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# Table of Contents

Synthesis, Mechanical and Tribological Characteristics of Immiscible Alloys ................................................................. 9  
SANJAY SRIVASTAVA ........................................................................................................................................................................ 9

Impact of Demographic Variables on Customer Satisfaction in Banking Sector – An Empirical Study ........ 23  
S. Vijay Anand, Dr. M. Selvaraj, Ph.D ........................................................................................................................................... 23

Design and Implementation of FMCW Radar Receiver in 65 nm CMOS Technology ...................................................... 30  
Neha Agarwal, Dwijendra Parashar ....................................................................................................................................... 30

Whither New Media Technologies in India? .............................................................................................................................. 35  
Dr. Chandra Shekhar Ghanta ..................................................................................................................................................... 35

Optimization of Convective Hot Air Drying of Ganoderma Lucidum Slices Using Response Surface Methodology ........................................ 38  
SiewKian Chin, Chung Lim Law .................................................................................................................................................... 38

Antifungal Properties of certain Plant Extracts against *Rhizoctonia Solani* Causing Root Rot of French Bean In Organic Soil of Manipur ................................................................................................. 49  
H.C. Mangang, G.K.N. Chhetry .................................................................................................................................................... 49

Assessment of Consumer Awareness amongst Undergraduate Students of Thane District- A Case Study .......... 53  
Indira Nair ........................................................................................................................................................................................................... 53

Performance Analysis of MIMO-OFDM System in Rayleigh fading Channel ............................................................... 60  
Prof. A.K Jaiswal, Er. Anil Kumar, Anand Prakash Singh .............................................................................................................. 60

PUBLIC PRIVATE PARTNERSHIP BASED SECURITY SYSTEM FOR WATER RESERVOIRS ........... 65  
P.P. Patil, Abhijit A. Patil, Mr. Hanmant N Renushe, Dr. B T Jadhav .............................................................................................. 65

Increasing the Performance of IEEE 802.11n in Multi Channel Multi Radio Mobile Ad hoc Networks ........ 69  
Zohaib Hasan Khan, Rajeev Paulus, Mukesh Kumar, Arvind Kumar Jaiswal ........................................................................... 69

Knowledge Discovery from Real Time Database using Data Mining Technique .......................................................... 74  
Smitha.T, Dr. V. Sundaram .............................................................................................................................................................. 74

Enhancement of Power Quality Using Active Power Filters .................................................................................................... 77  
G. Ravindra, P. Ramesh, Dr. T. Devaraju ...................................................................................................................................... 77

A survey on the Performance Optimization in Wireless Sensor Networks using Cross Layer Approach ........ 81  
Piyush Charan, Rajeev Paulus, Mukesh Kumar, Arvind Kumar Jaiswal ...................................................................................... 81

FRACTIONAL MELLIN INTEGRAL TRANSFORM IN (0, 1/a) ................................................................. 87  
S.M. Khairnar, R.M. Pise, J.N. Salunke ............................................................................................................................................ 87

Probe Feed Microstrip Patch Antenna Computer Aided Design Methodology .............................................................. 97  
N.T. Markad, Dr. R.D. Kanphade, Dr. D.G. Wakade ......................................................................................................................... 97

Effect of Parental Education on the Modernity of College Students of Ranchi Town ................................................. 103  

www.ijsrp.org
<table>
<thead>
<tr>
<th>Title</th>
<th>Authors</th>
</tr>
</thead>
<tbody>
<tr>
<td>CLASSIC 2 FLAVOUR COLOR SUPERCONDUCTIVITY AND ORDINARY NUCLEAR MATTER-A NEW PARADIGM STATEMENT</td>
<td>DR K N PRASANNA KUMAR, PROF B S KIRANAGI and PROF C S BAGEWADI</td>
</tr>
<tr>
<td>Job Satisfaction among Library Professionals in Haryana State</td>
<td>Somvir, Sudha Kaushik</td>
</tr>
<tr>
<td>Religion and Industrialization</td>
<td>Prof. Madya Dr. Md Golam Mohiuddin</td>
</tr>
<tr>
<td>A Robust Watermarking Technique Based on Discrete Cosine Transformation</td>
<td>Arathi Chitla</td>
</tr>
<tr>
<td>Preparation and Spectral Investigations of Neodymium Oxide doped Polymethylmethacrylate based Laser Material</td>
<td>Monika Chahar, Vazid Ali, Sushil Kumar</td>
</tr>
<tr>
<td>A REVIEW: THE STRUCTURAL INTERVENTION AND OD’S FUTURE</td>
<td>Gurveen Sandhu, Gurpreet Singh Mann, Rajdeep kaur Virk</td>
</tr>
<tr>
<td>Comparison of Exponential Companding Transform and Adaptive-ACE Algorithm for PAPR Reduction in OFDM Signal</td>
<td>Neelam Dewangan, Mangal Singh</td>
</tr>
<tr>
<td>ORAL HYGIENE AWARENESS AMONG TWO NON PROFESSIONAL COLLEGE STUDENTS IN CHENNAI, INDIA- A PILOT STUDY</td>
<td>Seenivasan MadhanKumar MDS, Venkatesan Singarampillay, Shanmuganathan Natrajan MDS</td>
</tr>
<tr>
<td>Biotransformation of a single amino-acid L-tyrosine into a bioactive molecule L-DOPA</td>
<td>Komal M Raval, Pooja S Vaswani and Dr. D.R Majumder</td>
</tr>
<tr>
<td>Effect of Nutrition Counseling on Junk Food Intake and Anthropometric Profile among Adolescent Girls of Working Mothers</td>
<td>Priya Singla, Rajbir Sachdeva and Anita Kochhar</td>
</tr>
<tr>
<td>SMART ANTENNAS IT’S BEAM FORMING AND DOA</td>
<td>SURAYA MUBEEN, DR.A.M.PRASAD, DR.A.JHANSI RANI</td>
</tr>
<tr>
<td>Multiple Slotted Antenna for WLAN/HIPERLAN/2/RADAR Applications</td>
<td>V.Anitha, S. Sri Jaya Lakshmi, J. Lavanya, Habibulla Khan, K. Sireesha, N. Divya Teja</td>
</tr>
<tr>
<td>The Effect of Arrowroot (Maranta arundinacea) Extract on the Survival of Probiotic Bacteria in Set Yoghurt</td>
<td>Nishani Abesinghe, Janak Vidanarachchi, Saliya Silva</td>
</tr>
<tr>
<td>DISASTERS STATISTICS IN INDIAN SCENARIO IN THE LAST TWO DECADE</td>
<td></td>
</tr>
</tbody>
</table>
Jyoti Purohit and C.R. Suthar

Improving the Transient and Dynamic stability of the Network by Unified Power Flow Controller (UPFC)...

K. Manoz kumar reddy

Production Management and Industrialization: A Divine Perspective

Prof. Madya Dr. Md Golam Mohiuddin

Design of a Robotic Arm for Picking and Placing an Object Controlled Using LABView

Shyam R. Nair

Design of a Humanoid Robot using High Speed Internet for Communication

Shyam R. Nair, Prof. Manjula Pramod

EVALUATION OF PEROXIDASES FROM VARIOUS PLANT SOURCES

Ila Bania and Rita Mahanta

PORTAL APPROACHES FOR DIGITAL LIBRARY OF INDIAN UNIVERSITIES

Nagaraja B. Naik, Vanaja D. Kuanri, Lokanatha C. Reddy

An Attempt to Analyze & Resolve the Pitfalls in CRM Software through Plug-In Instrumentation

Prasenjit Kundu, Debabrata Das

An Effective Way to Separate the Reflections from Polarized Images

S Nepoleon, N Banupriya, L Dinesh

AUTOMATIC TEXT SUMMARIZATION BASED ON PRAGMATIC ANALYSIS

MANISHA PRABHAKAR, NIDHI CHANDRA

Effective Diagnosis Management System (EDM): An Integrated System to closely monitor and Assist in Patient Diagnosis

Rahul Ramesh, Rajesh Rajendran, Sunitha R S

Minimization of Jamming Attack in Wireless Broadcast Networks Using Neighboring Node Technique

R.Priyadarshini, A.Prabhagaran, A.Lavanya, Asst,Prof.P.Boopathi

Type 0 Routing Header in IPv6

Sheenu Sharma, Pankaj Chauhan

Remote Client Authentication using Mobile phone generated OTP

Ms. Trupti Hemant Gurav, Ms. Manisha Dhage

Morphological Granulometric Feature of Nucleus in Automatic Bone Marrow White Blood Cell Classification

Shraddha Shivhare, Rajesh Shrivastava

Efficient In-Vitro Regeneration from Mature Leaf Explants of Mentha viridis L. Via Direct Organogenesis

Senthil K and KamaraJ M

Literature Survey on Offline Recognition of Handwritten Hindi Curve Script Using ANN Approach
Madhu Shahi, Dr. Anil K Ahlawat, Mr. B.N Pandey ................................................................. 362

Correlation of Plasma Apolipoprotein and lipid profiles with different stages of type 2 diabetic nephropathy- A Hospital based study in North Indian Population .................................................................................. 368

M.L Patel, Rekha Sachan, K. K. Gupta, Ravi Uniyal ........................................................................ 368

Prevalence and Predictors of Excessive Daytime Sleepiness in Obese Type 2 Diabetic Patients– A Tertiary Centre Experience .............................................................................................................. 374


Rhizosphere and non-rhizosphere microbial population dynamics and their effect on wilt causing pathogen of pigeonpea ......................................................................................................................... 378

T. Ranjana Devi and GKN Chhetry ........................................................................................................ 378

Business Process Reengineering for Indian Rural Health Care Sector using Data Envelopment Analysis Technique ........................................................................................................................... 382

G.M. Satyanarayana, H. V. Ramakrishna, C. T. Jayadeva ................................................................. 382

Design of a LabVIEW Based Real Time Simulator for ABS Tester ...................................................... 388

Shyam.R.Nair, Venkatesh Thalaimalayan .............................................................................................. 388

Media and Development Communication: A Perspective ....................................................................... 392

Malik Zahra Khalid .................................................................................................................................. 392

Reasons of Mobile Calls Drop so Frequently ....................................................................................... 397

Pragyan Verma, Sattyam Kishore Mishra, Preeti Sharma ...................................................................... 397

Heavy Mineral distribution studies in different micro-environments of Bhimunipatnam coast, Andhra Pradesh, India ........................................................................................................................................ 399

N. Rao Cheepurupalli1, B. Anu Radha2, K.S.N. Reddy1, E.N. Dhanamjayarao1, A.M.Dayal2 ...... 399

The Change of Religion and Language Composition in the State of Assam in Northeast India: A Statistical Analysis Since 1951 to 2001 ............................................................................................................ 409

Dr.Bhupen Kumar Nath*, Prof. Dilip C Nath** .................................................................................... 409

Parental Control algorithm for Sybil detection in distributed P2P networks ........................................ 415

Ankush Tehale, Amit Sadafule, Swapnil Shirsat, Rahul Jadhav, Satish Umbarje, Sandip Shingade .............................................................................................................................. 415

Taxonomical study of Software Reliability Growth Models ...................................................................... 420

Tariq Hussain Sheakh1, VijayPal Singh2 .................................................................................................... 420

Simulation of Optimal Power Flow incorporating with Fuzzy Logic Control and various FACTS Devices.... 423

EaswaraMoorthy Nanda Kumar1, Dr. R. Dhanasekaran2, Sundararaj Nanda Kumar1 ....................... 423

APPLICATIONS OF THE LAPLACE-MELLIN INTEGRAL TRANSFORM TO DIFFERENTIAL EQUATIONS ................................................................................................................................. 428

S.M.Khairnar, R.M.Pise* , J.N.Salunke** .................................................................................................. 428

Enhanced File Searching in Peer-2-Peer Network ..................................................................................... 436
Miss Priyanka Sahu, Mr. Brajesh Patel ................................................................. 436

Use of RFID for Safety at School/Hospital Campus ........................................... 440
Sushil I. Bakhtar¹ and Prof. Ram S. Dhekekar² .................................................... 440

Cyber Ethic’s infusion- a socio-cultural study of the youth and risk in the perception of Teachers ........................................................ 444
Lourdu Vesna.J ........................................................................................................ 444

A Novel and Efficient KNN using Modified Apriori Algorithm ....................... 448
Ritika Agarwal, Dr. Barjesh Kochar, Deepesh Srivastava .................................. 448

Traffic Generator Based Performance Evaluation of Proactive and Reactive Protocols of Mobile Ad-Hoc Networks ............................................................... 453
Megha Rastogi, Kamal Kant .................................................................................. 453

Factors Influencing Cropping Pattern in Bulandshahr District- With Special Reference to the Size of Land Holding ................................................................. 457
Gomatee Singh ........................................................................................................ 457

Comparison of Image Compression using Wavelet for Curvelet Transform & Transmission over Wireless Channel ................................................................. 467
Nilima D. Maske, Wani V. Patil ............................................................................. 467

Analysis & Proposed Model of Maintenance & Replacement Policies in Fleet Management System Using Data Mining ......................................................... 472
Er.Siddharth Arora, Er. Parneet kaur ..................................................................... 472

The Role of ‘Thinking Styles’ and ‘Creativity’ in bringing about Organizational Change ................................................................. 475
Prof. Dora Thompson, Prof.Manish Tongo, Prof.Mamta Chhabriya ........................ 475

Mass Media utilization pattern of farm Women ................................................... 480
Deepika Sharma .................................................................................................... 480

Voice Synthesis Using Wavelet Transform ........................................................ 483
Manvendr, A.K.Jaiswal, Mukesh Kumar, Alok Singh ........................................... 483

Survey on Consumption of Insecticides for Control of Mosquito as Vector (Order: Diptera) In Vadodara, Gujarat, India ......................................................... 490
Anita Singh, Suchi Gandhi ..................................................................................... 490

Compact Notch Loaded Microstrip Patch Antenna for Wide Band Application .......... 499
Saurabh Sharma, Anil Kumar, A.K. Jaiswal, Ashish Singh ..................................... 499

DATA SECURITY IN CLOUD .............................................................................. 506
Leena, Mrs A. Kakoli Rao, Chitra Kapoor ............................................................. 506

THE CONCEPT OF NADA AND BINDU IN TIRUMANTIRAM................................. 511
Nirmala.V ............................................................................................................... 511

A Study of Road Traffic Noise Annoyance on Daily Life in Agartala City Using Fuzzy Expert System and Multiple Regression Analysis ............................. 514

www.ijsrp.org
Debasish Bhattacharya and Debasish Pal

Correlation of Plasma homocysteine levels with BMI and Insulin Resistance, amongst Obese, Overweight and Non Obese Infertile Women

Sachan Rekha*, Patel ML**, Gupta Pooja*, Sachan Pushpalata***, Natu SM****, Pradeep Y*

Twilight - An Academic Web Portal for Department

Imran Tamboli, Amit Kanbarkar, Akshay Kotasthane, Arunkumar Patel, Sagar Rajebhosale

Mobile Computing

Ms. Deepa H. Kulkarni

Identification of Various Parameters for Designing A Decision Support System to Propose A Suitable Architecture for Cloud Computing

Bindia, Bhupesh Thakur

EXPLORATION OF SOME WILD EDIBLE PLANTS OF DIGRAS TAHSIL, DIST. - YAVATMAL, MAHARASHTRA, INDIA


Horizontal Fragmentation Technique in Distributed Database

Ms. P. R. Bhuyar

Dr. A. D. Gawande

Prof. A. B. Deshmukh

A Technique for Constructing Odd-order Magic Squares Using Basic Latin Squares

Tomba I.

Research Agenda: Behavioural Business Intelligence Framework for Decision Support in Online Retailing in

Archana Shrivastava, Dr. Ujwal Lanjewar

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Synthesis, Mechanical and Tribological Characteristics of Immiscible Alloys

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Abstract- A modified impeller mixing coupled with chill casting technique was used for the preparation of immiscible alloys. In this paper Al-Fe binary alloys was chosen for this study. This binary system shows the miscibility gap at specified concentration and temperature. The electrolytic grade iron powder of 300mesh size was dispersed in the melt of commercially pure aluminum. The iron content in the composite varied from 1.67 to 11.2 wt%. Experimental quantitative expressions, which correlate UTS, yield tensile strength, elongation, wear volume and frictional coefficients to the presence of iron in the matrix, have been determined. The presence of iron in the composite improved the ultimate tensile strength, 0.2% proof stress and the hardness. The ductility showed the adverse effect with increase of the iron content in the matrix. The results from microstructure showed the presence of second phase particles at the grain boundaries of aluminum-rich phase as well as within the grain itself which was confirmed by EPMA line as well as XRD analysis. The experimental data refer to correlation with the directional transient solidification of hypereutectic Al-Fe alloys and the percentage of the iron in the matrix. These composite have also been subjected to wear and friction testing at different operating parameters. The XRD analysis was used to analyze the wear debris.

Index Terms- Al-Fe composite, Liquid Metallurgy, Wear, Friction, Worn surface

I. INTRODUCTION

There are a number of elements which are not soluble in the aluminum matrix. These elements may be either soft element or hard elements, depends upon the nature of the elements taken. They exhibit two immiscible liquid phases within a certain temperature range. However, the different density of these liquid phases leads, to the formation of two layers. This prevents the homogeneous distribution of particles in a matrix using simple and inexpensive casting processes. Therefore, the industrial exploitation of such alloys has also been limited so far. Immiscible alloys have been studied intensively for the last decades, mainly focusing on two aspects: the fundamental mechanism of secondary phase segregation/coarsening; and mixing approaches for the fabrication process. The development of immiscible alloys has been largely constrained by the conventional equilibrium processing, which generally results in gross segregation due to the wide miscibility gap, and high disparity in the densities and melting temperatures between the immiscible elements. For example, aluminum alloys with proper distribution of lead have potential as materials for plain bearings, because of the lubrication ability of lead in the aluminum matrix. However, owing to the immiscibility of lead phase in the Al matrix the grossly segregated lead may sometimes act as a kind of inclusion.

The idea is to obtain aluminum matrix with finely distributed particles of e.g. indium, bismuth or lead as a soft phase or iron, nickel or cobalt as a hard phase with lubricating function. However this is still far from the practical application because the miscibility phenomenon poses problems during solidification. A miscible gap in the liquid state is found in metal-metal systems such as Al-Bi, Al-Pb, Cu-Pb, Zn-Pb, Ga-Pb etc. A typical equilibrium phase diagram is shown in Figure 1. By means of a rapid solidification technique, Al-based (Al–In Pb Sn Cd) 7-8 and Cu-based (Cu–Pb, Cu–Pb–Sn) alloys have been synthesized with uniform distributions of the fine immiscible particles embedded in the matrix, indicating that the microstructure could be considerably refined compared with conventionally processed materials. Similar to rapid solidification, ball-milling is another effective nonequilibrium process for producing novel materials. Both Cu-Fe and Cu-V alloy system have significantly asymmetric phase diagram.
happens for the Cu-V alloy. Al–Fe alloys are attractive for applications at temperatures beyond those normally associated with the conventional aluminum alloys. Allo ying Al with Fe increases the high temperature strength due to the dispersion of second phase particles.

Unfortunately, the equilibrium solubility of Fe in the Al lattice is very low, and it does not exceed 0.03%. Two points are to be noted: (1) the solubility of Fe in Al is extremely small; only 0.04 wt% Fe at 655°C and decreasing to virtually zero at room temperature; and (2) the second equilibrium eutectic phase is the intermetallic phase FeAl₃ as shown in Figure 2. The miscibility gap is found between the variable percentages of aluminum. Hence, these alloys cannot be precipitation strengthened by conventional ageing treatments. The strengthening effect can be enhanced by increasing the solid solubility of Fe in the Al matrix by some nonequilibrium processing techniques, viz. rapid solidification processing (RSP), mechanical alloying (MA) and severe plastic deformation (SPD).

The focus has increasingly shifted toward discontinuously reinforced composites as a competition to continuous fibre reinforced composites from the standpoint of isotropic mechanical properties. PMMCs have been shown to offer improvements in strength, wear resistance, structural efficiency, reliability, and control of physical properties such as density and coefficient of thermal expansion. The strength of PMMCs increases with decreasing reinforcement size, however the fine size and larger volume fractions lead to severe agglomeration of the discontinuous reinforcement.

The study of the tribological behavior of materials can bring important contributions to fuel consumption reduction and to damage prevention during the service of components and equipment. Rao et al. state that the strain-hardening tendency of Al-Si alloys depends on the DAS and that the size of the eutectic silicon governs the wear behavior of these alloys. Kori et al. studied the influence of the grain refiner on the wear resistance of as-cast Al-Si alloys and found that the reduction of the DAS improves the wear resistance due to both the production of more homogeneously distributed Si particles and the refinement of these particles.

The present article aims to contribute to better understanding of the interrelation between presence of the hard particles in the matrix and the corresponding mechanical properties and wear behavior. In the present work, Al-Fe composites are being produced by liquid metallurgical route.

II. EXPERIMENTAL PREPARATION OF Al-Fe COMPOSITE

Selection of materials and procedure for preparation

Commercially pure aluminum (99.8%), electrolytic iron powder of 50 μm size was selected for the preparation of Al-Fe composites with different compositions.

The experimental setup used for mixing and casting of composites is shown in Figure 3. It comprises of a cylindrical sillimanite crucible of 150mm diameter and 250mm depth with attachment of four baffles to its sidewalls for proper dispersion of second phase in melt during stirring. The crucible was placed in an electric heated muffle furnace. It was also equipped with a bottom pouring attachment, which could be closed or opened by graphite stopper with a lever system.
A steel mould was placed beneath the furnace to cast the molten metal. In the top cover suitable opening was provided to charge materials and insert thermocouples. The temperature of the furnace could be controlled with an accuracy of about ±5°C. Metallic bath temperature was measured continuously by chromel/alumel thermocouple. The agitator system could be raised or lowered with the help of the hanger and steel frame structure. After adjusting the mixer in a central position and required height from the bottom of the crucible, the motor was bolted and locked while mixing of melt. Three-blade impeller was used for effective mixing. This design provides very high rates of shear and only axial and radial flow currents are utilized for mixing without any significant vortex formation due to the presence of baffles. The Al-Fe composites were prepared employing liquid metallurgical route. The required amount of commercial pure aluminum was charged into the crucible and aluminum was heated to a temperature 200°C above its melting point i.e. 662°C. A mechanical stirrer was inserted into the melt, and agitation was started at a speed of 35 rotations per second. The 50-μm-size electrolytic grade iron powder was charged into the melt during stirring and the addition of the particulate into the melt was facilitated by vortex created by stirring action. Mixing was done for a period of 60 seconds. The emulsion was poured into the chilled cylindrical mould placed beneath the crucible. The same procedure was adopted for different compositions. Cylindrical casting of length 20cm and dia.2cm were obtained.

Evaluation of as-cast Properties of the Composite

The wet chemical analysis was used to determine the percentage of iron in the bulk. The EDAX analysis was done as a confirmation test to iron presence. EPMA has been used to trace out the presence of iron which is either present at the grain boundary or within the grain of the composite. X-ray diffraction analysis was carried out for phase analysis.

The metallographic specimens were prepared using standard technique and studied under SEM for different feature present. The densities of the composite were determined using Archimede’s principle. The hardness of the entire composite was measured using a Vickers hardness testing machine. The hardness was measured using Vickers hardness instrument Leitz Welzlar at a load of 49N. At least 3 indentations have been taken for each point. Tensile testing of all the Al-Fe composite was performed stress along with percentage elongation and reductions in area were computed from the results. During tensile testing evaluation of the composite materials, the strain rate was kept 2.5s⁻¹.

Wear test
A pin-on-ring configuration utilized in earlier studies was used to simulate the sliding wear behavior between the sheave wheel and cable. A pin on disc apparatus Figure 4 was used to investigate the dry sliding wear characteristics of the aluminium alloy and the composites. The cylindrical test pin of 10 mm diameter and 40 mm length were used against a hardened steel disc of 120 mm diameter.

Wear specimens of 10 mm diameter and 40 mm height were cut from as cast samples and machined and polished for wear test. Wear tests were conducted with a variable applied pressure of 14 Mpa and a sliding speed of 0.5 m/s with a constant sliding distance of 2500 meters. Wear test were also conducted with selected varying speeds and sliding distance ranging up to 40000 meters. The initial weight of the specimen was determined in a digital balance with a precision of ± 0.1 mg. The pin was kept pressed against a rotating steel disc of hardness 58 HRC under loaded condition.
Figure 5: Pin-on-ring configuration used to evaluate the sliding wear resistance of the candidate materials and coatings

Figure 5 shows the basic pin-on-ring configuration used with the pneumatically loaded pin forced onto the rotating ring. During the sliding wear tests, an initial wear-in period was used to allow the pin to conform to the curved surface of the ring as shown in the figure. Since the ring was rotated at a constant speed, the total sliding distance was calculated from knowledge of the ring diameter (12 cm) and the test duration of the pins in contact with the steel disk. The length of contact time between the pin and disk varied depending on the time required before the onset of chattering. Lubrication was not used during any of the wear tests conducted during this study. Before each wear test, the dimensions of the pins were carefully measured to calculate the exact surface area and corresponding load required to maintain a desired interfacial nominal pressure of 13.9 Mpa. However, all pins had a pre-wear surface area (apparent) of approximately 0.32 cm$^2$. It was determined that the increase in surface area of the pins after conforming to the wear surface on the ring was negligible due to the relatively large wear ring diameter.

On completion of the running through the required sliding distance the specimen pins were cleaned with acetone, dried and their weight were again determined for ascertaining the weight loss. After each wearing interval, the pin was cleaned, weighed, and then positioned back in the wear tester for another wear interval. After sufficient data were collected for a particular pin and linearity established, the wear ring was re-ground to remove any adhered materials. If it was the last run for a particular pin, a new ring was implemented for the next series of tests. The frictional traction encountered by the pin in sliding is measured by a PC based data logging system. Tribological testing was conducted at varying sliding distances, applied loads and sliding velocities. In this experiment, the velocities were varied from 0.732 m/sec to 3.82 m/sec and the loads were varying from 9.8N to 49N.

III. RESULT AND DISCUSSION

Chemical Analysis

Volumetric method is one of the most versatile techniques for the determination of element present at the microscopic level. In Al-Fe composites, iron is the minor constituent phase. Its percentage is determined by using the volumetric titration method. Specimens from different sections were used to find out the uniformity of dispersion and results are tabulated in Table 1. Further to confirm the presence of iron in the composites, energy depressive X-ray analysis (EDAX) was also used. Figure 6 and 7 shows the EDAX monographs of composite with two different compositions. In these monographs larger peaks correspond to aluminum and smaller ones to iron. It confirms the presence of iron in the Al-Fe composite. The results were also confirmed with EPMA and EDAX analysis.
Physical and Mechanical analysis

Tables 1 show the physical properties of the different Al-Fe composites. It is observed from the table that the density increased from 2.79 to 3.08 as the iron content varied from 6.32 to 11.2%. The mechanical properties of the composites are tabulated in Table 2. There is slight increase in the ultimate tensile strength (142 to 184MPa) 0.2% off-tensile stress (59 to 83MPa) as the iron content increased from 1.67 to 11.2% wt in the composite, providing a strengthening effect. However percentage elongation decreased from 32 to 17 with increase in the iron from 1.67 to 11.2wt.%. Table 2 also shows the hardness values for all the four composites with different compositions. Hardness of the composites increases from 95 to 179 with increase in iron content from 1.67 to 11.2%. The mechanical properties of cast aluminum are adversely affected by the presence of iron as large primary or pseudo-primary crystals.

Metallographic Analysis

Figure 8 (a) to (d) show the optical micrographs of composites with 1.67 to 11.2%Fe at same magnifications. These figures clearly reveal the presence of larger amount of second phase particles. These second phase particle exist in the elongated form.

Table 1. Chemical composition and Physical properties of Al-Fe composites

<table>
<thead>
<tr>
<th>Composite</th>
<th>wt.% Fe</th>
<th>wt.% Al</th>
<th>Density (Theoretical) g/cm³</th>
<th>Density (Experimental) g/cm³</th>
</tr>
</thead>
<tbody>
<tr>
<td>Al-1.67% Fe</td>
<td>1.67</td>
<td>Remainder</td>
<td>2.79</td>
<td>2.63</td>
</tr>
</tbody>
</table>
Table 2: Mechanical properties of the Al-Fe composite

<table>
<thead>
<tr>
<th>Composite</th>
<th>HV</th>
<th>UTS (MPa)</th>
<th>0.2%PS (MPa)</th>
<th>Elongation (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Al-1.67% Fe</td>
<td>95</td>
<td>142</td>
<td>59</td>
<td>32</td>
</tr>
<tr>
<td>Al-3.36% Fe</td>
<td>131</td>
<td>153</td>
<td>70</td>
<td>30</td>
</tr>
<tr>
<td>Al-6.23% Fe</td>
<td>163</td>
<td>159</td>
<td>74</td>
<td>27</td>
</tr>
<tr>
<td>Al-11.2% Fe</td>
<td>179</td>
<td>184</td>
<td>83</td>
<td>17</td>
</tr>
</tbody>
</table>

Figure 8: Optical micrographs of (a) Al-1.67%Fe (b) Al-3.36%Fe (c) Al-6.23%Fe (d) Al-11.2%Fe composite
These elongated forms appear in the needle shape at higher magnification and at the higher percentage of iron content. The needle shape intermetallic increases with increasing iron content. All the composites were also studied under SEM for further investigation of the microstructures. Figure 9 a to d shows the SEM micrographs of all the composites. At the lower magnification, clusters of Al-Fe intermetallics were seen, but at the high magnification (only given at the higher magnification), needle shape intermetallics were clearly visible.

XRD analysis was conducted for all the four compositions produced with different iron percentage. These composite were fabricated by chill casting methods. The iron particles are uniformly distributed within the matrix by sudden cooling. XRD monographs for different compositions are shown in Figure 10 a to d for all composition of the selected composite materials. In these curves large peaks correspond to major phase aluminum and smaller one corresponds to FeAl$_3$. Analysis of the Al–Fe composite materials fabricated from liquid metallurgy methods, the prepared system (i.e., composite materials) bearing 0.3 – 1.5 at.% Fe has shown that their structure is represented by a supersaturated solid solution of iron in aluminum, which decomposes after heat treatment.

Figure 9: SEM micrographs of (a) Al-1.67%Fe (b) Al-3.36%Fe (c) Al-6.23%Fe (d) Al-11.2% Fe composite.
yielding an equilibrium FeAl$_3$ phase (shown in Figure 8a or 9a). But these are again confirmed from the XRD investigation. At the lower percentage of the iron in the matrix, the peak of FeAl$_3$ along with aluminum is present as shown in Figure 10a and b. But during casting aluminum gets oxidized to alumina. The XRD micrographs are also contained the peak of alumina.

When the concentration of the alloying additive (Fe) is increased from 2 to 9.5 at %, extremely rapid hardening yields a metastable crystalline intermetallic FeAl$_6$ phase in addition to the aluminum-base supersaturated solid solution. Iron in the aluminum forms an intermetallic compound such as FeAl$_3$ as shown in Figure 8c and d.

Wear studies

The wear is the sliding phenomenon, in which the material is totally lost from the surface. The wear rate is calculated from the following formula:

\[
\text{Wear rate} = \frac{\text{loss of volume}}{\text{area} \times \text{sliding distance}}
\]

The unit of wear rate in this case is m$^3$/m$^3$. The variation of bulk wear with sliding distance was studied at different combination of loads and velocities. Figure 11 shows results of bulk wear for a test conducted at 0.37 MPa load and 0.772 m/s sliding velocity. The bulk wear is computed in terms of only volume loss. It is seen that the initial running-in period is followed by steady state wear for all the composites. The bulk wear continuously decreases with increase in iron content.
Figure 11: Variation of bulk wears with sliding distance at 3 kg load and 0.772 m/s sliding velocity for as-cast Al-Fe composites. Steady state wear is observed after initial running-in period of 500-1000m in almost all the case irrespective of load or sliding velocity used. Al-11.2 %Fe showed lower bulk wear among all the composite which may be due to higher amount of hard phase formation increasing the overall hardness of the composite material. The relation found here is in accordance with the pattern for most metallic materials derived theoretically as well as observed experimentally.24, 33 However, at higher combination of load and sliding velocity bulk wear is higher for all the four composite.

The studies conducted to see the effect of applied load on wear rate revealed that wear rate increased continuously with load in a linear manner irrespective of the sliding velocity5, 13 used as it is evident from Figure 12 at a particular velocity. Figure 13 shows the variation of wear rate with sliding velocity at 1kg load. Like other aluminum alloys/composite, Al-Fe composite showed an initial decrease in wear rate followed by a sharp increase in wear rate after attaining minima in wear rate for all the composites at different loads. But in all the case wear rate decrease with increase in iron content for all combination of loads and sliding velocities used 12, 19, 34. Figure 14 a and b shows the SEM study of the wear track of Al-11.2 wt% Fe at a different load. Wear debris are also examined with SEM. Debris of Al-Fe composite at a distance of about 1430m shows mainly oxidative nature and wear track is smooth with thin oxide layer, however at a distance of about 4000m debris comprised of different oxides with metallic particle and wear track was observed with thick oxide layer with deeper track as shown in Figure 14 b.

Figure 12: Variation of wear rate with load for Al-Fe composites.

Figure 13: Variation of wear rate with sliding velocity at 1 kg load for Al-Fe composites.
Figure 14: SEM micrographs of wear tracks of Al–11.2 wt. % Fe composite for 0.772 m/s sliding velocity and different sliding distance of (a) 1430m and (b) 4000m

Figure 15: SEM micrographs of wear tracks of Al–11.2 wt. % Fe composite for 0.772 m/s sliding velocity and different loads of (a) 2.0 kg and (b) 5.0 kg.

Figure 16: SEM micrographs of wear tracks of debris of Al–11.2 wt. % Fe composite for 3.24 m/s sliding velocity and different loads of (a) 2.0 kg and (b) 5.0 kg.
SEM images of the transverse section of the worn surface showed that the build up of oxide layer depending on sliding distance, composition, applied load and sliding velocity. In mild wear region after large sliding distance cracking and spalling of oxide layer is observed on the wear track which turns into deep groove after large sliding distance for all Al-Fe composite. The higher percentage of oxide layer is formed in sample with lower iron content in comparison to the samples of higher Fe-content. The oxidation of the worn surface depends upon the hardness of the materials. The hardness of the materials varies with iron content in the materials. Al-11.2% Fe shows the maximum hardness and they have capability to sustain the load. This increases the bulk hardness of composite from 95 to 179 VHN with iron percentage increase from 1.67 to 11.2%, hence improving the wear resistance of composites with increase in percentage iron for all case irrespective of load and sliding velocity.

XRD examination of wear debris shows the diffraction peaks corresponding to coexisting aluminum and alumina, different oxide of iron as well as the peaks of iron as shown in Figure 17. The main peak of the alumina are found at 37.6°(hkl: 213) and 37.8° (hkl: 109) and the different oxides of the iron at 33.18 and 35.46°. The peak of the iron is present at 44.67°.

Friction Studies:

The character of friction variation with sliding at the specific load (i.e 10N) is illustrated in Figure 18. The fig shows is graphically representation of the results obtained from the friction experiment at a fixed load and sliding velocity. It is evident from the Figure 18 the friction coefficient drastically decreases during the running in period. During the steady state period the friction coefficient is being stabilized. The friction behavior also varies with applied load. The average value of the friction coefficient at normal load is shown in Figure 19. In accordance with the figure the increase of the friction coefficient corresponds to increase of the normal load. The increase rate is especially evident for load change from 15 to 30 N.

Diagrams in Figure 20 show the dependence of the steady-state friction coefficient on the sliding speed, for various loads in dry sliding conditions. The nature of the dependence, in all the tested composite materials, manifests as decrease of the friction coefficient with increase of the sliding speed. The degree of change is especially prominent in the region of lower values of speeds.

The worn surfaces of the samples from the SEM examination are shown in Figure 21. The worn surfaces of the Al-11.2 wt% Fe samples were noticed to be smoother than those of the Al-1.67 wt %Fe. Generally, the parallel ploughing grooves and scratches can be seen over all the surfaces in the direction of sliding. These grooves and scratches resulted from the ploughing action of asperities on the counter disc of significantly higher hardness.

It can be noticed from the figure that for all the contact loads, the friction coefficient of Al-11.2%Fe is found to be low in comparison to the other composite. Al-11.2 wt% Fe showed higher hardness and from the metallographic observation indicated is uniformly distribution of FeAl₃ within the composite. The iron intermetallic with aluminum has higher hardness and also bear the maximum load. Therefore it acts as lubricant in the materials. It bears maximum amount of the load due to formation of hard intermetallic from the solidification of the melts. Therefore it reduces the wear rate.
Figure 19: Coefficient of friction vs. applied load for Al-Fe composite at 0.932 m/sec.

Figure 20: Friction coefficient vs. sliding speed of Al-Fe composite at different applied loads: 10N (b) 20N (c) 50N

Figure 21: Worn surface of the Al-Fe composite tested in dry lubricated sliding condition for 50 N of applied load and 0.26 m/s of sliding speed during friction experiment.

IV. CONCLUSION

It can be observed from the present investigation that iron could be successfully and uniformly distributed in aluminum using impeller mixing chill casting technique. UTS, 0.2%PS and VHN increased with increase the volume fraction of the iron in the matrix. The Al-11.2%Fe composite showed higher percentage of elongation while compared to Al-6.23% Fe. Finally the increase in iron content in the matrix supports the formation of different type of intermetallic. This intermetallic increased with volume fraction of iron in the matrix. Wear rate with sliding distance showed almost linear relationship for fixed load and sliding velocities. Wear rate of the composite materials initially decrease with sliding velocity and attains a minima in wear rate and then increases with further increase in sliding velocity.
REFERENCES

Impact of Demographic Variables on Customer Satisfaction in Banking Sector – An Empirical Study

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**Professor and Director, Sona School of Management, Sona College of Technology, Salem 636 005, Tamilnadu India

Abstract- For every organization, customer satisfaction plays vital roles that enhance loyalty and profit. Earlier all sectors focused on Market Orientation, but now they should focus on Customer Orientation for their growth in the competitive market. Due to rapid changes in technology and competition among the banking sectors, it is inevitable for the service organization to study the impact on customer satisfaction. The purpose of this paper is to evaluate the impact of demographic variables on customer satisfaction in public sector bank. Chi Square test, Descriptive analysis and Weighted score method was applied. The result revealed that there is no significant relationship between the demographic variables and customer satisfaction except the choice of the bank and the status of residential area.

Index Terms- Customer Satisfaction, Competition, demographic variables, Imperial Bank, Behavioral intention

I. INTRODUCTION

The East India Company laid the foundations for modern banking in the first-half of the 19th century with the establishment of the following three banks:
1) Bank of Bengal 1809
2) Bank of Bombay 1840
3) Bank of Madras 1843

In 1955, the State Bank of India Act was passed. Accordingly the “Imperial Bank” was nationalised and “State Bank of India” emerged with the objective of banking facilities on a large scale. Specifically in the rural and semi-urban areas and for various other public purposes. State Bank of India being a “Bankers Bank” acts as agent of the RBI at the places where the RBI has no branch. Accordingly, it renders the following functions:
1) Banker to the government
2) Banker to bankers in the limited way
3) Maintenance of Currency chest
4) Acts a clearing house
5) Renders promotional functions

In Salem District, State Bank of India comprises with 31 Branches including all categories like Metro, Urban, Semi Urban and Rural.

State Bank of India, Mohan Nagar Township Branch was started under rural category on 14.12.1979.

II. OBJECTIVES

1. To exhibit the profile of the customers
2. To study the association between the demographic variables and it impact on customer satisfaction.

III. LITERATURE REVIEW

There is a significant difference between public and private banks with regard to customer satisfaction, commitment and loyalty banks should focused on assurance-empathy, tangibles and the private sector should focus on providing reliable services (Sandip Ghosh Hozra, Dr.Kailash B.L. Srivastava May 2010) Service quality, Corporate image and Customer perceived value has a significant influence consumer behavioural intention (Ahmed Audu Maiyaki and Dr. Sany Sanuri Mohd. Mokhtar (2011) Reliability and competitiveness have the maximum impact on customer satisfaction. Banks need to be more innovative and endeavour to provide more value added services to boost the satisfaction level of customers. In Banks (H. Premraj and Dr. N. Sankaralingam (2012) Improving service quality can increase favorable behavioural intentions (S.Arun Kumar, B. Tamilmani, S. Mahalingam and M. Vanjikovan 2010) Service quality is a significant determinant of customer satisfaction in Indian banking industry irrespective of public and private sector banks(Monica Bedi 2010) There is no significant difference in the level of satisfaction of the respondents belonging to different age, education and occupation except income (R. Elangoan and K. Sabitha( 2011))

As most of the studies have done with the impact of customer satisfaction on loyalty and Behavioural intention, this paper attempted to study the impact of demographic variables on customer satisfaction.

IV. METHODOLOGY OF STUDY

To accomplish the aforementioned research objectives, Data are collected from a structured questionnaire survey of 50 customers from State Bank of India, Mohan Nagar Township Branch, and Salem District. They were asked to evaluate their satisfaction of services with the bank.

Percentage analysis, Chi Square Test, Descriptive analysis and Weighted score method have been applied for the data analysis.
### V. Demographic Profile of the Sample Respondents

<table>
<thead>
<tr>
<th>Sl. No</th>
<th>Demographic Variables</th>
<th>Number of respondents (n=50)</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>01.</td>
<td>Age:</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Between 20-30</td>
<td>20</td>
<td>40%</td>
</tr>
<tr>
<td></td>
<td>31-40</td>
<td>9</td>
<td>18%</td>
</tr>
<tr>
<td></td>
<td>41-50</td>
<td>10</td>
<td>20%</td>
</tr>
<tr>
<td></td>
<td>51-70</td>
<td>11</td>
<td>22%</td>
</tr>
<tr>
<td>02.</td>
<td>Gender</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Male</td>
<td>38</td>
<td>76%</td>
</tr>
<tr>
<td></td>
<td>Female</td>
<td>12</td>
<td>24%</td>
</tr>
<tr>
<td>03.</td>
<td>Marital Status</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Unmarried</td>
<td>38</td>
<td>76%</td>
</tr>
<tr>
<td></td>
<td>Married</td>
<td>12</td>
<td>24%</td>
</tr>
<tr>
<td>04.</td>
<td>Educational Qualification</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>1-5&lt;sup&gt;th&lt;/sup&gt; std</td>
<td>3</td>
<td>6%</td>
</tr>
<tr>
<td></td>
<td>6-10&lt;sup&gt;th&lt;/sup&gt; std</td>
<td>19</td>
<td>38%</td>
</tr>
<tr>
<td></td>
<td>11-12&lt;sup&gt;th&lt;/sup&gt; std</td>
<td>7</td>
<td>14%</td>
</tr>
<tr>
<td></td>
<td>Degree</td>
<td>17</td>
<td>34%</td>
</tr>
<tr>
<td></td>
<td>Postgraduate and above</td>
<td>4</td>
<td>8%</td>
</tr>
<tr>
<td>05.</td>
<td>Type of family</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Single</td>
<td>23</td>
<td>46%</td>
</tr>
<tr>
<td></td>
<td>Joint</td>
<td>27</td>
<td>54%</td>
</tr>
<tr>
<td>06.</td>
<td>Dependents in Family</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>One</td>
<td>26</td>
<td>52%</td>
</tr>
<tr>
<td></td>
<td>Two</td>
<td>20</td>
<td>40%</td>
</tr>
<tr>
<td></td>
<td>Three &amp; above</td>
<td>4</td>
<td>8%</td>
</tr>
<tr>
<td>07.</td>
<td>Occupation</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Agriculture</td>
<td>8</td>
<td>16%</td>
</tr>
<tr>
<td></td>
<td>Business</td>
<td>15</td>
<td>30%</td>
</tr>
<tr>
<td></td>
<td>Public</td>
<td>9</td>
<td>18%</td>
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<tr>
<td></td>
<td>Private</td>
<td>12</td>
<td>24%</td>
</tr>
<tr>
<td></td>
<td>Others</td>
<td>6</td>
<td>12%</td>
</tr>
<tr>
<td>08.</td>
<td>Income</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Below 5000</td>
<td>1</td>
<td>2%</td>
</tr>
<tr>
<td></td>
<td>5001-10000</td>
<td>12</td>
<td>24%</td>
</tr>
<tr>
<td></td>
<td>10001-30000</td>
<td>9</td>
<td>18%</td>
</tr>
<tr>
<td></td>
<td>Above 30000</td>
<td>28</td>
<td>56%</td>
</tr>
<tr>
<td>09.</td>
<td>Information about SBI Schemes</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Newspaper</td>
<td>4</td>
<td>8%</td>
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<tr>
<td></td>
<td>Media</td>
<td>6</td>
<td>12%</td>
</tr>
<tr>
<td></td>
<td>Direct visit</td>
<td>40</td>
<td>80%</td>
</tr>
<tr>
<td>10.</td>
<td>Minimum investment</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Upto 5000</td>
<td>15</td>
<td>30%</td>
</tr>
<tr>
<td></td>
<td>5001-10000</td>
<td>13</td>
<td>26%</td>
</tr>
<tr>
<td></td>
<td>10001-50000</td>
<td>9</td>
<td>18%</td>
</tr>
<tr>
<td></td>
<td>50001-100000</td>
<td>13</td>
<td>26%</td>
</tr>
<tr>
<td>11.</td>
<td>Frequency of visit to SBI</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Everyday</td>
<td>4</td>
<td>8%</td>
</tr>
<tr>
<td></td>
<td>1-2 times/week</td>
<td>12</td>
<td>24%</td>
</tr>
<tr>
<td></td>
<td>1-2 times/fortnight</td>
<td>8</td>
<td>16%</td>
</tr>
</tbody>
</table>
**CHI-SQUARE ANALYSIS:**

1. **Association between the status of area and frequency of Visit to Bank:**

   \( H_0: \) There is no significant relationship between status of the area and frequency of visit to bank.

   \( H_1: \) There is a significant relationship between status of the area and frequency of visit to bank.

   It is seen that the ChiSquare value is 13.225 and the Asymp sig value is 0.104 which is greater than the critical value \((P=0.05)\). Hence null hypothesis is accepted and there is a no significant relationship between status of the area and frequency of visit to bank.

2. **Association between Gender and frequency of visit to bank:**

   \( H_0: \) There is a no significant relationship between Gender and frequency of visit to bank.

   \( H_1: \) There is a significant relationship between Gender and frequency of visit to bank.

   It is seen that the Chi-Square value is 7.739 and the Asymp sig value is 0.102 which is greater than the critical value \((P=0.05)\). Hence null hypothesis is accepted and there is a no significant relationship between Gender and frequency of visit to bank.

3. **Association between Occupation and Frequency of Visit to Bank:**

   \( H_0: \) There is a no significant relationship between Occupation and frequency of visit to bank.

   \( H_1: \) There is a significant relationship between Occupation and frequency of visit to bank.

   It is seen that the Chi-Square value is 7.739 and the Asymp sig value is 0.102 which is greater than the critical value \((P=0.05)\). Hence null hypothesis is accepted and there is a no significant relationship between Occupation and frequency of visit to bank.
### Chi-Square Tests

<table>
<thead>
<tr>
<th></th>
<th>Value</th>
<th>df</th>
<th>Asymp. Sig. (2-sided)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pearson Chi-Square</td>
<td>17.412</td>
<td>16</td>
<td>.359</td>
</tr>
<tr>
<td>Likelihood Ratio</td>
<td>21.249</td>
<td>16</td>
<td>.169</td>
</tr>
<tr>
<td>Linear-by-Linear</td>
<td>5.031</td>
<td>1</td>
<td>.025</td>
</tr>
<tr>
<td>Association</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>N of Valid Cases</td>
<td>50</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

a. 25 cells (100.0%) have expected count less than 5. The minimum expected count is .48.

It is seen that the Chi-Square value is 17.412 and the Asymp sig value is 0.359 which is greater than the critical value (P=0.05). Hence null hypothesis is accepted and there is a no significant relationship between occupation and frequency of visit to bank.

### 4. Association between Marital status and frequency visit to bank:

<table>
<thead>
<tr>
<th></th>
<th>Value</th>
<th>df</th>
<th>Asymp. Sig. (2-sided)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pearson Chi-Square</td>
<td>8.588</td>
<td>8</td>
<td>.378</td>
</tr>
<tr>
<td>Likelihood Ratio</td>
<td>9.401</td>
<td>8</td>
<td>.310</td>
</tr>
<tr>
<td>Linear-by-Linear</td>
<td>1.929</td>
<td>1</td>
<td>.165</td>
</tr>
<tr>
<td>Association</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>N of Valid Cases</td>
<td>50</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

a. 11 cells (73.3%) have expected count less than 5. The minimum expected count is .08.

It is seen that the Chi-Square value is 8.588 and the Asymp sig value is 0.378 which is greater than the critical value (P=0.05). Hence null hypothesis is accepted and there is a no significant relationship between Marital status and frequency of visit to bank.

### 5. Association between Income and Minimum investment:

<table>
<thead>
<tr>
<th></th>
<th>Value</th>
<th>df</th>
<th>Asymp. Sig. (2-sided)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pearson Chi-Square</td>
<td>17.717</td>
<td>12</td>
<td>.125</td>
</tr>
<tr>
<td>Likelihood Ratio</td>
<td>22.353</td>
<td>12</td>
<td>.034</td>
</tr>
<tr>
<td>N of Valid Cases</td>
<td>50</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

a. 16 cells (80.0%) have expected count less than 5. The minimum expected count is .04.

It is seen that the Chi-Square value is 17.717 and the Asymp sig value is 0.125 which is greater than the critical value (P=0.05). Hence null hypothesis is accepted and there is a no significant relationship between income and Minimum investment.
6. Association between Educational Qualification and Knowing of schemes in SBI:

H₀: There is no significant relationship between Educational qualification and knowing of schemes in SBI  
H₁: There is a significant relationship between educational qualification and knowing of schemes in SBI

It is seen that the Chi-Square value is 9.471 and the Asymp sig value is 0.304 which is greater than the critical value (P=0.05). Hence null hypothesis is accepted and there is no significant relationship between Educational qualification and Knowing of schemes in State Bank of India.

Table: 7 Percentage analyses of Variables of Satisfaction:

In order to analyse the level of customer satisfaction 5 variables are considered as detailed below by applying the Likert scale with range 1- Strongly disagree to 5- Strongly Agree. The results revealed the following:

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Variables</th>
<th>Strongly disagree</th>
<th>Disagree</th>
<th>Moderate</th>
<th>Agree</th>
<th>Strongly agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>01.</td>
<td>Considering everything, I am satisfied with State bank</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>02.</td>
<td>I am satisfied with the personal contact with staff of my state bank of India</td>
<td>0</td>
<td>0</td>
<td>2</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>03.</td>
<td>Choice of mine to use this bank is good</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>04.</td>
<td>My experience with this bank has been enjoyable</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>4</td>
<td>1</td>
</tr>
<tr>
<td>05.</td>
<td>My State bank of India always always meets my expectations</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>4</td>
<td>2</td>
</tr>
</tbody>
</table>

From the above table, it is seen that nearly 82% of the respondents are strongly agreed with the overall satisfaction of the bank, 62% of the respondents are having more satisfied with the personal contact of staff in the bank, 78% of the respondents are agreed strongly that their choice of bank is good. 80% of the respondents have told that their experience with the bank is enjoyable and 80% of the respondents are strongly agreed that their bank is always meeting their expectations.
Table: 8 Weighted Score and Rank summery of the Satisfaction variables:

In this table, based on the range allotted (1- Strongly Disagree to 5- Strongly Agree), the score of each variable was multiplied with the total number of respondent and the mean weighted score was calculated. The ranking result is furnished below:

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Customer Satisfaction</th>
<th>Weighed score</th>
<th>Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>01</td>
<td>Considering everything, I am satisfied with State bank of India</td>
<td>4.68</td>
<td>1</td>
</tr>
<tr>
<td>03</td>
<td>Choice of mine to use this bank is good</td>
<td>4.68</td>
<td>1</td>
</tr>
<tr>
<td>04</td>
<td>My experience with this bank has been enjoyable</td>
<td>4.64</td>
<td>2</td>
</tr>
<tr>
<td>04</td>
<td>I am satisfied with the personal contact with staff of my state bank of India</td>
<td>4.46</td>
<td>3</td>
</tr>
<tr>
<td>05</td>
<td>My State bank of India always always meets my expectations</td>
<td>4.02</td>
<td>4</td>
</tr>
</tbody>
</table>

From the above table, it is seen that the Overall satisfaction and the choice of the bank stands first equally with experience second, personal contact with staff third, meeting the personal expectations stands fourth among the customers.

Table 5: Association between demographic variables and Customer satisfaction:

<table>
<thead>
<tr>
<th>Variables</th>
<th>Status of area</th>
<th>Educational Qualification</th>
<th>Occupation</th>
<th>Income</th>
<th>Frequenc y of visit</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) Chi-Square (Pearson Correlation)</td>
<td>0.311</td>
<td>0.272</td>
<td>0.523</td>
<td>0.418</td>
<td>0.441</td>
</tr>
<tr>
<td>2. I am satisfied with the personal contact with staff of my state bank of India</td>
<td>9.530</td>
<td>5.281</td>
<td>7.340</td>
<td>12.707</td>
<td>16.001</td>
</tr>
<tr>
<td>a) Chi-Square (Pearson Correlation)</td>
<td>0.146</td>
<td>0.948</td>
<td>0.834</td>
<td>0.176</td>
<td>0.191</td>
</tr>
<tr>
<td>3. Choice of mine to use this bank is good</td>
<td>17.147</td>
<td>15.037</td>
<td>11.153</td>
<td>1.955</td>
<td>14.637</td>
</tr>
<tr>
<td>a) Chi-Square (Pearson Correlation)</td>
<td>0.009*</td>
<td>0.239</td>
<td>0.516</td>
<td>0.992</td>
<td>0.262</td>
</tr>
<tr>
<td>4. My experience with this bank has been enjoyable.</td>
<td>13.002</td>
<td>25.722</td>
<td>13.318</td>
<td>17.265</td>
<td>19.529</td>
</tr>
<tr>
<td>a) Chi-Square (Pearson Correlation)</td>
<td>0.112</td>
<td>0.058</td>
<td>0.649</td>
<td>0.140</td>
<td>0.242</td>
</tr>
<tr>
<td>a) Chi-Square (Pearson Correlation)</td>
<td>0.405</td>
<td>0.160</td>
<td>0.724</td>
<td>0.707</td>
<td>0.709</td>
</tr>
<tr>
<td>(a) Asymp. Sig (2 sided)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(* significance at 5% level of significance)

From the above table, it is clearly seen that there is no significant difference between the demographic variables with the customer satisfaction except status of residential area with the choice of bank.
VI. CONCLUSION

Previous studies revealed that there is no significant difference in the level of satisfaction of the respondents belonging to different age, education and occupation except income (R. Elangovan and K. Sabitha (2011), this study revealed that there is no significant relationship between the demographic variables of the respondents and the satisfaction level except personal choice of bank with the status of the residential area.

VII. LIMITATIONS AND FUTURE RESEARCH

As this study is conducted with the State Bank of India, Mohan Nagar Branch of Salem District with the sample size of 50 respondents, there is a wide scope for further study with large number of samples to analyse the impact of customer satisfaction on customer loyalty and Behavioural intention because customer satisfaction is the antecedent for Customer Loyalty and Behavioural intention with different analysis method.

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Design and Implementation of FMCW Radar Receiver in 65 nm CMOS Technology

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Abstract - Mention the abstract for the article. An abstract is a brief summary of a research article, thesis, review, conference proceeding or any in-depth analysis of a particular subject or discipline, and is often used to help the reader quickly ascertain the paper's purpose. When used, an abstract always appears at the beginning of a manuscript, acting as the point-of-entry for any given scientific paper or patent application. The latest sub-micron CMOS technologies can be used to design 77 GHz radio frequency integrated circuits (RFICs) at very low cost in mass production. A fully-integrated FMCW radar system for automotive applications operating at 77 GHz has been proposed. Utilizing a fractional N synthesizer as the FMCW generator, the transmitter linearly modulates the carrier frequency across a range of 700 MHz. The receiver together with an external baseband processor detects the distance and relative speed by conducting an FFT-based algorithm. Millimeter-wave PA and LNA are incorporated on chip, providing sufficient gain, bandwidth, and sensitivity. Fabricated in 65-nm CMOS technology, this prototype provides a maximum detectable distance of 106 meters for a mid-size car while consuming 243 mW from a 1.2-V supply.

Index Terms - 77 GHz, fast Fourier transforms (FFT), fractional-N synthesizer, frequency modulated continuous-wave (FMCW) radar, low-noise amplifier (LNA), power amplifier (PA).

I. INTRODUCTION

The emerging automotive radar systems have been developed over the past years to create a more secure and more comfortable driving environment. Up to now, quite a few standards have been established for different applications (Fig. 1). For example, short-range (< 10 m) radars are adopted to provide parking assistance or to prevent side-crash, which utilizes pulse-based modulation with a wide bandwidth of 7 GHz. Because of the short distance, it must provide a wide azimuth angle (>70 degree) and a fine resolution (<10 cm) [1]. Used in the Stop-and-Go system, the mid-range radars usually operate at 24-GHz band to cover a distance of 10–40 m with an angle of 30–60. The 77-GHz band, on the other hand, has been dedicated to long-range radars, e.g., the adaptive cruise control (ACC) system, which basically detects the distance and the relative speed of the vehicles in front so as to perform a real-time response by means of the braking system or other protective mechanism. It must cover a range up to 100–150 meters [4]. At the speed of 110 km/h, saving one second response time is equivalent to extending over 30 meters for braking. With proper operation, such an anti-collision system can reduce a great amount of casualties in traffic accidents. The 77-GHz radar presents significant advantages over microwave (e.g., 24-GHz) radars. The more compact size makes it suitable for further integration. The associated narrow-beam width requirement fits in with long-distance applications. For example, high-gain narrow-beam width antennas such as horn or dish can be used. Also, as compared with the laser radar, which is subject to disturbance by rain or mist, millimeter wave reveals better environmental resistance. However, even with modern technology, 77-GHz radar systems are still very expensive and can only be applied to luxury cars. It is because in conventional approaches, engineers need to collect individual mm-wave circuits and put them together as a module, rather than realizing a fully-integrated circuit in one chip. It inevitably suffers from high cost and low yield. Today, the trend to popularize this high-end technique puts more pressure on cost reduction. Research on 77-GHz automotive radars has been extensively conducted over the past years. For example, [5] and [6] provide single-chip transceivers and transceiver arrays in SiGe BiCMOS technology, respectively, and 77-GHz transceivers are also demonstrated in CMOS [7], [8]. Even so, highly-integrated 77-GHz radar transceivers have never been realized in CMOS before. Unlike compound technologies, CMOS manifests itself in its low cost, high yield, and potential of highly integration, and it is of course desirable to implement long range radar transceivers in CMOS.

In this paper, we propose a solution that integrates the whole transceiver in single chip, which along with antennas and baseband processor forms a complete system. It substantially reduces the cost and increases the reliability. Note that [9] only accomplishes the transmit part. Whole-system assembly requires much more effort than building up blocks.

Before looking at design details, we need to evaluate the challenges of realizing such a high-frequency system. It is well known that the returned power loss of a radar system is given by

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\[ \frac{P_R}{P_T} = \frac{G_T G_R \sigma^2}{4\pi^2 R^4} \]  

(1)

Where \( P_T, P_R \) denote the transmitted and received power, \( G_T, G_R \) the gain of antennas, \( \sigma \) the radar cross section, \( \lambda \) the wavelength, and \( R \) the distance. At 77 GHz, the reflected wave would be attenuated by approximately 150 dB at a distance of 100 meters. Here, the radar cross section \( \sigma \) is defined as

\[ \sigma = \lim_{r \to \infty} \frac{4\pi R^2}{S_i} \frac{S_e}{S_i} \]  

(2)

Where \( S_e \) denotes the incident power density measured at the target, and \( S_i \) the scattered power density seen at a distance \( r \) away from the target. For a mid-size automotive, \( \sigma \approx 30 m^2 \). In the receive side, the lowest detectable power level can be expressed as

\[ P_{\text{RX, min}} = -174 + NF_{\text{RX}} + 10 \log_{10} BW_{\text{RX}} + \text{SNR}_{\text{min}} \]  

(3)

To estimate the minimum required output power in the Transmit side \( P_{\text{TX, min}} \), we have

\[ P_{\text{TX, min}} = P_{\text{RX, min}} + \text{Loss} - 2 \times G_{\text{out}} \]  

(4)

In advanced CMOS technologies, the millimeter wave (mm-wave) PA and LNA designs become applicable. However, the design margins are still quite small. To be more specific, we can analyze the performance of state-of-the-art PAs and LNAs, and predict their output saturation power \( P_{\text{sat}} \) for PAs and power gain (for LNAs) at 77 GHz by regression. As illustrated in Fig. 2(a) and (b), they are approximately 7.5 dBm and 11 dB. For the radar to function properly, we need a PA with at least 10 dBm and an LNA with \( >18\text{-dB} \) gain and \( <10\text{-dB} \) NF. Thus, it is necessary to adopt modern mm-wave circuit designs so as to achieve the required performance. Block optimization and integration technique are equally important. Similarly, the noise figure of LNAs must be kept below 10 dB as the intersection point is about 7.5 dB Fig. 2(c). Note that the down-conversion mixer and IF amplifier contribute significant noise figure as well.

Figure 2: Performance analysis of CMOS mm-wave circuits: (a) \( P_{\text{sat}} \) of PAs, (b) power gain and (c) noise figure of LNAs.

This paper is organized as follows. Section II briefly describes the FMCW radar theory. Section III presents the transceiver architecture, revealing system level Consideration for future work is discussed in Section IV. Finally, Section VII concludes this work. In architecture level, conventional structures tend to use an integer phase locked loop with a programmable direct digital frequency synthesizer (DDFS) as the reference input. We integrate the FMCW generator and the radio frequency (RF) front-end in one chip, and have it co-designed with the interconnection to antennas. Together with signal processor realized in a field programmable gate array (FPGA), the FMCW radar system is capable of detecting multiple objects and exhibiting their positions and speeds in real time.
III. TRANCEIVER ARCHITECTURE

The transceiver architecture is illustrated in Figure 3. It contains an RF front-end (PA, LNA, and mixer), two high gain antennas, an FMCW generator (basically a fractional synthesizer), and an FPGA-based signal processor. By tuning the divide modulus, the full-rate VCO delivers FMCW carrier signal around 77 GHz directly to the PA, the mixer, and the first divider. One important advantage of this structure is that it requires no frequency doublers or triplers, simplifying the circuit design by eliminating lots of mm-wave blocks. The reference clock \( f_{ref} \) is set to about 700 MHz created be an external PLL with a crystal oscillator (50 MHz) for simple implementation. If necessary, this low speed PLL can be further integrated into the transceiver. A 16-bit modulator produces a 3-bit modulation signal for the divider, which follows the 2nd divider. Note that the power consumption of this architecture is at least 2 orders less than that of the DDFS version. The full-rate clock is amplified by the PA and coupled to the antenna directly.

In the receiver path, another antenna captures the reflected signal. After the LNA and mixer, we obtain the IF signal and have it digitized by means of an external analog-to-digital converter (ADC) before sending it to the digital signal processor (DSP). The ADC provides 12-bit output with sampling rate of 3 MSample/s. Again, if necessary, it can be easily included in the main chip. Since the IF is quite low, the ADC power consumption can be kept less than 1 mW. An FFT algorithm is implemented in the FPGA to calculate the distance and speed, which can track up to 5 objects simultaneously. In order to achieve the best frequency resolution, the FFT sampling time should be as large as \( T_m/2 \) to fully utilize the information for IF frequency estimation at each \( f^+ \) and \( f^- \) interval. However, since the numbers of FFT points are usually a power of 2, the FFT sampling time here may be slightly smaller than if the sample rate is pre-selected. In this design, we choose a 2048-point FFT with 3-MSample/s sampling rate, leading to an FFT sampling time as

\[
\text{FFT Sampling Time} = \frac{2048}{2 \text{MHz}} = 0.60 \text{ ms}
\]

Equation (5) corresponds to 1.46-kHz frequency resolution. It is also important to look at the modulation mechanism. As shown in Fig. 4(b), the ramp is composed of 8192 steps with stepping rate of about 10.9 MHz. Note that the stepping is accomplished by using the output, which facilitates the synchronization between DSP (in FPGA) and the modulation logics (on chip). The resolution is thus given by

\[
\Sigma \Delta \text{ resolution} = \frac{1000 \text{ Hz}}{8192} = 0.12 \text{ kHz} = 1.5 \text{ dB}
\]

In other words, each step corresponds to 2 LSBs. The loop bandwidth of the frequency synthesizer is of great concern as well. In order to achieve a linear triangular profile with steep turn-around points, the bandwidth must be much greater than the modulation frequency, which is 0.67 kHz, and less than the stepping rate, which is 10.9 MHz [Figure 3]. In this design, the loop bandwidth is set to be 1 MHz as an optimal value.
Other issues may affect the transceiver performance and need to be considered carefully. For example, to extract correctly, the logics on the board and the chip must be synchronized by the same reset and clock signals. Adaptability is important as well. Parameters such as B and Tm had better be made programmable to meet different standards.

![Diagram](image1.png)

Figure 4: (a) VCO and its Tuning range (b) First frequency divider range

![Diagram](image2.png)

Figure 5: 38.5-GHz frequency divider

IV. FUTURE WORK

The antenna is of great importance in a radar system and is worthy of further modification. As discussed in Section I, in order to reach a long distance, we need high-gain antennas such as horn or dish to concentrate the radiation energy. In such cases, signal at 77 GHz must be transformed from coplanar waveguide to rectangular waveguide mode, and vice versa. A low-cost solution may be found if we use a patch antenna array. It is well known that a large antenna array could get a high gain by focusing the radiation energy. As demonstrated we design an 8*8 patch array on a commercially available PC board, RO4003C [41], which occupies an area of approximately 2.3 2.5 cm on a board with. Tree-structure corporate feeding paths guarantee that the overall radiation is constructive. Using 8* 8 elements, we can achieve >20-dBi gain and >1-GHz bandwidth, quite close to the requirement of automotive FMCW radar systems.

V. CONCLUSION

A fully-integrated 77-GHz FMCW radar transceiver has been proposed in this paper. Utilizing fractional- synthesizer as an FMCW engine, we substantially reduce the complexity of the circuit and board designs. Significant power and area can be saved by this architecture, leading to a low-cost solution. Millimeter- wave front-end realized in CMOS technology has been demonstrated as well. With baseband processors and high-gain antennas included, this work provides a complete realization example, which reveals promising potential for future automotive applications.

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Whither New Media Technologies in India?

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Abstract- Technology is playing a major role in disseminating the information. The ethical use of new technologies in journalistic work is imperative given the widespread use of such technology for the benefit of society. In general the usage of information technology can be found in the form of Internet-based technologies in information gathering and news writing. Attribution of online information, general use of online content, plagiarism of Web-based news, use of direct quotations found online. Unfortunately, it is found in recent past that such type of sources is being used without quoting proper sourcing and attribution. Even these unwanted practices have been encompassed to many areas including personal, proprietary, business or corporate information and what not?

Besides, the misrepresentation of identity using e-mail and instant messaging to obtain information, publication of confidential information without permission, use of the threat of publication of information online to pressure sources, and unauthorized use of online video, such as that found on You Tube, television channels too found as most unwanted and unethical practices in the domain. In this regard a million dollars question will emerge that whether these new media technologies? This paper examines the ethics of Indian newsgathering practices in the context of new media technologies. The methodology of the paper is descriptive and explorative in nature.

Index Terms- media ethics, online journalism, new media technologies, social media

I. INTRODUCTION

Journalism is a profession, which operates in the public area and therefore can give rise to various ethical issues. The Journalists Code of Ethics and other ethical guidelines are yet to be updated to reflect modern technology and the changes it has brought to the world of journalism. Journalism education in India does not generally offer college or university courses dedicated to journalism ethics; there is lack of ethics training in particular and the question of what constitutes ethical journalism practice is not one that is discussed often in Indian newsrooms. Most of the media scholars suggested that there is an urgent need for analysis of Indian media by ethicists and scholars to control the unwanted freedom of the media and violating the ethics.

In India, the concept of journalism codes of ethics has raised in 1976. The Indian Parliament introduced a code of ethics called Parliamentary Codes. Since the inception of the parliamentary codes, some non-government organizations and media outlets like Times of India formulated Codes of ethics for their journalists. Even in the regional media like Telugu, newspapers formulated code of ethics in 1995. Among the latter is the Norms of Journalistic Conduct from the Press Council of India (PCI) and the All-India Newspaper Editors’ Conference: Code of Ethics. The latter code, which is shorter, bears considerable resemblance to the former, the Norms of Journalistic Conduct. The Norms of Journalistic Conduct, which are adopted by the Press Council of India, focuses mostly on macro level issues or on specific areas of news coverage. For example, it discusses violence, indulging women, obscenity and vulgarity; privacy including not intruding (photographically) in moments of grief, and right of reply, right to privacy, as well as coverage of elections and communal disturbances, and references to caste, religion and community of people covered in the news. The code also cautions against sensational headlines, “suggestive guilt” (guilt by association), and glorification of social evils such as “sati” (widow suicide). Apart from this in most of the cases, the media restrains to disclose the information and maintains restrain in various issues like defaming the moral issues.

II. ETHICS SELF RESTRAIN

Ethics should set guidelines, rules, norms, codes and principles that will lead journalists and all other media workers to make moral decisions. They should not be forced to do so because ethics are voluntarily opted. There are teleological ethics and deontological ethics. While there is, a relationship between the ethical codes of journalism in a society of journalists subscribes to the role of journalists in that society, the Indian codes of ethics suggests appearing to play a very prominent role over other codes. As said above the code completely depends on the morality of the media organizations and working journalists. In other words, professional codes of ethics created by Press Council of India and other associations tend to address general social roles the news media should play in national leadership. It is most important to build confidence in the people on media. In relationship to government institutions/organizations and focus less than the numerous western codes that are concerned about both the social roles and specific behaviors of working journalists, such as paying sources for information or certain personal and professional relationships that are a considered conflict of interest and widely viewed to be unethical.

Naturally then, journalistic ethics are similarly indigenously fashioned in engaging the idea of ethical relativism. In the most of the cases, journalists are completely violating the ethics in the name of sensationalism. Journalists in Asia and the Middle East did not think a universal code was realistically implementable. It is due to distinguishable political systems and accompanying controls. Not only that, the belief of journalists in western code of journalistic ethics also made them to land on the wrong perceptions in this regard.
III. GLOBALIZATION AND MEDIA

In Indian journalism, the scholarly literature focuses on journalism and journalism ethics on macro level matters. The effect of globalization and the consequent marketing and profit making pressures on issues like independent journalism, conflict of interest, accuracy and accountability, corporatization of news and the consequent reduction of the public sphere. These are all issues of great consequence. The important are the journalists’ encounters with situations that require ethical decision making in the day-to-day operational practice of journalism. Similarly, the codes of ethics in use in the Indian journalism the journalists do not directly address the practical day-to-day ethical issues journalists may confront in gathering of the news and news reporting. For example, the codes do not discuss the use of modern digitalization of media such as small, portable hidden cameras nor do they discuss attribution, impersonation, violating confidentiality, non-payment for content, plagiarism etc. These issues have become particularly important with the advent of new technology in media. Journalists confirm that the cheap and easy availability of cell phones, spy cameras, modems and computers had led to major changes in the way news is gathered and disseminated, and the kinds of news that is covered.

In electronic media the new technology has led to the use of bells and whistles, possibly sometimes at the cost of content. In most of the cases, the broadcasting media is creating hype. However, the more important question is about the ethics of newsgathering with these new technologies. There is a need to wide debate on this type of newsgathering formats and how the media ethics have been violated. While compact DVD (digital video Device) cameras, cell-phone cameras, spy cameras, miniaturized cameras with recording capabilities, and miniaturized microphones with taping mechanisms capture off-the-cuff footage and allow journalists to report news quickly and more accurately, they are also easily hidden “from potential subjects”. Journalists in India have used hidden cameras to expose corruption and exploitation. Empirical studies of the day-to-day ethical issues journalists deal with in India seem to be few. Even fewer, it seems, address new issues related to digital tools, computers, and computer networks. One recent study on acceptability of certain practices among Indian journalists focused on five factors: Breaking Trust/ Masquerading, Accepting Gifts, Disclosing Harmful Facts, Staging/Altering photographs, and Paying/Inventing Sources. Indian journalists rated all these practices as unacceptable. The least acceptable practice was disclosing harmful facts.

IV. CHANGING SCENARIO OF INDIAN MEDIA

Indian media has decades of history in disseminating the information through various media tools. In January 1780, James Augustine Hicky started the first newspaper, a weekly, variously called as the ‘Bengal Gazette’ or ‘the Calcutta General Adviser’ or ‘Hicky Gazette’. He is still regarded as the father of Indian Journalism. Since the inception of Bengal Gazette, the Indian press emerged day to day and became very strong in the public to disseminating the information. Today is over 200 year’s old history. Indian Radio is about 100 years old and Doordarshan is about 50 years old.

Before Independence in India, Media was a mission. Its mission was to free India from the clutches of foreign rulers, the British. There were many restrictions on ‘Media’ in the form of regulations. The infamous gagging act was brought to suppress the vernacular press, for example, is one such regulation. After Independence to there have been many commissions but those were to streamline the working conditions of journalists; maintain ethical issues in publishing and broadcasting the news. When the media emerged as a main source of the motivation in the people, India had adopted a socialist approach to development, and also a development journalism approach to news. Within the media, in particular, the print press was private, while broadcast news media was owned by the government that especially was charged from presenting social issues. Journalists in general, irrespective of the medium, were socialized into prioritizing social issues news. Especially social issues are more glamour in the public and attracted a lot of attention.

V. FOREIGN DIRECT INVESTMENT AND MEDIA

When the Globalization era started in India, the then Prime Minister Mr. P.V. Narasimha Rao opened up India’s economy and thus paved a way for multi-national corporations to enter in to our country in early 1990s. However, based on the 1955 law, Foreign Direct Investment (FDI) in the Indian press industry was still restricted. This law was possibly aimed at staying the cultural imperialism. When the liberalization process came into force, the government allowed up to 26 percent equity in news and current affairs publications and up to 74 percent equity in non-news and non-current affairs publications. At the same time, the bill suggests that in any news media organization, three-fourths of the editorial staff and the chief editors should be Indians. This attempt at maintaining indigenous control of content did not keep the media from changing rather drastically. This change is manifested in the growth in a number of media outlets, in commercialization of the press and in its tabloidization. Circulation jumped 33 per cent between 2001 and 2005. Broadcast media had grown exponentially a lot in a scenario of both foreign and domestic channels. Foreign satellite channels became extremely popular within the urban, affluent Indian elite, but growth touched all spectrums of society all over the media.

The neo-globalization policies implemented in India since the early 1990s have also resulted in the commercialization of the press. The Indian media completely went into the clutches of the capitalists and it became a profit-oriented business. The “Murdochization” of the Indian press, as it has moved, from “by-line to bottom-line.” In turn, Indian journalism is now characterized as what is now known as a “Page Three” culture. Generally, in the past, the third page would cover entertainment and high society news, but today this type of news dominates in the third page. In the recent days, the main concept of news organizations completely crossed all the lines. Instead of disseminating information, educate the people and entertain the people, the media is giving top priority to entertain the people only. The first two objectives of the media went to least in the list. The New media technology, which has likely facilitated the development of this growth, commercialization, and tabloidization, might also provide greater opportunity to engage in unethical practice. Thus, the study of the ethics of...
newsgathering practices using new technology is a significant research topic for Indian journalism.

VI. TECHNOLOGY AND MEDIA ETHICS

In the era of globalization when the new technologies are introduced, the media computer-based and network-centered technologies emerged and are being adopted by news organizations all around the world. Media organizations are completely dependent on the new technologies to gather and transmit the news. In the past three decades, numerous ethical concerns and issues about digital journalism and new technologies began to come to the forefront of journalism around the world. Among the early concerns to be debated and discussed, manipulation of images as digital photography and picture editing became increasingly common than before or after 90’s. When these technologies spread in Europe, Asia, and elsewhere, the ethical questions in those regions also surfaced. At the same time, the media organizations were concerned about the speedy acquisition of the information, and decreasing the filtering of the information, the decline of fact checking, and even the re-distribution of the information without permission or rights. The potential invasion of personal privacy and publication of personal information concerns also grew in the public mind with the expansion of more and more publicly accessible databases around the world. While this issue varied according to regional and national laws, regulations, and rules, it remains a concern and has become a leading international issue with identity theft and other issues growing each year in all regions of the globe. Clearly, privacy issues in the digital era have also created a concern among the journalists and consumers of the news media.

Ownership and rights to digital content on the Web have led to numerous copyright laws and fair use of ethical issues involving new technologies and the news media. Use of published content without permission or appropriate attribution is relatively simple with new technologies and has grown as an international problem in recent years. For the past three decades, the growth of text archives of content in databases and on web pages, which are accessible through the Web, has posed numerous questions about the proper use of this content, not only within existing international and national laws, but also the inappropriate and unethical use of content which is most commonly known as ‘plagiarism’. There is so much concern and focus on blogs and bloggers as either professional journalists or the so-called citizen journalists and the ethics of the blogosphere in general; social networking, online discussion space, and use of chat rooms as reporting resources or other journalistic applications.

VII. CONCLUSION

In Indian media, the concept of news has taken a new shape. In the early days, the media completely dedicated to educate the people through disseminating the information through their medium. The competition between the media organizations were also in a healthy manner. When the liberalization process initiated in India, the complete media strategy has been changed. The credibility of the news has been completely downfallen. In the name of sensationalism the media, either directly or indirectly violating the ethics or entering the private life too. While the process of news gathering the media persons violating ethical values. The new media technologies are very much misused to misguide the people. Press council of India that is supposed to enforce values and ethics is said to be teeth less. It has to be rejuvenated. The owners of the Media will have to be oriented towards adoption of values and ethics. The Society being a composition of many individual ethnic groups belonging to various cultures, religions, various levels of economic status, in order to run the society in a right path and quality in life, everybody of the society should strive for restoring values and ethics in Society.

REFERENCES


AUTHORS

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Optimization of Convective Hot Air Drying of Ganodermalucidum Slices Using Response Surface Methodology

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Abstract- In this study, response surface methodology was applied to optimize the drying conditions of Ganodermalucidum slices during convective hot air drying, by referring to the retention of its active ingredients. The independent variables are drying temperature (40 to 80°C), velocity of air circulation (0.19 to 1.66 m·s⁻¹) and slice thickness (0.1 to 0.5 cm) whereas the response variables are ganoderic acid content (GA), water-soluble polysaccharides content (Poly), total drying time (DT) and equilibrium moisture content (EMC). Analysis of variance showed that all independent variables had significant effect on DT and the degradation of GA in the slices. Effect of drying temperature and air velocity were more significant on the retention of Poly than the effect of slice thickness whereas EMC of the slices was only affected by drying temperature. The optimum drying condition to maximize both GA and Poly in the slices at minimum drying time was found at temperature of 62.80°C, air circulation of 1.66 m·s⁻¹ and 0.1 cm of slice thickness. At this optimum condition, the predicted responses for GA, Poly, DT and EMC were 37.043 µg / g DM, 0.414 mg / g DM, 80.11 min., and 3.41% d. b., respectively.

Index Terms- Ganoderic acids, Ganodermalucidum, hot air drying, optimization, response surface methodology, water-soluble polysaccharides.

I. INTRODUCTION

Hot air drying is a conventional drying method for the drying of G. lucidum upon harvesting to reduce moisture content of the fruiting bodies to a level low enough for safe storage or to be sold in dehydrated form. It has been applied in Ganoderma processing industry as this method is simple and economical feasible. However, the bio-active ingredients of G. lucidum such as ganoderic acids and water soluble polysaccharides are heat sensitive and therefore tend to degrade in considerable ratio if improper drying condition, such as high drying temperature is applied (Chin et al., 2009). Similar findings were obtained for hot air drying of onion slices, betel leaves, and fingerroot when higher drying temperature (or lower drying temperature with longer drying time) was applied, which resulted in serious degradation of the active ingredients as well as physical quality (Praveen kumar et al., 2005; Rayaguru et al., 2011; Therdtai and Northongkom, 2011).

Optimization is therefore required to ensure rapid processing while maintaining optimum product quality especially in term of the retention of bioactive ingredients. Besides bioactive ingredients, the quality aspects for drying of food materials may include color parameters, texture, rehydration ratio and final moisture content, whereas the process parameters to be optimized include drying temperature, flow-rate of drying air, pressure, power intensity, thickness of slices and drying time, which are dependent on the method of drying (Giri and Prasad, 2007; Sobukola et al., 2010; Singh et al., 2008; Manivannan and Rajasimman, 2011).

Response surface methodology (RSM) is a useful technique for optimization studies. According to Montgomery (2001), RSM is a collection of mathematical and statistical techniques that is useful for modelling and analysis in applications where a response is influenced by several factors. This technique has been extensively applied to different drying process in fruits and vegetables (Madamba, 1997; Madamba and Liboon, 2001; Eren and Kaymak-Ertekin, 2007; Lidhoo and Agrawal, 2008; Perez-Francisco et al., 2008; Singh et al., 2006).

Thus far, studies on the optimization of drying of medicinal mushrooms by referring to the retention of bioactive ingredients is not available in the literature. Several papers have so far dealt with the optimization of drying process to maximize the retention of bioactive ingredients (or conversely, minimize the undesirable active components) in other food products for instances total phenolic content, flavonoid content and total volatile base nitrogen (TVBN) compounds using RSM (Shi et al., 2008; Erbay and Icier, 2009; Silva et al., 2010). Erbay and Icier (2009) optimized the operating conditions and the process time of a pilot scale heat pump dryer for the drying of olive leaves, by referring to the total phenolic content, total antioxidant loss, final moisture content of olive leaves and exergic efficiency of the drying chamber. High exergic efficiency with minimum total phenolic content and antioxidant activity loss was found at the optimal drying temperature of 53.43°C with air velocity of 0.64 ms⁻¹ for drying time of 288.32 minutes. Using the same drying method, the optimum operating conditions of heat pump dryer that yielded maximum specific moisture evaporation rate (SMER) and drying rate (DR) with minimum total volatile base nitrogen (TVBN) and color change (ΔE) of horse mackerel, was
successfully determined at drying temperature of 30°C, velocity of air circulation at 1.5 ms⁻¹ and osmotic pre-drying treatment in 9.9% sodium chloride (NaCl) solution (Shi et al., 2008).

Furthermore, Erbay and Icier (2009) also found that hot air drying at temperature of 51.16°C, air velocity of 1.01 ms⁻¹ and process time of 298.68 minutes corresponded to the minimum loss of both total phenolic content and antioxidant activity with maximum exergetic efficiency when optimization study was performed for hot air tray drying of olive leaves. Similar to this, Silva et al., (2010) optimized the convective hot air drying process of flavonoid-rich Inga edulis leaves and found that Inga edulis leaves dried at 70°C with air flow velocity of 1.4 ms⁻¹ showed minimum loss of flavonoids content with insignificant degradation of flavonols (as compared to freeze dried product) at total drying time less than 40 minutes.

It is evident that optimization is an essential tool to formulate an efficient drying process which in turn produces high quality of dried product. It is crucial to the Ganoderma processing industry to carry out the process in an operating condition that can maximize the retention of both ganoderic acids and water-soluble polysaccharides as they are the most important quality attribute which translate to the commercial value of this medicinal mushroom in the commercial market. Thus, the objective of this research was to optimize the operating conditions of convective hot air drying (which is the technique applied in the industry now) of G. lucidum slices by maximizing the retention of crude ganoderic acids and water soluble polysaccharides content, while minimising processing time, using response surface methodology.

II. MATERIAL

Fruiting bodies of G. lucidum was supplied by Ganofarm Sdn. Bhd., TanjungSepat, Selangor DarulEhsan, Malaysia. Slices of desired thickness were obtained by cutting the fruiting bodies with vegetable slicer to obtain torispherical shape (height = 2.3 ± 0.1cm, length = 5.3± 0.1cm).It's the foremost preliminary step for proceeding with any research work writing.

III. METHODS

A. Hot air drying

Slices of G. lucidum (0.1 to 0.5 cm thickness) were dried in a laboratory scale hot air circulation oven (Memmert, Germany, range 20-250°C with accuracy of 0.5°C) at temperature range of 40 to 80°C and velocity of air circulation of 0.19 to 1.66 ms⁻¹. The drying process was terminated when equilibrium moisture content (EMC) of the samples was achieved. EMC refers to the final moisture content of the dried samples when no change in sample weight (W) is observed at a certain drying condition. EM can be obtained from equation (1):

\[
\text{Equilibrium Moisture Content (d.b)} = \frac{W_{eq} - W_d}{W_d} \times 100\% \tag{1}
\]

Where subscripts \(d\) and \(eq\) denote bone dry and equilibrium, respectively.

B. Analysis of crude ganoderic acids

Dried samples at EMC were ground into powder using a mechanical grinder (Retsch, SM100, Haan, Germany) which is attached with a sieve (conidur holes, 5 mm) to obtain a homogeneous powder size. The powder \((17 \pm 0.1 \text{ g})\) was subjected to extraction process for 5 days at room temperature using 180 ml of 95% (v/v) ethanol. During extraction, the powder in ethanol solution was shaken for 24 hours using a mechanical shaker (Model 903, PROTECH, Malaysia). After the removal of the solid powder by vacuum filtration, the supernatants were dried at 45°C under vacuum condition (150 mbar) in rotary evaporator (Heidolph, 4000 series, Schwabach, Germany) until all ethanol was vaporized. The residue was then suspended in distilled water (10 ml) and later extracted with 10 ml chloroform (Fisher, Pittsburgh, PA) for 24 hours. After removal of water by centrifugation (6000 rpm, 15 min.), the ganoderic acids in the chloroform extract was further extracted with 5% (w/v) aqueous sodium hydrogen carbonate (NaHCO₃) in order to convert the ganoderic acids into ganoderic acids salts which is insoluble in chloroform but miscible in water. After removal of chloroform phase, the basic aqueous solution containing ganoderic acids salts was neutralized with hydrochloric acid (HCl) (2N) until the pH of the solution was lower than 3.0 to yield pure crude ganoderic acids which are soluble in organic solvent. Finally, the crude ganoderic acids was dissolved in absolute ethanol (99.4% v/v, Fisher, Pittsburgh, PA) and absorbance was measured at 245 nm in a spectrophotometer (Biochrom, Libra S12, UK) (Fang et al., 2002).

The standard curve for quantitative analysis of crude ganoderic acids content in the dried samples was obtained using thymol (Sigma, Milwaukee, WI) as standard solution (Tang and Zhong, 2003) whereas absolute ethanol was used as blank solution. The standard curve is shown in Figure 1.

\[y = 39.192x, r^2 = 0.9955\]

Figure 1: Profile of the standard curve of thymol concentration (Cthymol) which varies linearly with optical density (Od) at 245 nm.

C. Analysis of water-soluble polysaccharides

The total water-soluble polysaccharides content were determined based on colored reaction of polysaccharides and
their derivatives with phenol and concentrated sulphuric acid (Cui et al., 2006).

Dried samples at EMC were ground into powder using a mechanical grinder (Retsch, SM 100, Haan, Germany). The powder (1 ± 0.1 g) was subjected to hot water extraction (50 ml) at 60 - 65°C to accelerate the extraction rate without affecting the stability of water-soluble polysaccharides (Chang et al., 2006). During extraction, the powder in the hot water was shaken for more than 15 hours using a mechanical shaker (Model 903, PROTECH, Malaysia). After the removal of the solid powder by vacuum filtration, the supernatants were dried at 50°C under vacuum (100 mbar) in a rotary evaporator (Heidolph, 4000 series, Schwabach, Germany) until all water was vaporized. The polysaccharides were then washed with 85% ethanol which was vaporized again in the rotary evaporator at 45°C and 150 mbar. The residue was then dissolved with distilled water to form a solution. The solution was then transferred to a 250 ml flask, which was then diluted to 250 ml with distilled water. 2 ml of the solution was pipet into a 10 ml centrifuge tube and 1 ml of 5% phenol was added. The mixture was shaken for 2 minutes. 5 ml of concentrated sulphuric acid (H2SO4) (98% v/v) was then added to the solution and shaken for another 5 minutes. The concentration of water-soluble polysaccharides in the solution was determined quantitatively by measuring the absorbance at 490 nm using a spectrophotometer (DR 2800, Hach, USA).

The standard curve for quantitative analysis of total water-soluble polysaccharides content in the dried samples was plotted using β-1,3-glucan (Sigma, Milwaukee, WI) as standard solution (Cui et al., 2006) whereas distilled water was used as blank solution. The standard curve is shown in Figure 2.

D. Experimental design

The effect of three independent variables, A (drying temperature), B (velocity of air circulation) and C (slice thickness), on four response variables namely crude ganoderic acids content (GA), water-soluble polysaccharides (Poly), total drying time (DT) and equilibrium moisture content (EMC) of the slices was evaluated by using response surface methodology (RSM). The variable levels were selected on the basis of preliminary drying experiments and the restriction of equipment setting such as the velocity of air circulation. 15 experiments were performed according to Box and Behnken design with three levels of each independent variable and 3 central points (Box and Behnken, 1960). Table 1 shows the levels of variable applied whereas the combination of variables and the corresponding responses for response surface analysis are shown in Table 2. The behaviour of the response surface was investigated for each of the response variables (Yi). Experiment data were fitted to a second order polynomial model and the regression coefficients were obtained. The generalized second order polynomial model proposed for predicting the response variables is given as:

\[ Y_i = \beta_0 + \beta_1 A + \beta_2 B + \beta_3 C + \beta_{AB} A^2 + \beta_{BB} B^2 + \beta_{CC} C^2 + \beta_{AB} AB + \beta_{AC} AC + \beta_{BC} BC \]  

(2)

Where \( \beta_0, \beta_{AB}, \beta_{BB} \) and \( \beta_3 \) are the constant, linear, quadratic and cross-product regression coefficients, respectively and A, B, C are the coded independent variables of drying temperature, velocity of air circulation and slices thickness.

Table 1: Independent variables used in optimization study.

<table>
<thead>
<tr>
<th>Variables (Unit)</th>
<th>Symbol</th>
<th>Code</th>
<th>Variable levels</th>
</tr>
</thead>
<tbody>
<tr>
<td>Temperature, T (°C)</td>
<td>A</td>
<td>40</td>
<td>60</td>
</tr>
<tr>
<td>Air circulation, V (ms⁻¹)</td>
<td>B</td>
<td>0.19</td>
<td>0.93</td>
</tr>
<tr>
<td>Slice thickness, t (cm)</td>
<td>C</td>
<td>0.10</td>
<td>0.30</td>
</tr>
</tbody>
</table>

E. Analysis of data

Response surface analysis of the experimental data in Table 2 was carried out using a commercial statistical package Design Expert, version 8.0.2 (Stat-Ease Inc, Minneapolis, MN). Regression analysis and analysis of variance (ANOVA) were conducted by fitting equation (2) to the experimental data to determine the regression coefficients and statistical significance of model terms. The significance of the model terms was assessed by F-ratio at a probability (p) of 0.05. Model adequacies were determined using model analysis, lack of fit test, coefficient of determination (R²), predicted error sum of squares (PRESS) and coefficient of variation (CV).

F. Optimization procedure

Numerical optimization was performed using Design Expert software. Multiple responses were optimized simultaneously through the use of a desirability function that combines all the responses into one measurement (Eren and Kaymak-Ertakin). The desirability function D(x) is defined as:

\[ D(x) = (d_1 \times d_2 \times ... \times d_n)^{1/n} \]  

(3)

Where \( d_1, d_2, ..., d_n \) are responses and \( n \) is the total number of responses in the measure. Numerical optimization method finds operating conditions (combination of independent variables) that
maximizes the desirability function, ranging from zero (least desirable) outside of the limits to one (most desirable) at the goal.

### Table 2: The experimental design data for the response surface analysis.

<table>
<thead>
<tr>
<th>Exp. No.</th>
<th>Run No.</th>
<th>T (°C)</th>
<th>V (ms⁻¹)</th>
<th>t (cm)</th>
<th>GA (µg / g DM)</th>
<th>Poly (mg / g DM)</th>
<th>DT (min.)</th>
<th>EMC (% d.b.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>15</td>
<td>40</td>
<td>0.19</td>
<td>0.30</td>
<td>35.40</td>
<td>0.343</td>
<td>400</td>
<td>10.01</td>
</tr>
<tr>
<td>2</td>
<td>9</td>
<td>80</td>
<td>0.19</td>
<td>0.30</td>
<td>31.64</td>
<td>0.389</td>
<td>90</td>
<td>2.06</td>
</tr>
<tr>
<td>3</td>
<td>12</td>
<td>40</td>
<td>1.66</td>
<td>0.30</td>
<td>38.00</td>
<td>0.361</td>
<td>255</td>
<td>10.3</td>
</tr>
<tr>
<td>4</td>
<td>10</td>
<td>80</td>
<td>1.66</td>
<td>0.30</td>
<td>34.97</td>
<td>0.326</td>
<td>120</td>
<td>9.16</td>
</tr>
<tr>
<td>5</td>
<td>11</td>
<td>40</td>
<td>0.92</td>
<td>0.10</td>
<td>34.52</td>
<td>0.363</td>
<td>80</td>
<td>2.06</td>
</tr>
<tr>
<td>6</td>
<td>6</td>
<td>80</td>
<td>0.92</td>
<td>0.10</td>
<td>29.70</td>
<td>0.363</td>
<td>80</td>
<td>2.06</td>
</tr>
<tr>
<td>7</td>
<td>7</td>
<td>40</td>
<td>0.92</td>
<td>0.50</td>
<td>33.23</td>
<td>0.327</td>
<td>315</td>
<td>10.12</td>
</tr>
<tr>
<td>8</td>
<td>3</td>
<td>80</td>
<td>0.92</td>
<td>0.50</td>
<td>27.14</td>
<td>0.332</td>
<td>120</td>
<td>2.13</td>
</tr>
<tr>
<td>9</td>
<td>2</td>
<td>60</td>
<td>0.19</td>
<td>0.10</td>
<td>31.18</td>
<td>0.380</td>
<td>120</td>
<td>3.80</td>
</tr>
<tr>
<td>10</td>
<td>5</td>
<td>60</td>
<td>1.66</td>
<td>0.10</td>
<td>38.99</td>
<td>0.416</td>
<td>90</td>
<td>3.96</td>
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<tr>
<td>11</td>
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<td>0.19</td>
<td>0.50</td>
<td>27.11</td>
<td>0.380</td>
<td>255</td>
<td>4.41</td>
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<tr>
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<td>1.66</td>
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<td>0.408</td>
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<td>30.78</td>
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<td>4.21</td>
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<tr>
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<td>0.92</td>
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<td>0.365</td>
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<td>4.6</td>
</tr>
<tr>
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<td>60</td>
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<td>0.30</td>
<td>31.23</td>
<td>0.357</td>
<td>105</td>
<td>4.75</td>
</tr>
</tbody>
</table>

### Table 3: Desired goals for independent variables and responses

<table>
<thead>
<tr>
<th>Independent variables / Responses</th>
<th>Goal</th>
<th>Weight (1: least important; 5: most important)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Drying Temperature, T (°C)</td>
<td>In the range</td>
<td>-</td>
</tr>
<tr>
<td>Air Circulation, V (ms⁻¹)</td>
<td>In the range</td>
<td>-</td>
</tr>
<tr>
<td>Slice thickness, t (cm)</td>
<td>In the range</td>
<td>-</td>
</tr>
<tr>
<td>GA (µg / g DM)</td>
<td>Maximize</td>
<td>5</td>
</tr>
<tr>
<td>Poly (mg / g DM)</td>
<td>Maximize</td>
<td>5</td>
</tr>
<tr>
<td>DT (min.)</td>
<td>Minimize</td>
<td>5</td>
</tr>
<tr>
<td>EMC (% d. b)</td>
<td>In the range</td>
<td>-</td>
</tr>
</tbody>
</table>

(most favorable response values). The desired goal for each independent variable and response was chosen. The independent variables were kept within the range while the responses were set to maximum for both GA and Poly, and minimum for DT. Different weights were also assigned to each goal to adjust the shape of desirability function for optimization of the multiple responses (Table 3).

### G. Verification of models

The adequacy of response surface model (equation 2) for predicting the optimum response values was verified by conducting experiments under the recommended optimum conditions. The responses of the experimental and predicted values were compared in order to check the validity of the models. The standard error between the experimental value and predicted value is defined as:

\[
\sigma = \sqrt{\frac{\sum (Z_i - Z'_i)^2}{N}}
\]

Where \( \sigma \) is the standard error, \( Z_i \) is a predicted value, \( Z'_i \) is an experimental value and \( N \) is the number of replication.

### IV. RESULTS AND DISCUSSION

Table 4 shows the ANOVA results for different runs of drying experiment. Analysis of variance shows the models are statistically significant for all responses at 95% confidence level. Apparently, the lack of fit and pure error for total drying time are the highest with sum of squares error 8410 and 116.67 respectively, which results in relatively high value of residual variance, PRESS and CV. This indicates that the model is not adequate to represent the experiment data, although both R² and adj-R² are higher than 0.80. According to Bas and Boyaci (2007), large value of R² does not necessarily imply that the regression model is good one (Bas and Boyaci, 2007). However, the adeq.
precision value (signal to noise ratio) of the model which is greater than 4.0 indicates an adequate signal, such that the model can be used to navigate the design space (Montgomery, 2001).

Despite the lack of fit is significant in the case of ganoderic acids content, acceptable PRESS, CV (less than 10%), $R^2$ and adeq. precision values indicating that the model is sufficient to predict the response (Giri and Prasad, 2007). Analysis of variance also confirms that the models predicted the water-soluble polysaccharides content and EMC accurately with insignificant lack of fit, low PRESS and CV values, and high $R^2$, adj-$R^2$ and adeq. precision values. As shown in Table 4, drying temperature is a significant factor for all the responses. The
Table 4: ANOVA table showing the independent variables as linear, quadratic and interaction terms on each response variable and coefficients ($\beta_i$) in terms of actual levels of the independent variables

<table>
<thead>
<tr>
<th>Source</th>
<th>df</th>
<th>Sum of squares</th>
<th>p-value</th>
<th>Sum of squares</th>
<th>p-value</th>
<th>Sum of squares</th>
<th>p-value</th>
<th>Sum of squares</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Ganoderic acids (GA)</td>
<td>Polysaccharides (Poly)</td>
<td>Drying time (DT)</td>
<td>EMC</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Model</td>
<td>9</td>
<td>51.119</td>
<td>161.38</td>
<td>0.041*</td>
<td>0.083</td>
<td>9.90E-3</td>
<td>0.009*</td>
<td>760.994</td>
<td>1.26E5</td>
</tr>
<tr>
<td>A</td>
<td>1</td>
<td>-0.642</td>
<td>39.23</td>
<td>0.020*</td>
<td>9.21E-3</td>
<td>1.55E-3</td>
<td>0.011*</td>
<td>-18.170</td>
<td>6.57E4</td>
</tr>
<tr>
<td>B</td>
<td>1</td>
<td>-2.646</td>
<td>30.41</td>
<td>0.031*</td>
<td>-0.075</td>
<td>7.30E-4</td>
<td>0.044*</td>
<td>-292.953</td>
<td>1.09E4</td>
</tr>
<tr>
<td>C</td>
<td>1</td>
<td>27.428</td>
<td>40.35</td>
<td>0.019*</td>
<td>0.087</td>
<td>1.79E-4</td>
<td>0.242</td>
<td>-1.01E3</td>
<td>2.31E4</td>
</tr>
<tr>
<td>A²</td>
<td>1</td>
<td>4.53E-3</td>
<td>12.12</td>
<td>0.118</td>
<td>-6.30E-5</td>
<td>2.34E-3</td>
<td>0.005*</td>
<td>0.121</td>
<td>8.63E3</td>
</tr>
<tr>
<td>B²</td>
<td>1</td>
<td>4.107</td>
<td>18.18</td>
<td>0.069</td>
<td>0.062</td>
<td>4.17E-3</td>
<td>0.001*</td>
<td>80.213</td>
<td>6.93E3</td>
</tr>
<tr>
<td>C²</td>
<td>1</td>
<td>-40.807</td>
<td>9.84</td>
<td>0.151</td>
<td>0.034</td>
<td>6.94E-6</td>
<td>0.804</td>
<td>72.917</td>
<td>31.41</td>
</tr>
<tr>
<td>AB</td>
<td>1</td>
<td>0.012</td>
<td>0.13</td>
<td>0.851</td>
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*Significant at $p < 0.05$ (95% level).
Figure 3: Profile of response surface and contour plots for ganoderic acids content (GA) (µg / g DM) as a function of (a) velocity of air circulation (ms\(^{-1}\)) and temperature (°C), (b) thickness (cm) and temperature (°C) and (c) thickness (cm) and velocity of air circulation (ms\(^{-1}\)).

Figure 4: Profile of response surface and contour plots for water-soluble polysaccharides content (Poly) (mg / g DM) as a function of (a) velocity of air circulation (ms\(^{-1}\)) and temperature (°C), (b) thickness (cm) and temperature (°C) and (c) thickness (cm) and velocity of air circulation (ms\(^{-1}\)).

Figure 5: Profile of response surface and contour plots for total drying time (DT) (min.) as a function of (a) velocity of air circulation (ms\(^{-1}\)) and temperature (°C), (b) thickness (cm) and temperature (°C) and (c) thickness (cm) and velocity of air circulation (ms\(^{-1}\)).
velocity of air circulation affected the ganoderic acids and water-soluble polysaccharides content prominently during the drying process. Nevertheless, there is no significant contribution of slice thickness to the water-soluble polysaccharides content and EMC of the slices. To visualize the combined effect of the two factors on the response, the response surface and contour plots were generated for each of the models in the function of two independent variables, while keeping the remaining independent variable at the central value (Figure 3 to 6).

A. Ganoderic acids (GA)

The second order polynomial regression equation (response surface model) describing the effect of process variables on crude ganoderic acids content of Ganoderma slices is given in equation (5).

\[
GA = 51.119 - 0.642T - 2.464V + 27.428T + 4.53 \times 10^3T^2 + 4.107V^2 + 0.012TV - 0.08TV - 10.148V\]

Equation (5)

Table 4 clearly shows that the ganoderic acids content is significantly affected by all independent variables namely drying temperature (T), velocity of hot air circulation (V) and slice thickness (t) at p < 0.05. Drying temperature and slice thickness are the main factors affecting the degradation of ganoderic acids in the slices during drying. Both drying temperature and slice thickness exhibit a negative linear effect on ganoderic acids content whereas the velocity of hot air circulation exerts a positive linear effect to this response variable, which are shown in Figure 3(a to c). However, it was found that the quadratic and interaction effects of all the independent variables did not influence the ganoderic acid content significantly (p> 0.05) as compared to linear term (Table 4). Therefore, Ganoderma slices dried with the combination of lower drying temperature, smaller slice thickness and higher air velocity could retain higher amount of crude ganoderic acids. Drying at high temperature stimulates the volatilization of ganoderic acids (Chin et al., 2009). On the other hand, high velocity of air circulation enhances the drying rate and reduces heat treatment time for the drying process, which in turn mitigates the decomposition of ganoderic acids by enzymes (Chin et al., 2009; Cui et al., 2006).

B. Water-soluble polysaccharides (Poly)

ANOVA results in Table 4 show that water-soluble polysaccharides content of the slices is significantly (p<0.05) influenced by drying temperature and velocity of air circulation. There is no significant (p>0.05) contribution of slice thickness to the degradation of water-soluble polysaccharides during the drying process. The response surface model for water-soluble polysaccharides relating the process variables is given in equation (6).

\[
Poly = 0.083 + 9.21 \times 10^3T - 0.075V + 0.087t - 6.30 \times 10^4T^2 + 0.062V^2 - 0.034t^2 - 3.96 \times 10^4TV - 1.99 \times 10^3Tt - 0.013Vt
\]

Equation (6)

Figure 4 (a and b) shows that the quadratic term of drying temperature had a significant (p< 0.05) negative effect on water-soluble polysaccharides while the linear term has a positive effect. Both linear and quadratic terms of the velocity of air circulation show significant (p< 0.05) positive effect on water-soluble polysaccharides content (Figure 4 (a and c)). Similar to ganoderic acids content, the interaction terms of the independent variables demonstrated insignificant (p> 0.05) effect on the retention of water-soluble polysaccharides during the drying process. Water-soluble polysaccharides exhibit reverse behaviour in terms of drying temperature as compared to ganoderic acids content. Higher amount of water-soluble polysaccharides were observed when higher drying temperature and velocity of air circulation were applied during the drying process, as compared to low temperature drying such as drying at 40°C. Polysaccharides tend to be hydrolyzed when water is bound to the molecule, with the aids of hydrolytic enzymes in weak acidic condition (Kallander and Landel, 2007; Zhao et al., 1999; Cui et al., 2006). Hence, water content in the slices has to be removed instantly at relatively high drying temperature and velocity of air circulation.
circulation during the drying process. Generally, hydrolytic enzyme is denatured at temperature higher than 50°C. Thus, drying at high temperature could reduce the hydrolysis degree of water-soluble polysaccharides as the enzyme activity is slow. In addition, high velocity of air circulation increases the rate of moisture removal and halts the hydrolysis process of water-soluble polysaccharides in the slices. Nevertheless, water-soluble polysaccharides content was found to decrease gradually at drying temperature higher than 60°C, as shown in Figure 4 (a and b). This may be due to the thermal degradation of polysaccharides at high drying temperature which is resulted from the breakdown of cell wall polysaccharide network (Cohen and Yang, 1995; Simal et al., 2000; Chang et al., 2006).

C. Drying time (DT)

The total drying time for a drying process is affected by drying condition and slice thickness. Referring to Table 4, drying temperature can be seen to have the strongest effect on the total drying time, followed by slice thickness and velocity of hot air circulation. It is significantly affected by the linear terms of all the independent variables (Table 4). Both drying temperature and velocity of air circulation show negative linear effect on total drying time while the slice thickness shows positive linear effect, as depicted by Figure 5 (a – c). Drying at higher temperature and high velocity of air circulation intensifies the drying rate of the slices and leads to a shorter drying time (Chin et al., 2008). For smaller slice thickness, the moisture evaporation rate of the drying process is enhanced due to a shorter distance for the moisture to travel from the interior of the slices to the surface, which in turn shortens the total drying time (Chin et al., 2009). The response surface model relating the total drying time to the process variables is given in equation (7).

\[ DT = 760.994 - 18.170T - 292.915V + 1.01 \times 10^4 + 0.121T^2 + 80.213V^2 + 72.917T^2 + 2.211TV + 9.688Tt + 127.55Vt \]  

D. Equilibrium moisture content (EMC)

Drying temperature is the main process variable that affects the EMC of Ganoderma slices significantly at \( p < 0.05 \) (Table 4). As shown in Figure 6 (a and b), the EMC is negatively affected by the linear term of drying temperature, whereas its quadratic terms show an opposite effect. The velocity of air circulation and slice thickness do not affect the EMC significantly \( (p > 0.05) \), neither in terms of linear, quadratic nor interaction terms of both variables (Figure 6 (c)). Chen et al., (2001) reported that the equilibrium moisture content is a function of equilibrium relative humidity and drying temperature. Higher drying temperature with lower relative humidity stimulates the moisture transfer from the inner part of the slices and contributes to the attainment of lower moisture content (Chin et al., 2008). The response surface model relating the total drying time to the process variables is given in equation (8).

\[ EMC = 137.11 + 125.80T + 3.2 \times 10^3V + 0.46t + 9.68T^2 + 0.08V^2 + 0.27t^2 + 0.14TV + 0.20Tt + 0.03Vt \]  

E. Optimization and experimental validation

Numerical optimization procedures were carried out to predict the optimum drying condition and slice thickness within selected ranges which generated the desired response goal. Table 5 indicates that 19 solutions were obtained at different desirability for the various combinations of independent variables and the results of the responses. The highest desirability value (nearest to the response goal), which is 0.931 (solution 1), was selected as the optimum conditions for hot air circulation oven drying of Ganoderma slices. The optimum condition is found at 62.8°C of drying temperature, 1.66 ms\(^{-1}\) of air circulation and 0.1 cm of slice thickness. At this point, the predicted responses for GA, Poly, DT and EMC are 37.043 µg/g DM, 0.414 mg/g DM, 80.11 min., and 3.41% d.b., respectively. Drying experiments were performed using the derived optimum condition and the resulted responses were determined. Table 6 shows the comparison between predicted and experimental values for each of the response. The experimental response values are in agreement with the predicted values.

V. CONCLUSION

Respond surface analysis was effectively used to determine the effect of drying conditions and slice thickness on the retention of active ingredients, equilibrium moisture content as well as the total drying time of Ganoderma slices during hot air drying. Based on the profiles of response surface, drying at lower hot air temperature, smaller slice thickness and higher velocity of air circulation retained higher amount of ganoderic acids in the dried slices whereas higher retention of water-soluble polysaccharides was found in the slices dried at higher drying temperature and higher velocity of air circulation, without significantly affected by the slice thickness. In terms of total drying time and equilibrium moisture content of the slices, drying temperature shows the strongest effect to these responses as compared to the other variables such as velocity of air circulation and slice thickness. Results of numerical optimization show that maximum retention of ganoderic acids and water-soluble polysaccharides at minimum total drying time of the slices could be achieved at drying temperature of 62.8°C, air circulation of 1.66 ms\(^{-1}\)and slice thickness of 0.1 cm.

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<td>19 (Last solution)</td>
<td>67.28</td>
<td>0.19</td>
<td>0.18</td>
<td>30.529</td>
<td>0.393</td>
<td>118.10</td>
<td>2.98</td>
<td>0.571</td>
</tr>
</tbody>
</table>

Table 6: Predicted and experimental values of the responses at optimum drying conditions

<table>
<thead>
<tr>
<th>Responses</th>
<th>Predicted values</th>
<th>Experimental values ± SD</th>
<th>Standard error</th>
</tr>
</thead>
<tbody>
<tr>
<td>GA (µg / g DM)</td>
<td>37.043</td>
<td>36.397 ± 0.716</td>
<td>0.909</td>
</tr>
<tr>
<td>Poly (mg / gDM)</td>
<td>0.414</td>
<td>0.409 ± 0.05</td>
<td>0.086</td>
</tr>
<tr>
<td>DT (min.)</td>
<td>80.11</td>
<td>80 ± 0.577</td>
<td>0.577</td>
</tr>
<tr>
<td>EMC (% d.b.)</td>
<td>3.41</td>
<td>3.47 ± 0.028</td>
<td>0.096</td>
</tr>
</tbody>
</table>

*SD: Standard deviation

ACKNOWLEDGMENT

The authors wish to acknowledge Ganofarm Sdn. Bhd. Malaysia, for the supply of fresh G. lucidum.

REFERENCES


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Email address: Chung-Lim.Law@nottingham.edu.my
Antifungal Properties of certain Plant Extracts against *Rhizoctonia Solani* Causing Root Rot of French Bean In Organic Soil of Manipur

H.C.Mangang, G.K.N.chhetry

Department of Life Sciences Manipur University, Canchipur 795003, India

**Abstract**- *Rhizoctonia solani* is a major pathogen, causing root rot disease of French bean (*Phaseolus vulgaris*). The pathogen is worldwide in distribution and is observed in almost all bean growing countries,[1].This pathogen is also found to cause root of french bean in the organically managed farms of Manipur. [2]. It is a major menace to the bean cultivators. Although chemical use could check the pathogen yet, it’s use in the organic farming system is not permitted. Hence, the use of plants for their anti fungal properties which could be used against the pathogen in the organic farming system becomes an area of interest for the eco friendly mode of disease management. Also the local farmers are using these eco-friendly means like using cows urine, neem leaf extracts etc for controlling plant diseases. So ten commonly available medicinal plants were selected based on their wide application in the state and for their value in folk medicine. Cold water extracts of the ten plants were tested in vitro against *R.solani* and extracts of plants viz. *Artemisia vulgaris*, *coix lacryma jobi*, Lantana camera, Michelia champaka, *Passiflora foetida*, *punica granatum*, and *Strobilanthes flaccidifolius* showed 50% or more mycelial inhibition. Among the plant extracts *Coix lacryma jobi* showed maximum percent mycelia inhibition with respect to control. The plant extracts were then tested in pot cultures and the plant extracts decrease rot incidence significantly as compared with control pots. In field trials Lantana camera showed maximum decrease in disease incidence. So these plants with anti rhizoctonia properties could be utilized against the pathogen, at least to lessen the impact of the pathogen. Similar eco friendly means of disease control has been appreciated by the present environment conscious generation. Thus exploring new plants for their anti fungal activity would bring about more resource base for use in eco friendly and sustainable mode of agriculture especially in organic farms.

**Index Terms**- plant extracts, antifungal, organic agriculture, Rhizoctonia

**I. INTRODUCTION**

French bean (*Phaseolus vulgaris*) locally known as *coli hawai / tankhul hawai / konsam hawai* (in Manipuri dialect) is a common crop of the state. It is widely cultivated in the state and is a favourite for the preparation of a variety of curries. Most of the marginal farmers of the state grow the crop in the organic mode without the addition of synthetic chemical inputs. In fact their croplands could be considered to be organic by default.

Root rot of French bean caused by Rhizoctonia solani is an important fungal disease of French bean causing considerable damage to the crop. Various methods for the management of the disease have been studied by various workers in other states. There are reports that foliar spray of carbendazim (0.1%) and tebuconazole (0.05%) were most effective in reducing the disease.[3] However due to residual effect of synthetic fungicides, there is demand for more eco friendly substances like bio pesticides. Moreover such synthetic chemicals are not permitted in the organic farming system. As such exploration of plant resources for their antifungal potential against the pathogen is quite inevitable for a sustainable and eco friendly management of the pathogen. Further these plant extracts could be readily used by the farmers to lesion the impact of the pathogen on their crop. Using plant resources for its antifungal activity is an attractive avenue for the development of sustainable mode of agriculture in organic farming system. Hence, new plants especially locally available, need to be explored for their antifungal property. Thus ten plants locally used in medicinal purposes were selected based on their abundant availability during the cropping season and for their use in folk medicine.

**II. MATERIALS AND METHODS**

1. **Pathogen isolation**

The pathogen is isolated from the infected seedling whose symptom is marked by sharp edge reddish circular or elongated lesions on the hypocotyls of French bean. The pathogen is first isolated in water agar [4] and then maintained on PDA plates at 25±5 OC in BOD incubator and transferred on fresh PDA at regular interval for further study.

2. **Plant extracts preparation**

Ten plants viz. *Artemisia nilarigica*, *Artocarpous integefolia*, *Citrus maxima*, *Coix lacryma jobi*, *Hedychium coronarium*, *Lantana camera*, *Michelia champaka*, *Passiflora foetida*, *Punica granatum* and *Strobilanthes flaccidifolius* were selected for the study. Healthy non infected leaves of the ten plants were collected from the local area ie. Kakwa, Manipur, India. The leaves were washed with running tap water and finally rinsed with distilled water. It is then blotted with filter paper. Preparation of the plant extract is done as given by M.N.Khare.[5]. Twenty grams of the plant material were taken and ground well with mortar and pestle. Then water is added in the ratio of 1:2 (weight by volume). It is strained through muslin.

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The extract is allowed to settle for a while and the supernatant is passed through filter paper. The filtrate was used for the test. The concentration of the extract thus prepared is taken as 100%. Poisoned food technique is employed to undergo the test for the antifungal activity of the plant extracts. PDA with 2% agar was used as culture medium. Varying amounts of plant extract were added to PDA to get a final concentration of 5%, 10%, 15%, and 20% to access their effect on the mycelial growth of the test pathogen.

3. Inoculation
The PDA mixed with the plant extracts were poured in Petri plates and allowed to set. Then, one disc (7mm) of the test fungus taken from the margin of five days old culture were taken and placed in the reversed orientation at the centre of the Petri plates. Three replications were set up for each treatment. The whole set up is placed in BOD incubator with temperature set at 25°C for five days. Pathogen grown on PDA plates with no plant extracts but with only distilled water acts as control plate. Percent inhibition is calculated as

\[
\text{Percent inhibition} = \left( \frac{(a-b)}{a} \right) \times 100, \quad \text{where } 'a' \text{ is the radial growth of the pathogen in the control medium and 'b' is the radial growth of the pathogen in the test medium.}
\]

4. Pot culture
Inoculation of soil is done as performed by Sachin Upamanyu et al [3]. The mass culture of R. solani was prepared on sand corn meal medium which was inoculated with mycelia bits and incubated for fifteen days at 25 ± 5°C in BOD incubator. The mass culture of R. solani was mixed in steam sterilized soil @ 10g/pot. The inoculated pots were sprayed with sterile water and established under polythene cover for two days. The seeds were sown in the inoculated pots. Six plants which show 50% mycelial inhibition over control in in vitro plates were used for pot culture experiment. Plant extracts with 20% concentration were used for the pot experiment. Each plant extract was applied in pathogen inoculated and non inoculated pots at an interval of three days up to 15th day after sowing of seed. Distilled water is applied in control pot. The disease incidence is calculated by dividing the total no of plants showing disease symptoms by the total seeds sown and then multiplying by hundred. The data observed on the 20th day after sowing is used for statistical analysis.

5. Field Trials
Field trials were conducted for two consecutive growing seasons (2009 & 2010) at Kakwa a small hamlet at the outskirt of the Imphal city of Manipur, India. The field shows rhizoctonia rot incidence during 2008 cropping season. Hence experiment is carried out at the natural inoculums potential of the soil. Field preparation were done during January. FYM at the rate of 20 tonnes /hectare, as recommended by Jasrotia RS and Sharma CM [6], were applied in the experimental plot one week prior to the sowing of the seeds. The experiment was conducted in 2x2 m² plots with three replications. In one treatment plant extracts with 20% concentration were applied at three days interval after sowing of seeds. Soil drench treatment as done by Sunita chandel & Manica Tomar [7] was followed. In control plots distilled water was applied. The total disease incidence at 20 days after sowing of seeds is used for statistical analysis. Rhizoctonia rot is more prominent during the earlier growth stages of the plants. Hence disease parameter is studied only at the young stages of the crop.

6. Statistical analysis
The data obtained was analysed using technique of ANOVA as given by Ronald E Walpole [8] to test the effectiveness of the plant extracts and if there is any significant difference in the antifungal properties of the plant extracts.

III. RESULTS

1. In vitro mycelia inhibition
The results as presented in Table 1 shows that the plant extracts were effective in significantly reducing the growth of mycelia as compared with control plates. Again 50% or more mycelia inhibitions as compared with control plates were observed with aqueous extracts of the plants viz. A. vulgaris, C. lacryma jobi, L. camera, M. champaka, P. foetida, P. granatum, and S. flaccidfolius. But A. integefolia, C. maxima and H. coronarium showed less than 50% mycelia inhibition. The effect of concentration gradient from 5% to 20% showed no statistical difference. This might be due to the effectiveness of the plant extracts at further lower concentrations. For this minimum inhibition concentration need to be studied.

2. In vivo disease incidence
The extract treated pots showed significant reduction in disease incidence with respect to control treatments. As shown in table 2, the application of the plant extracts showed decrease in the number of plants rotted. As per our data L. Camera showed maximum decrease in disease incidence. The finding showed the anti fungal effect of the six plants extract against R. solani.

3. Field Trials
From the result as sown in table 3, the plant extracts showed significant differences in DI % as compared with control treatment. L. Camera showed minimum percent disease incidence and it shows 61.07% reduction in DI% over control treatment plots.

IV. TABLES

Table 1: Radial mycelia growth and percent mycelia inhibition of R. solani with different plant extracts
### Table 2: DI % of *R. solani* on French bean with different plant extracts in pot culture.

<table>
<thead>
<tr>
<th>Name of plants</th>
<th>DI % inhibition</th>
<th>% control</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. vulgaris</td>
<td>25.33(22.28)</td>
<td>54.74</td>
</tr>
<tr>
<td>C. lacryma jobi</td>
<td>39.45(38.91)</td>
<td>60.55</td>
</tr>
<tr>
<td>L. camera</td>
<td>30.34(33.42)</td>
<td>69.66</td>
</tr>
<tr>
<td>M. champaka</td>
<td>36.65(37.26)</td>
<td>63.35</td>
</tr>
<tr>
<td>P. foetida</td>
<td>47.12(43.35)</td>
<td>52.88</td>
</tr>
<tr>
<td>P. granatum</td>
<td>50.23(45.13)</td>
<td>49.77</td>
</tr>
<tr>
<td>S. flaccidifolia</td>
<td>49.96(44.98)</td>
<td>50.04</td>
</tr>
<tr>
<td>Control</td>
<td>100(90)</td>
<td></td>
</tr>
</tbody>
</table>

Values in parentheses are arcsine transformed values.
CD (P<0.05) between plant extracts=3.74

### Table 3: DI % of *R. solani* on French bean with different plant extracts in field experiment.

<table>
<thead>
<tr>
<th>Name of the plants</th>
<th>DI % inhibition</th>
<th>% reduction over control</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. vulgaris</td>
<td>22.23(28.13)</td>
<td>31.09</td>
</tr>
<tr>
<td>C. lacryma jobi</td>
<td>18.40(25.40)</td>
<td>42.96</td>
</tr>
<tr>
<td>L. camera</td>
<td>12.56(20.76)</td>
<td>61.07</td>
</tr>
<tr>
<td>M. champaka</td>
<td>16.74(24.15)</td>
<td>48.11</td>
</tr>
<tr>
<td>P. foetida</td>
<td>16.48(23.93)</td>
<td>48.92</td>
</tr>
<tr>
<td>P. granatum</td>
<td>20.39(26.84)</td>
<td>36.79</td>
</tr>
<tr>
<td>S. flaccidifolia</td>
<td>17.64(24.83)</td>
<td>45.32</td>
</tr>
<tr>
<td>Control</td>
<td>32.26(34.61)</td>
<td></td>
</tr>
</tbody>
</table>

*Mean of three replicates
Values in parentheses are arcsine transformed values.
CD(P<0.05) between plant extracts=3.31
Rhizoctonia solani is a necrotropic soil borne pathogen with high competitive saprophytic activity[9]. Hence regular application of the fungicide is needed especially in organic soil where organic matter is usually high. Synthetic chemicals might successfully control the disease but its application might be against the logic of organic farming. Hence exploration of alternative anti fungal agents, especially the plant extracts has merits. Plant extracts as potential antifungal substance has been explored against several fungal diseases [5],[10]. In our study six plants showed 50% or above fungal mycelium inhibition activity against the pathogen in in vitro experiment. These plants have been reported to possess antifungal properties against different fungi. Lantana camera is found to effective against Fusarium solani [11]. Chhetry and Belbahri [12] reported the utility of C lacryma jobi in biological management of pest and disease in jhum cultivated crops. Passiflora species have been shown to possess anti fungal activities to a number of fungi [13]. P granatum shows anti fungal activity against Aspergillus spp.[14]. G.R.Shinde and R.C.Paled [15] have found garlic extract to inhibit R.solani. In our results C. lacrymajobi showed maximum percent mycelia inhibition in vitro. Although C.lacryma jobi, L.camera and M campaka showed above 60% control over non treatments in pot experiments .Only L camera showed 61% reduction of DI% in natural field condition. A.K Srivastava [16] was of the view that thymol present in L. Camera is responsible for the fungidal activity. Although none of the plants under study showed 100% mycelia inhibition plant yet most of them showed anti fungal activity against R.solani. From the in vitro, pot culture and field results, it can be safely concluded that the aqueous extracts of the six plants could be used in the organic farming environment to lessen the impact of the pathogen on bean crop although complete control could not be attained. Yet based on their wide availability and ease of application it could be used in wide scale in the organic farms for bean cultivation. Even though more useful oils and other components could be extracted through the use of other synthetic solvent and refined techniques yet, their use by the marginal farmers in the organic environment is limited. Hence the use of aqueous extracts has merits and is simple and could be easily followed even by a layman. This study would benefit the farmers who wish to lessen the impact of rhizoctonia rot on bean production. More and more plants, locally available need to be explored for a fruitful sustainable agriculture.

VI. CONCLUSIONS AND FORWARD LOOK

From the results some plants under study showed significant inhibitory effect even though none of the plant extracts shows cent percent mycelia inhibition. They are widely available in the state. Hence these plants could be used in the organic farming environment to lessen the impact of the pathogen in bean production in Manipur. More novel plants need to be explored to increase the resource base for use in organic farming system in a sustainable mode.

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Assessment of Consumer Awareness amongst Undergraduate Students of Thane District- A Case Study

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Abstract- Any individual who buys goods and services for personal consumption and not for commercial purpose are called consumers. Consumers form the largest economic group in any country. They are the pivots of all economic activities. The advancement of technology and the advent of sophisticated gadgets in the markets and the aggressive marketing strategies in the era of Globalization have not only thrown open a wide choice for the consumers but also rendered the consumer vulnerable to a plethora of problems associated with such rapid changes. There is an urgent and increasing necessity to educate consumers so that they can be protected against the exploitation of the manufacturers and sellers.

In spite of the various initiatives undertaken by the Government to educate and promote welfare to the consumers, the analysis of the primary data collected from 758 undergraduates’ students from six different colleges located in six different talukas of Thane District revealed that the level of consumer awareness is limited. This paper tries to suggest some measures that should be undertaken by the Government, business houses and consumer themselves to protect the interest of the consumers. An enlightened consumer is an empowered consumer. An aware consumer not only protects himself from exploitation but induces efficiency, transparency and accountability in the entire manufacturing and services sector.

Index Terms- consumers, government initiatives, consumer awareness, and intellectual property rights

I. INTRODUCTION

The Latin term ‘Consumo’ means, “eat up completely” which understandably led to the current use of the term ‘consumer’. Any person who buys goods and services for personal consumption and not for commercial purpose or resale is called a consumer.

Consumers form the largest economic group in any country. They are the pivots of all economic activities. The Government, Industry and the Consumers form the three main partners in the venture of national development. While the Government provides the capital resources, industry utilizes the capital for producing goods and consumer procures the goods, paying money for their material needs and facilities.

The need for empowerment of consumers as a class cannot be overlooked in India and is already well recognized all over the world. The advancement of technology and the advent of sophisticated gadgets in the markets and the aggressive marketing strategies in the era of Globalization have not only thrown open a wide choice for the consumers but also rendered the consumer vulnerable to a plethora of problems associated with such rapid changes. There is an urgent and increasing necessity to educate and motivate the consumers with regard to quality of products. In short, the consumer should be empowered with respect to his rights as a consumer. He should be equipped to be vigilant with a discerning eye so as to enable to protect himself from any malpractice on the part of the traders.

II. OBJECTIVE OF THE STUDY

1) To prod consumer awareness regarding ration card and card holders rights.
2) To assess consumer awareness amongst under graduate students regarding information to be displayed in a ration shop.
3) To probe the awareness of the undergraduate students regarding the intellectual property rights and consumer protection.
4) To analyze the opinion poll amongst the students.

III. RESEARCH METHODOLOGY

The study is largely descriptive and analytical. The required data for the study was collected from primary and secondary sources; the primary source constitutes the main corpus of information as it will make the major thrust area to collect reliable complete and first hand information about the awareness of consumers in the areas under study. To test the objectives, field study was conducted wherein a combination of direct approach, comprising of questionnaire-aided interviews, discussions and observational techniques was followed.

Primary data was collected from the sample subjects, the undergraduate students of conventional courses from six different colleges which were randomly selected from the areas of Ambernath, Ulhasnagar, Kalyan, Murbad, Bhiwandi, and Thane talukas of Thane District on the basis of geographical location convenient to the researcher.

Similarly, information was collected from officials of Consumer Guidance Society, Mumbai Grahak Panchayat and consumers at large.

In order to test the above stated objectives 850 questionnaires were distributed to the under graduate students. Out of the 850
questionnaires, 758 questionnaires which were correctly filled were taken into account, out of which 404 were females and 354 were male students.

Data of sample units chosen is listed below in a tabular form.

Table -1: Data of sample units chosen for the study

<table>
<thead>
<tr>
<th>Name of the College</th>
<th>Taluka</th>
<th>Sample Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>P.D.Karkhanis College</td>
<td>Ambarnath</td>
<td>81</td>
</tr>
<tr>
<td>Smt. C.H.M. College</td>
<td>Ulhasnagar</td>
<td>246</td>
</tr>
<tr>
<td>Saket College</td>
<td>Kalyan</td>
<td>73</td>
</tr>
<tr>
<td>Shivle College</td>
<td>Murbad</td>
<td>50</td>
</tr>
<tr>
<td>B.N.N. College</td>
<td>Bhiwandi</td>
<td>154</td>
</tr>
<tr>
<td>Dnyanasadhana College</td>
<td>Thane</td>
<td>154</td>
</tr>
</tbody>
</table>

Source: Compiled from primary data.

Secondary data was collected from the following sources:
1) Reports and bulletins, both Indian and foreign relevant for the study,
2) Books, journals, seminar papers, speeches, symposia, conferences etc., related to consumer education, consumer protection and consumer guidance.
3) Study of reports of well established consumer organization like Consumer Education and Research Centre (CERC), Ahmedabad, Consumer Guidance Society of India, Mumbai.

Government Initiatives:

Similarly, Government has under taken various initiatives to spread consumer awareness by resorting to publicity like advertisements have been released in national dailies as well as regional newspapers in local languages promoting consumer awareness. Around 30 major issues like, ISI, Hallmark, Labeling, MRP, Weights and Measures, Credit Cards, Financial Product, Real estate, Pharmaceuticals etc. were taken as a part of the print advertisement and more than 12000 insertions were given in the newspapers throughout the length and breadth of the country as per the DAVP(Directorate of Advertising and Visual Publicity) policy.

The Consumer Affairs Department has produced 6 video spots of 30 seconds duration on various consumer related issues such as short measurement of petrol, Grievance Redressal System, MRP, ISI, and Hall-marking etc., which is being telecast through Doordarshan and Satellite Channels. Issues pertaining to rural and remote areas have been given prominence in the various advertisement spots.

Radio being cheapest and having widest reach, a 15 minute weekly programme titled “Jago Grahak Jago” is being broadcasted through 70 stations in 20 regional languages from the year 2004. To make the programme popular a prize of Rs. 500/- per programme in every language is given. The Department of Consumer affairs has provided programmes produced in the field of consumer protection for broadcasting through Gyanvani FM Radio Stations functioning under Indira Gandhi National Open University (IGNOU) for the benefit of students. The Department of Consumer Affairs has produced 6 radio spots of 20 seconds duration on various consumer related issues such as MRP, short measurement, expiry date on medicine, adulteration, ISI mark, redressal system and started broadcasting from 14th October 2004 onwards in All India Radio and Radio City Stations.

A 12 episode video programme namely, ‘Grahak Dost’ of 30 minutes duration was produced by the Department of Consumer affairs in Hindi language initially which was telecasted on Doordarshan in the year 2004. This programmes is further made in 4 regional languages to spread the message of consumer awareness in remote areas.

The Department of consumer Affairs also prepared 4 video programmes in Hindi each of 30 minutes duration specially targeting primary, upper primary and secondary level students of schools during the year 2004-05 and got it telecasted through Doordarshan. The programme, is made available in CD to schools, consumer clubs in the schools, State Governments and others concerned to involve the students in consumer movement. The Department of Consumer Affairs has launched its consumer campaign in all regional languages through cinema slides in 9186 cinema halls in States/ Union Territories.

Nukkad Natak Contest on consumer issues is organized by the Government to spread awareness amongst the students. Government also make use of sport events, outdoor publicity, participating in national and international trade fairs, tie up with the Department of Post, use of Internet etc. to promote consumer awareness.

In spite of the initiatives undertaken by the Government, the study revealed that the consumer awareness amongst students were limited and hence they are exploited by the manufacturers, traders and sellers who use fraudulent methods to market their goods.

IV. FINDINGS OF THE STUDY

Assessment Regarding Ration Card and Card Holders Rights:
While assessing the awareness of students regarding the statement that weekly quota is not forfeited if not purchased, it was observed that only 17.5% students from all the six colleges taken together were aware of the law. Partially aware percentage was estimated to be 12.0% and majority of the students who were unaware of the law was 70.4%.

While assessing the awareness of students regarding the statement that samples of food grains to be displayed in sealed plastic bags it was observed that majority of students from all the six colleges taken together were aware of the law i.e. 48.4%. Partially aware percentage was estimated to be 17.8% and the students who were unaware of the law was 33.8%.

While assessing the awareness of students regarding the information that yellow receipts have to be issued with date of purchase, it was observed that majority of students from all the six colleges taken together were aware of the law i.e. 52.2%. Partially aware percentage was estimated to be 12.7% and the students who were unaware of the law was 35.1%.

While assessing the awareness of students regarding the law that there is no rule that ration quota can be purchased only once a day, it was it was observed that a meager percentage of the students from all the six colleges taken together were aware of the law i.e. 14.9%. Partially aware percentage was estimated to be 12.9% and majority of the students who were unaware of the law was 72.2%.

While assessing the awareness of students regarding the law that no fees to be charged for adding or deleting names in the existing ration card, it was observed that a small percentage of the students from all the six colleges taken together were aware of the law i.e. 25.7%. Partially aware percentage was estimated to be 8.5% and majority of the students who were unaware of the law were 65.8%.

**Assessment Regarding Information to be displayed in a Ration Shop:**

While assessing the awareness of students regarding the rule that it is mandatory to display registration number of the ration shop, it was observed that a meager percentage of the students from all the six colleges taken together were aware of the law i.e. 60.8%. Partially aware percentage was estimated to be 8.5% and students who were unaware of the law were 30.7%.

While assessing the awareness of students regarding the rule that it is mandatory to display inspector’s name and time of his weekly visit, it was observed that only 30.7% of the students from all the six colleges taken together were aware of the law. Partially aware percentage was estimated to be 17.9% and students who were unaware of the law was estimated to be 51.4%.

While assessing the awareness of students regarding the rule that it is mandatory to display of stock position of all ration commodities in units, it was observed that only 18.6% of the students from all the six colleges taken together were aware of the law. Partially aware percentage was estimated to be 11.6% and majority of the students who were unaware of the law i.e. 69.8%.

While assessing the awareness of students regarding the rule that it is mandatory to display official price list, it was observed that 32.6% of the students from all the six colleges taken together were aware of the law. Partially aware percentage was estimated to be 11.9% and majority of the students who were unaware of the law i.e. 55.5%.

While assessing the awareness of students regarding the rule that it is mandatory to display total number of ration cards registered with the shop, it was observed that meager percentage of the students from all the six colleges taken together were aware of the law i.e. 14.6%. Partially aware percentage was estimated to be 11.4% and majority of the students who were unaware of the law i.e. 74.0%.

While assessing the awareness of students regarding the rule that it is mandatory to display total number of units registered with the shop, it was observed that a very small percentage of the students from all the six colleges taken together were aware of the law i.e. 13.7%. Partially aware percentage was estimated to be 11.4% and majority of the students who were unaware of the law i.e. 74.9%.

**Assessment Regarding Intellectual Property Rights and Consumer Protection:**

While assessing the awareness of students regarding the rule that it is mandatory to display of total number of units registered with the shop, it was observed that a very small percentage of the students from all the six colleges taken together were aware of the law i.e. 13.7%. Partially aware percentage was estimated to be 11.4% and majority of the students who were unaware of the law i.e. 74.9%.

While assessing the awareness of students regarding the rule that it is mandatory to display of total number of units registered with the shop, it was observed that a very small percentage of the students from all the six colleges taken together were aware of the law i.e. 13.7%. Partially aware percentage was estimated to be 11.4% and majority of the students who were unaware of the law i.e. 74.9%.

**Comparison of Opinion Poll of Ki to Kvi Statements Taken Together of All Six Colleges Under Study:**

<table>
<thead>
<tr>
<th>Statements</th>
<th>Ki- Consumer education should be incorporated in the syllabi of schools and colleges</th>
<th>Kii- There should be faster consumer disputes Redressal.</th>
<th>Kiii- More</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
<td>4.79</td>
<td>3.93</td>
<td>5.00</td>
</tr>
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<td>Variance</td>
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<td>1.765</td>
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</table>
people participation in promoting consumer welfare

<table>
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<tr>
<th></th>
<th>Mean</th>
<th>SD</th>
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<td>Kiv- More Participation by voluntary consumer organizations in promoting consumer welfare</td>
<td>2.21</td>
<td>1.308</td>
<td>1.710</td>
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<tr>
<td>Kv- Dominant role of mass media in creating consumer awareness</td>
<td>2.68</td>
<td>1.525</td>
<td>2.324</td>
</tr>
<tr>
<td>Kvi- More Stringent Punishment to sellers and traders who indulge in malpractices</td>
<td>4.44</td>
<td>1.603</td>
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</tbody>
</table>

Source: Compiled from primary data.

While analyzing the preference order of the students from all the six colleges under study regarding to the above said statements it was observed that students had polled greater preference for the (Ki) statement i.e. Consumer education should be incorporated in the syllabi of schools and colleges a mean of 4.79, which was followed by (Kvi) statement i.e. More stringent punishment to sellers and traders who indulge in malpractices a mean of 4.44. The third preference order was for the statement (Kii) i.e. there should be faster consumer disputes redressal a mean of 3.93. The fourth preference was shown for (Kiii) statement i.e. More people participation in promoting consumer welfare a mean of 2.93. The next preference was for statement (Kv) i.e. Dominant role of mass media in creating consumer awareness a mean of 2.68. The students polled least preference for statement (Kiv) i.e. more participation by voluntary consumer organizations in promoting consumer welfare a mean of 2.21.

V. SUGGESTIONS

Imparting Consumer Education:

We live in a consumption society. Consumption is an important part of our everyday life and uses up a significant proportion of our money and our time. This consumption society is changing very rapidly. Ever since the mid-twentieth century consumers have faced major changes in their life styles and consumption habits due to different cultural, social, economic and technical influences. The increasing mobility of population, production of new items and services, new purchasing methods and information availability modify perceptions. This development has created the need for consumers who can interpret relevant information and corporate messages in order to make prudent choices. Hence consumers need information and education.

1. “Consumer education is a process that equips people to function as responsible consumers in a complex, technological society-it helps them understand their value systems; develop sound decision-making procedures in the market place; recognize their rights and responsibilities; and understand the cumulative effect of consumer decisions on the community, economy and environment.” [Western Provincial Task Force Report on “Consumer Oriented Studies for Elementary School Children”, 1976, pg 21]

2. Consumer education is the process by which consumers:a) “Develop skills to make informed decisions in the purchase of goods and services in the light of personal values, maximum utilization of resources, available alternatives, ecological considerations and changing economic conditions. b) Become knowledgeable about the law, their rights and methods of recourse, in order to participate effectively and self-confidently in the market place and take appropriate action to seek consumer redress. c) Develop an understanding of the citizen’s role in the economic, social and government systems and how to influence those systems to make them responsive to consumer needs.” [US Department of Education, 1980]

Consumer education should help to open the ‘consumer eye’ of the consumers. The ‘consumer eye’ concept means that an informed consumer looks at a product critically and analytically, first from his own point of view as an individual consumer, then with the interest of the community at large in mind. Consumer education must inculcate the responsibilities of consumers. Responsibilities always precede rights. If consumers want their rights recognized, they must first exercise their responsibilities.

A free market economy can only function effectively with the support of an educated consumer. Consumer education is a way to balance the power between the producers and consumers. Consumer education provides the insight necessary to develop citizens into responsible and intelligent acting consumers.

Education is the first line of defense against fraud and deception. It is the most powerful tool for progress of the country and is a social and political necessity. Undoubtedly, knowledge is power. It is education, which transforms the individual’s personality, enriches the mind, sublimates the emotions and illuminates the spirits. Education leads to liberation- liberation from ignorance, subjugation, exploitation, superstition and prejudice. Education has a well-defined role in creating conditions of change. Education helps an individual as a consumer in making rational choices and protects him from trade and business related exploitation. It can help one to make well-informed decisions before one spend money. Only knowledge and alert consumers aware of their rights and responsibilities can protect themselves efficiently. Where the literacy rate is high and social awareness is greater, the consumer cannot be easily
Informed, educated and aware consumers are assets to the society. Education and information bring independence, which in turn contributes to the growth and development of individual personality. An informed and educated citizen is considered to be sine qua non for the success and well functioning of constitutional democracy.

In India 240 million people are between the age group of 10 to 19. But this demographic dividend is not something that it comes to India automatically. It could well turn into a demographic disaster in the absence of right type of education. We need to move from education based learning to inspired learning.

Consumer awareness plays a key role in customer decision making. By increasing a potential or current customer’s knowledge about a product, service or business, a healthy economic environment is established in which customers are informed and protected and businesses are accountable. It benefits both individuals and society as a whole. From individual point of view it enhances critical thinking, improved life skills and increased self-confidence. Consumer awareness benefits the society by promoting satisfaction, increasing economic stability and creating realistic customer expectations.

Within India, the level of consumer awareness varies from State to State depending upon the level of literacy and the social awareness of the people. The report of the study on the Consumer Protection Act commissioned by the Comptroller and Audit General (C&AG) of India conducted in July-August 2005 brought out that 66% of the consumers were not aware of consumer rights and 82% were not even aware of the Consumer Protection Act (CPA). In rural areas, only 13% of the population had heard of the CPA. The need of the hour is, therefore is to educate the common consumers particularly in rural areas who happen to be easy victims of unlawful trade practices being adopted by wrongdoers, because of their less education and poor knowledge to understand about their responsibilities as consumers. Creation of awareness among consumers about their rights at districts and taluka level needs to be given high priority. Once they are educated and made aware of the schemes that have been drawn up for their benefits and also the redressal forum that is available, the benefit of various schemes, in true sense, will reach the common consumers of the society.

It is, therefore, our bounden duty to play our part jointly and effectively is disseminating various schemes to the common consumers of the country. In this regard, the role of educational institutions cannot be ignored.

Role of educational institutions in consumer protection movement may not legitimately be denied on any conceivable ground. It is recommended that educational institutions need to play an effective role in consumer awakening and imparting information regarding organizations working for the consumer’s interest. Various methodologies should be adopted by the educational institutions such as organizing seminars, workshops, lectures, discussions, colloquiums, essay competitions, quizzes etc. in the area of consumer protection and welfare to give boost to the consumer protection movement in the country. Consumer education teaches individuals to be more skilled buyers and enables them to know what the value is for money. Consumer education therefore should take place in the classrooms, work place, community centre and homes. The practitioners of consumer education should include teachers, parents, trade unionists, NGOs and the media. Thus consumer education should embrace all sections of the society formally and informally. Government should establish links with educational institutions like universities, colleges, high schools to emphasize the need for improving consumer education. Synergies should be made among all stakeholders to contribute to the development of appropriate education and information materials, to disseminate amongst the poor, marginalized, disadvantaged and rural illiterate communities to enable them to access to advice and assistance in meeting their essential needs.

**Activation of Consumer Clubs in Schools and Colleges:**

Consumer clubs in schools and colleges have to be activated through some structured activities. An interested teacher, who can act as the catalyst, with the approval of the school Principal and with the assistance of the local consumer organization can initiate the school and college consumer club.

The teacher can identify a core group of students who will advertise the setting up of the club to the school population. It is important that the core group is not selected merely on academic performance. The club should avoid the pitfalls of elitism - including students of different capabilities and social strata.

The teacher’s discretion and influence should be exercised in the selection of some special members who will be needed by the club. These important students can be nominated as the organizers, speakers, artists and writers. They are necessary for the survival of the club (or else the teacher will end up doing all the work). Monthly meetings and demonstrations for one hour after school hours on the 1st Monday of each month can be held. Each month a topic or activity may be scheduled as in the model calendar.

Activities both long term and short term, undertaken by members that will benefit the general school and college population should be the priority. It is a good idea to plan activities requiring minimum resources but benefiting maximum numbers of students.

A notice board placed in a pivotal position in the schools and colleges, where there is a lot of traffic, as for instance, somewhere between the classrooms and the canteen. The board should display clippings, pictures, attractively and legibly written results of surveys and inquiries. To sustain interest, all materials should be changed regularly. A consumer club notice board should be opened to be updated daily by the teacher and students with consumer related news.

There should be a consumer corner in the school and college library to display samples and all forms of consumer education materials.

Days of national and international importance to consumers i.e. 24th December and 15th March may be celebrated in the schools/ colleges. Posters/speech/essay competitions can be organized at schools/colleges levels by the consumer club. Field visits to local markets/consumer courts and door to door campaign in the local community etc. may be organized for at least four days in a year. It can be done on Saturdays by prior arrangement.

Minutes of each activity have to be recorded by the students and teacher coordinator jointly and to be documented.
The informality of consumer education via clubs is a magnetic force for consumer education. Sustained activities raise consumer consciousness.

**Media:** It can play an important role to promote general awareness of the rights of the consumers by providing information to them. It can publish periodical and product specific booklets, pamphlets, cassettes, CDs, slides, documentary films and other devices of mass communication for promoting consumer awareness in English and regional languages, highlighting the problems in specific areas like real estate, public utilities, non-banking financial agencies etc. Enlighten the business community on its ethical and legal obligations to maintain quality of the products or services and to be transparent in dealing with consumers. Conduct motivational campaign for groups of potential customers both in urban and rural areas. The role of media to promote consumer awareness cannot be undermined and mass media is required to play a more rigorous and positive role.

**Large Business Houses:** The large business houses especially those who are producing consumer products must have a consumer affairs cell at the highest level in their own business organization. This should be made compulsory by the concerned ministry. To follow the directions very strictly if necessary ordinance has to be passed. Business organizations should regularly provide information in regard to self-regulatory or consumer protection activities to the media and that should persuade important newspapers to publish a regular feature on consumer affairs so as to promote consumer awareness.

Consumer meets should be organized regularly by traders and business houses on open invitation through advertisements published in newspapers and customers attending these meets should be invited to offer their complaints and suggestions in regard to the products and services of the company. The concerned governments should direct all the business houses to organize meets regularly and should be watched constantly.

**Need for a Strong Intellectual Property Right Regime:**
A strong Intellectual Property Right (IPR) regime is a critical precondition for enhancing and stimulating economic growth in the country. It facilitates greater investment into the research and development as well as provides means to improve the quality of life of people of the country. IPR not only protects the innovative and creative capacity of competitors and owners of IP rights that supply goods and services, but it also concern itself with the interests of the consumers of those goods and services, directly or indirectly. The existence of such rights is necessary for overall development of society.

The areas of intellectual property that are most relevant for consumer protection are Trade Marks, Geographical Indications and Protection against unfair competition.

A trade mark is a sign which is used in the course of trade and distinguishes goods or services of one enterprise from those of other enterprises. Consumers often make their purchasing choices on the basis of recognizable trademarks/service marks. So, the main thrust of trade mark Act is to ensure that trademarks don't overlap in a manner that causes users/consumers to become confused about the source of a product.

Geographical Indication is an indication used to identify goods having special characteristics originating from a definite geographical territory. The benefits of registration of geographical indications are:

a) Provides legal protection to Geographical Indications in India, which in turn gives boost to the exports;

b) Prevents unauthorized use of a Registered Geographical Indication by others;

c) Promotes economic prosperity of producers of goods produced in a geographical territory;

d) Promotes consumers' welfare by providing goods of reputation and quality; etc.

These IP rights help the consumers in buying quality products and protect them from use of substandard products which may cause health and safety hazards. Thus, the proper operation of IP rights and their enforcement is very important for consumers. Further, it is the core of IP system that people of the country must be protected from unfair competition, that is, from any act of dishonest practice in trade and business.

Protection against unfair competition has been recognized as one of the main objectives of intellectual property system. It does not grant exclusive rights to the owners with respect to the subject concerned, like in the case of patents, trademarks, etc. In fact, it prohibits any act of competition that is contrary to honest practices in industrial or commercial matters, referred to as "unfair competition".

The acts of unfair competition not only adversely affect the competitors, which tend to lose their customers and market share; but also affect consumers as they are likely to be misinformed and mislead and tend to suffer economic and personal prejudice. Free and fair competition between enterprises is considered to be the best means of satisfying supply and demand in the economy as well as of serving the interests of consumers and economy as a whole. This stimulates innovation and productivity and leads to the optimum allocation of resources in the economy; reduces costs and improves quality; as well as accelerates economic growth and development.

**Formation of Local Organizations of Ration Card Holders:**
It is difficult for individual alone to ensure proper implementation of the rationing rules and assert one's rights hence, it is necessary to form local organizations of ration card holders. Local groups, women's groups and party branches should take the lead in solving card holder's problems. Complaints redressal committees need to be set up for this purpose. Card holder, ration shopkeepers and ration inspector should be member of this committee.

Such a committee could be for 5 - 10 ration shops jointly. Problems that cannot be solved by the committee can be referred to the Controller or the Department. The PDS covers all of Maharashtra. Rationing Problems affect everyone from city dwellers to people living in rural areas. It is essential that organizations which are working on behalf of cards holders should come together in the form of a federation to ensure proper working of the PDS.
Role of Government: Government will have to play more effective role in promoting consumer awareness and protecting the interest of the consumers. Government should make and implement rules of punishment more harsh so that manufacturers and traders think twice before adopting fraudulent practices. A campaign should be set in motion to involve each and every consumer for making them more conscious and aware of their rights and responsibilities. To involve each and every consumer seminars, conferences, talks, street plays etc. should be made a part of the campaign.

Government and other consumer activist agencies should make efforts in the direction of propaganda and publicity of District Forum, State and National Judiciary established for consumer protection so as to make more and more consumer aware about the machinery for their greater involvement and to seek justice in case of grievances.

Redress procedure should be made more logical, easy enough to be understood by a large number of consumers. Further, procedures should be designed as to have easy handling and quick disposal of cases.

Involvement of people at large: The policies, schemes and programmes of the Government of India through the Department of Consumer Affairs are no doubt useful but their effectiveness finally depends on the involvement of the institutions and the people at large. A number of schemes have already been in operation such as, Grahak Jagran, consumer clubs is schools, promoting involvement of research institutions, universities, colleges etc., in consumer protection and welfare. Similar programmes and schemes are needed at the State Government level also to provide further impetus to consumer movement in the country. Organisations of civil societies are having special responsibility in this regard. However, as consumers, all of us should join our hands and remember the bold words of Shri. Swami Vivekananda, a famous saint and philosopher of India—“Arise! Awake! Stop not till the goal is reached”.

VI. CONCLUSION

The efficient and effective programs of consumer protection are of special significance to all of us because we all are consumers. Even a manufacturer or provider of service is a consumer of some other goods or services. If both the producers/providers and consumers realize the need of coexistence, adulterated products and spurious goods and other deficiencies in the services would become a thing of past. The active involvement and participation from all quarters i.e. the Central and State Governments, the educational institutions, the NGO’s, the print and electronic media and the adoption and observance of a voluntary code of conduct by the trade and industry and the citizen’s charter by the service providers are necessary to see that the consumers get their due. The need of the hour is for total commitment to the consumer cause and social responsiveness to consumer needs. This should, however, be proceeded in a harmonious manner so that our society becomes a better place for all of us to live in.

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Performance Analysis of MIMO-OFDM System in Rayleigh fading Channel

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apseng2005@gmail.com

Abstract- In this paper we show the performance of MIMO-OFDM [1] (Multiple Input Multiple Output-Orthogonal Frequency Division Multiplexing) system in Rayleigh Fading Channel [2]. MIMO-OFDM system is very popular technique for mobile communication now a day’s. We compares Ergodic and Outage Capacity [3] with taking various numbers of Transmitting and Receiving antennas and various performance measures such as SNR, BER etc.

Index Terms- MIMO-OFDM, Ergodic Capacity, BER, SNR, Outage Capacity

I. INTRODUCTION

Now a day’s integration of Orthogonal Frequency Division Multiplexing (OFDM) technique with Multiple Input Multiple Output (MIMO) systems has been an area of interesting and challenging research in the field of broadband wireless communication. Multiple input multiple output (MIMO) systems using multiple transmit and receive antennas are widely recognized as the vital breakthrough that will allow future wireless systems to achieve higher data rates with limited bandwidth and power resources, provided the propagation medium is rich scattering or Rayleigh fading and the fades are independent and identically distributed. On the other hand, traditionally, multiple antennas have been used to increase diversity to combat channel fading. Hence, a MIMO system can provide two types of gains: spatial multiplexing or capacity gain and diversity gain. However, the capacity and diversity benefits of MIMO systems depend strongly on what kind of fading the channels undergo; whether the fades associated with different transmit and receive antennas are correlated; and whether the channel state information (CSI) is available at the transmitter. This paper presents the progress we have made towards determining the capacity and benefits of multiple antennas under different assumptions about the underlying channel.

Wireless technology is the foundation for the much anticipated ubiquitous communication networks that will allow people and machines to transfer and receive information on the move, anytime and anywhere. This technology will enable an endless array of applications such as wireless phones, wireless Internet access, wireless local area networks (WLAN), automated highways, distance learning, video conferencing, and home audio/visual networks. There are many technical challenges that must be overcome in order to make this vision a reality. One of the toughest challenges faced by wireless engineers and system designers is the bottleneck presented by the wireless link layer as some of the applications e.g., video conferencing, and home audio/visual networks require data rates nearing 1 Gb/s. Moreover WLANs are faced with demands of providing higher data rates due to the increase in rich media content and competition from 10 Gb/s wired LANs. Designing very high speed links that offer good range capability on the wireless channel is a hard problem for several reasons. The wireless channel is a harsh time-varying propagation environment. A signal transmitted on a wireless channel is subject to interference, propagation path loss, and delay spread, Doppler spread, shadowing and fading. While it is possible to increase data rates by increasing the transmission bandwidth or using higher transmit power, both spectrum and transmit power are very constrained in a wireless system. The bandwidth, or spectrum, is prohibitively expensive. Increasing transmit power adds interference to other systems and also reduces the battery life-time of mobile transmitters.

II. SYSTEM MODEL

A model of MIMO-OFDM system with \( N_{Tx} \) transmit antennas and \( N_{Rx} \) receive antennas is depicted in the Figure 1. Let, \( x_i \), \( y_i \) and \( r_i \) be the transmitted signal, received signal and the Additive White Gaussian Noise (AWGN) for the \( i^{th} \) sub-carrier respectively and the system uses frequency selective channel. The received signal can be given as

\[
y_i = H_i s_i + r_i ; \quad 0 \leq i \leq N_s
\]

In Eq. (1), \( N_s \) represent the number of sub-carriers \( H_i \) is the channel response matrix of \( i^{th} \) sub-carrier that is of size \( N_{Tx} \times N_{Rx} \). The \( H_i \) is a Gaussian random matrix whose realization is known at the receiver and it is given as

\[
H_i = \sum_{l=0}^{L-1} h_l \exp \left( -j2\pi^* i*l/N_s \right)
\]

In Eq. (2) \( h_l \) is assumed to be an uncorrelated channel matrix where each element of the matrix follows the independently and identically distributed (IID) complex Gaussian distribution and \( L \) represents the tap of the chosen channel (i.e. L-tap frequency selective channel). It is assumed that a perfect channel state information (CSI) is available at the receiver but not at the...
transmitter. The total available power is also assumed to be allocated uniformly across all space-frequency sub-channels.

In MIMO-OFDM system Ergodic Capacity is defined as this is the time-averaged capacity of a stochastic channel. It is found by taking the mean of the capacity values obtained from a number of independent channel realizations. And Outage Capacity is defined as the q% outage capacity. Cout,q is defined as the capacity that is guaranteed for (100 – q) % of the channel realizations. Ergodic Capacity is defined by equation

\[ C = E \left( \frac{1}{N_S} \sum_{l=0}^{N_S-1} \log \left( \det \left( I_{N_{Rx}} + \frac{\gamma}{N_{Tx}} Q \right) \right) \right) \]  

\[ \gamma = \frac{\rho}{n_{Tx}} \]  

\[ Q = H_l H_l^H \]  

In above equation E(.) denotes Ergodic Capacity, \( I_{N_{Rx}} \) is identity matrix of \( N_{Rx} \), \( N_{Rx} \), \( \rho \) is SNR per sub-carrier, \( n_{Tx} \) no of transmit antenna. Fig no 1 shows the block diagram of MIMO-OFDM system.

We use QAM (Quadrature Amplitude Modulation) for transmission. CP (Control Programming) is an operating system originally created for 8-bit processor. FFT is an efficient algorithm to compute the discrete Fourier transform and its inverse. RF switch generally called Radio Frequency switch. PIN Diode is generally used to make it operate at very high frequency.

In this switch input signal is fed at one end then this signal is split into no of output signal by demux.

\[ Q = H_l H_l^H \]  

**Fig 1.** Block Diagram of MIMO-OFDM system, (a) Transmitter and (b) Receiver
III. RESULT AND DISCUSSION

Table No 1. SNR and Ergodic Capacity (n_t=30)

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Above fig show how ergodic capacity change with respect to SNR value where n_t is no of transmit antenna. We use MATLAB R2010 for calculating Ergodic and Outage Capacity. We see that when there is less no of transmit antenna then capacity is not increasing too much but when no of transmit antenna (n_t) increases then at very small value of SNR , Ergodic Capacity increases rapidly. This indicate that ergodic capacity is function of no of transmit antenna and SNR. Fig no 2 shows the variation of SNR vs. Ergodic capacity(value of n_t are constant). In fig no.2 we find limitation of ergodic capacity. We see that at n_t=1 although we increase SNR but Ergodic capacity not increases w.r.t SNR means it is nearly study state. So for improve Capacity or channel we should increase the no of transmit and receive antenna. Table no.2 shows variation of ergodic and outage capacity w.r.t no of transmit antenna, and it give that there are 1% difference between them and this comparison also present in graph no 6. Fig no 3 an 5 show individual variation of Ergodic and Outage Capacity. Table 3 shows that if we increase SNR then BER is also reduces and fig 6 is semi logical plot between SNR and BER. It show that if SNR increases then BER decreases.
Table 3: SNR vs BER

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<td>20</td>
<td>6.35E-24</td>
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</table>

Table 3 shows variation of bit error rate w.r.t signal to noise ratio. We use AWGN as a noise signal and QAM (Quadrature Amplitude Modulation) as a modulation. In fig no 4 when SNR is increase then the value of BER is almost zero at 20.

Fig. 5 Outage capacity vs. n_r

Fig. 6 Outage and Ergodic capacity vs n_r

IV. CONCLUSION

Ergodic channel capacity has some limitation in MIMO-OFDM system. So channel capacity optimization is necessary to improve the performance of MIMO-OFDM System. By above
result we can analyze MIMO-OFDM system deeply and use various algorithms to optimize channel capacity.

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I would like to thank Mr. Champak Roy (M.D. Hyapatia Software Solution), Er. Rajeev Paulus (Assistant Professor, SHIATS) and all of my Friends and Family members.

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PUBLIC PRIVATE PARTNERSHIP BASED SECURITY SYSTEM FOR WATER RESERVOIRS

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Abstract- Information systems are playing the important role by sharing it about the information of natural resources maintained by the human beings. The security aspects about the important resources studied where due to lack of users to provide the security systems by their involvement. We mentioned here the problems with existing system and due to which what adverse effects are arising due to lack of information system for the resource sharing? We suggested a web based model for information sharing based on the public private partnership (PPP). We also mentioned how the available human resource can be involves in the security system as part of extending the services to the nation buildings other than the present government human resources. How does this aspect helps to inculcate the concept of extending national services in the education system is stated in the paper. Paper also encompasses with working, advantages, and limitations.

Index Terms- information, PPP, resources, nation, security

I. INTRODUCTION

Education is playing the vital role in the development and sustenance of any country. Nation tries to be well accumulated with the different natural resources. Some resources are under utilization by the mankind by making use of science and technology [1, 6]. But there are certain resources which are very important in the view of future and development of mankind and especially the farming and industrial sectors. Seventy percent community is living based on agricultural business. Hence present case study selected here is a large water resource ‘Koyana Dam and its security aspects about disaster administration’. Here the term disaster administration is viewed in the view of attack by the militants only. It is observed that Koyana - water resource is not having adequate safety and security measures due to certain unavoidable reasons and limitations in the usage of available human resources. Hence we felt the need of the proposed model based on Public Private Partnership [3].

II. CASE STUDY: SECURITY MODEL FOR KOYANA DAM

Objective of the paper is to enhance information sharing amongst various elements such as clients (public units – colleges) private agencies and share the data about human resources to enhance the security measure as service for providing better security to the natural resource e.g. Koyana Dam as help to nation and enhance coordination amongst the various Govt. departments.

The present study is based on Koyana Dam located in Satara district of Maharashtra - a huge water resource with large power generation plant in Western belt of India. These units are resources of water and electricity in the view of nation. Survey shows that, present mechanisms for information generation and sharing are inadequate. It is observed that, today the users are involved in providing the security as police force and other supporting man power which is a very less in the view of prevention of Natural and Artificial Disaster such as attack by external agencies. It is seen that the Govt. is unable to increase and provide the adequate and skilled man power with safety equipments. We felt that these limitations can be overcome by implementing the proposed model which follows the Private Public Partnership for information sharing and accumulation based on Distributed Computations [5]. Though public units are involved but under the control of Dam Administration.

III. PROBLEMS IN PRESENT WORKING

Why need of Web Based Computing Model for Koyana Dam Security?

We observed that, present security system available at Dam is having following limitations.

- Lack of adequate human resources
- Lack of central control agency
- Lack of coordination amongst the agency and security system
- Lack of storage of visitors database
- Inadequate emergency services
- Lack of information system and generation of requisite reports
- Preventive measure for invader attack
As Dam area is large present human security control is fewer in the view of 24x7x365.
Possibility of Huge damage

IV. PROPOSED DAM SECURITY MODEL
The architecture of Proposed Model is shown as below

![Dam Security Model](image)

The present administration comprises with:
- Human Resources as Users
- Computing Equipments [10]
- Telecommunication Services
- Dam Security

The proposed model comprises with the following as support and service cells.
- College : NCC units
- District Administration
- Military and Police Training Institute
- Tourism and Medicinal Agency
- Retired. Police and Military Agency
- Dam security Cell
- Record Room
- Planning and Controlling Authority

V. TOOLS USED
The tool can be developed as web based security system [7] by using the .Net platform along with the database MS Access. The model uses Client Server Architecture. The object oriented Programming paradigms are followed during the building of the system.
There are two types of users: Client side users and Server side users.
The clients can be College NCC cells, military and police training institute, Retired Police and military agencies, district administration. The server side users are the controlling and planning authority and Dam Security.

VI. RESOURCES UTILIZED
The term resource used here is the database [4] as well as the human man power. The users of the model are:
- College NCC users
- District Administration user
- Military and Police Training Institute users
- Tourism and Medicinal Agencies
- Retired. Police and Military Agency users
- Dam security Cell users
- Record Room users
- Planning and Controlling Authority users

Public Agencies:
The term public agencies refer to the different units such as Colleges, District Administration, Military and Police Training Institutes, Retired. Police and Military Agencies,

Private Agencies:
Here the private users are: Tourism and Medicinal Agencies, Dam security Cell, Record Room, Planning and Controlling Authority.

Proposed Model:
It is observed that providing the security to the national resources should be the prime responsibility of the nation. But it is seen that Govt. has adequate schemes for the implementation of security issues. But it is seen that as the area covered by the Dams is large dispersed all over the nation. There are number of dams whose security considerations can be studied. In present study, we have selected Western Zone of the Maharashtra for the study purpose.

FLOW DIAGRAM OF DAM SECURITY MODEL
The flow diagram for proposed Dam Security model is shown as

![Flow Diagram of Security Model](image)
VII. WORKING

Following should be role and responsibilities of the various components.

1) Planning and Controlling Authority users
The planning controlling authorities comprises with Dam Security cell along with other agencies who participates in the above said model. They prepare the schedule and communicate to the requisite units. The schedule is hosted and updated on the server computer by the administrator.

2) District Administration user
The District administrator’s role is to support the participants/users from outside areas. They should be updated and assisted about the routes, maps of other important locations in the area around the district e.g. visiting places like temples, forts, forests, hill stations in the view of developing Tourism and study of medicinal plants and Ayurvedic Sciences.

3) Dam security Cell users
The important role and responsibility is of Dam Security Cell users. They have to prepare the actual plan which is their main job. Every location where the private users like students, Retired Military police and other experts may participate. Full time Security employee/s must undertake to support the participating outside users. They need to assist and supported for their personal security, food other arrangements and their requirements about tours and study related issues.

4) Record Room users
The record room maintains data of security [9] personnel’s, users about the detailed about:

- Educational data
- College data
- Residential data
- Referred Administration data
- Past History
- Daily visiting data of the users

The record room has to update the data and communicates to the Dam Security as well as to the District Administration.

5) College NCC users
The NCC units must be chaired by the Local Military NCC unit in association with Principal nominated by the University Grant Commission (UGC). The NCC unit

6) Military and Police Training Institute users
These users from military and police training institutes who completed their internship soon they can participants of the model. The users under the able guidance and training with authorized nomination of the Govt. Senior officer can be involved with certain security constraints. Not only the local institutions can be take part in to this as Internet is the Distributed Computing Model so the national level training institutes can submit their trainees data as global users.

7) Tourism and Medicinal Study Agencies

In the view of developing and enhancing the Tourism as industry this model can be the one of the good solution with the help of Web based security system [7]. The users who participates can bring their family members, friends who are having keen interest in the field of Tourism and stay in the nearby places and visit the Forest and Hill area besides the dam. At certain distance the Kankan the nice belt of Greenery can be visited with the help of dam security and administration. With help of these users, the travel and tourism industry may be strengthening. The final year and research students of Ayurveda – a branch of medical science can be motivated with the usage of the model. This helps to enhance both to the Dam Administration and their Studies with the help of large availability of medicinal plants I the nearby forest. The data and information of near by forest and other places can be made available by the model and provided on the request.

8) Retired Police and Military Agency users
The retired and healthy officers and soldiers from the various parts of the country may be involved based on their wish under the certification of the Govt. Medical Officer. These users can support and advise in the Dam Security issues under the guidance and support of the District and Dam Security cell. They can visit and stay with their family, friends and they can be helping to enhance and develop Tourism and Medicinal study.

VIII. ADVANTAGES

Following are will be the advantages of the proposed model.

[i] Exchanges information securely for resource sharing.
[ii] Model for rural development and community building.
[iii] Helps to reduce workload on present security users.
[iv] On site experience for the trainee students.
[v] Enhances security in the view of 24x7x 365 ways.
[vi] Enhances awareness about National security love and affection towards the responsibilities.
[vii] New door for the development of Tourism industry.
[viii] Centralized data storage for decision making [2].
[ix] Data can be mined for the further decision making.
[x] Present human resources can be relived from overload.
[xi] Opportunity for Ayurveda Doctors, Medicinal Researchers to collect and study medicinal plants in the forest.
[xii] Enhances awareness about National Resources and their problems for rural development.

IX. LIMITATIONS

Following will be the limiting factors during the implementation of the proposed model.

- High risk for the sponsoring authority to maintain the data.
- The full time existing employee must extend the assistance and support.
- District administration support must be adequate
• 24x7x365 support for participants.
• Local community help is required.
• Instant data communication between Institutes/colleges, Military and Police Officers working presently and also retired.

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Increasing the Performance of IEEE 802.11n in Multi Channel Multi Radio Mobile Ad hoc Networks

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Abstract- In wireless ad hoc networks, a central issue is how to improve the system throughput, delay with low cost. To address this issue, one common approach is the multi-channel scheme. Multi-channel Multi-radio (MCMR) is a promising solution because commercial off-the-shelf (COTS) products can be utilized. The performance evaluation of IEEE802.11n in multi-channel multi-radio (MCMR) mobile ad hoc network, based on various performance metrics such as throughput, end-to-end delay, PDR(packet delivery ratio) and routing overhead has been made at different number of channels.

Index Terms- WMNs; Throughput; End-to-end delay; PDR; Routing overhead.

I. INTRODUCTION

Throughout the past decade, IEEE 802.11 access technologies have been broadly applied to wireless local area networks (WLANs) deployments. The dominant standard for WLANs is IEEE 802.11, which provides specifications for both the physical layer and the medium access control (MAC) layer. By definition, WLANs usually covers a small area, typically less than 500 meters in diameter. To set up wireless ad hoc network with inexpensive, commercial off-the-shelf (COTS) devices, the concept of wireless mesh network (WMN) has been proposed [1] and is considered as an effective solution. In a WMN, nodes can automatically establish an ad hoc network and maintain the connectivity; therefore the network is dynamically self-organized and self-configured. According to [1], there are two types of nodes in WMN: mesh routers and mesh clients. Mesh routers are typically equipped with multiple radio interfaces in order to provide a backbone for routing packets. Mesh clients, on the other hand, incorporate network interface cards that connect them to the WMN through mesh routers. An example of WMN is illustrated in Fig. 1, where mesh routers are set up on top of big buildings and mesh clients are deployed at the rooftop of residential houses.

II. BACKGROUND AND RELATED WORKS

In the literature, there are a number of preliminary results about the performance multi-channel multi-radio (MCMR) wireless ad hoc (or wireless mesh) networks. In this work, focus on the performance of the backbone of WMN, which consists of interconnected mesh routers. Clearly, to improve the performance of wireless ad hoc network, an effective approach is to install multiple radios in each mesh router. In this manner, the network can leverage more radio spectrum resource if multiple radio interfaces of nodes can transmit and receive on different channels simultaneously. Evidently, as the hardware cost keep decreasing, this approach is becoming more and more attractive.

In this paper, we will investigate the performance of wireless ad hoc network based on WMN technologies. In particular, we will focus on the performance of the backbone of WMN, which consists of interconnected mesh routers. To address this issue, one common approach is the multi-channel scheme. Multi-channel Multi-radio (MCMR) is a promising solution because commercial off-the-shelf (COTS) products can be utilized.
Here, the authors focused on the design of channel assignment and routing algorithms. Their results show that it is possible to improve the network throughput significantly, even with only two network interface cards in each node. A complete performance evaluation is presented in this paper to show the improvement due to 1) multiple channels provisioned in the network; 2) multiple radio interfaces, 3) the number of gateway nodes and the placement of these nodes; and 4) the algorithmic parameters, such as channel selection criterion and routing metrics. The simulation study was conducted over a fixed architecture, namely Hyacinth, which composes of 9 nodes with 2 interfaces per node. Two out of these 9 nodes served as gateways nodes connected to a wired network. Compared to [2], we take into account the packet aggregation mode in the MAC layer. The author showed that even with just 2 NICs on each node, it is possible to improve the network throughput by a factor of 6 to 7 when compared with the conventional single-channel ad hoc network architecture.

[3] Presents optimization models for fixed channel assignment in WMNs with multiple radios. The authors consider interference constraints and try to maximize the number of bidirectional links that can be activated simultaneously. In other words, the purpose of the scheme is to maximize spatial reuse. [3] showed that the combination of multiple radio nodes in conjunction with a suitably structured multi-hop or mesh architecture has the potential to solve some of the key limitations of present day wireless access networks that are based on single-radio nodes.

Similarly, in [4], the authors show that interference can adversely affect the performance, and the authors propose a channel assignment solution to minimize interference within the mesh network. The proposed solution intelligently assigns channels to radios to minimize interference within the mesh network and between the mesh network and co-located wireless networks. It utilizes novel interference estimation technique implemented at each mesh router. An extension to the conflict graph model, the multi-radio conflict graph, is used to model the interference between the routers. This strategy has several advantages. First, it prevents changes in the topology of the network because routers will discover otherwise disconnected neighbors by communicating over the default radio interface. Second, overcoming node failure is simplified because a router will be able to choose alternate paths to route around a failed node. Third, the routing protocol will now have the option of selecting a path that is not frequency diversified if it has better performance characteristics than a frequency diversified alternative. As a final advantage, any disruption of flows during channel assignment can be avoided by redirecting flows over the default radio until the assignment completes.

[5] have discussed about Ultra wideband (UWB) communication that is an emerging technology that promises to provide high data rate communication for wireless personal area networks. One of the critical challenges in UWB system design is the timing acquisition problem, i.e., a receiver needs a relative long time to synchronize with transmitted signals. Clearly, the timing acquisition overhead will significantly limit the throughput of high data rate UWB ad hoc networks. To resolve the timing acquisition problem, they proposed a general framework for medium access control (MAC) protocols, under the framework; a transmitting node can aggregate multiple upper layer packets into a burst frame at the MAC layer. Besides packet aggregation, they also design a novel retransmission scheme which is suitable for error-prone wireless environment, in which only the packets that encounter transmission errors will be retransmitted. Through extensive numerical and simulation results, [5] showed that, compared to existing MAC protocols; in which upper layer packets are transmitted one by one, the proposed protocol can drastically reduce the timing acquisition overhead. Consequently, both the throughput and the end-to-end delay performance can be significantly improved.

It is important to note that the channel assignment problem is a key issue for MCMR network design. A summary of the state-of-the-art and open issues in resource allocation is presented in [6]. This paper investigates the problem of resource allocation (i.e., channel allocation, scheduling and routing) for network performance optimizing. Such an optimization problem is particularly challenging in MCMR networks, given tightly coupled resources and often requires joint optimization solutions. To name a few, the selection of the network interface cards (NICs) for the communication, the binding of channel to the NICs, the scheduling of transmissions and the traffic routing over the resulting topology are amongst the major degrees of freedom involved in the resource allocation problem, yet closely intertwined with each other.

III. THE SIMULATION CONFIGURATION

In this section, we illustrate the network configuration of our simulation study. We consider a 25-node MCMR WMN backbone in which all nodes are stationary and they are not required to have the same number of radio interfaces. All nodes are mesh routers and node 12 acts as a central mesh router that could be connected to a wired network, as shown in Fig. 2.
Our main goal is to evaluate the throughput and delay performance of packet aggregation under MCMR wireless ad hoc networks. Our wireless ad hoc network design has the following assumptions and features:

- 24 nodes transmit frames to the central mesh router through other mesh routers in a multihop manner.
- The path or flow from any node to the central mesh router can be built using up to four channels.
- We consider four MCMR scenarios on the same network topology. In the first scenario, we assign only one channel at each node. From the second to the fourth scenario, two to four channels can be used, respectively.
- In each scenario, channels are statically assigned. Moreover, for scenario two to four, we have conducted extensive simulation to find the best channel assignment, which can lead to the largest throughput at high load.
- We assume that there is no transmission error if there is no collision.
- Distance from any node to its next hops is 100 meters.
- The maximum number of aggregated packets per frame is 15.

In order to reach our objectives we use the Network Simulator 2 (NS2) which has the necessary base structure for simulating many kinds of computer networks including IEEE 802.11 based wireless networks which is the framework for our thesis. For our valuation we use the following four metrics in our study:

1) **Throughput:** It is a sum of sizes (bits) or number (packets) generated/sent/received packets, calculated at every time interval. Usually it is measured in bps, Kbps, Mbps. In our study we would take Mbps.

2) **End-to-End Delay:** Average time difference (in seconds) between the time of packet receiving at the destination node, and the packet sending time at the source node.

3) **Packet Delivery Ratio:** The packet delivery ratio of a receiver is defined as the ratio of the number of data packets received over the number of data packets transmitted by the sender.

4) **Routing overhead:** The routing overhead, defined as the ratio between the numbers of sent routing packets over the total number of received data packets.

### IV. SIMULATION RESULTS

In this section, we present the results of the experiments, which will be organized in four parts. In the first part, we show the number of channels versus throughput performance. In the second part we show the number of channels versus end to end delay performance. In these two parts, we illustrate four scenarios in order to compare and demonstrate the improvement in terms of throughput and delay, where the first scenario shows results using one channel, the second one shows results using two channels, and so on. In Figure 3, we see with one channel per wireless node and packet aggregation of fifteen per frame has a throughput of almost 334 Mbps while with four channels it is 364 Mbps. Clearly we have improved Throughput at four numbers of channels. In Figure 4, we consider the end to end delay performance. We see with one channel per wireless node and packet aggregation of fifteen per frame has a delay of almost 12.3 msecs while with four channels it is 11.2 msecs. Clearly we have low end-to-end delay at four numbers of channels.

![Figure 3: Throughput performances vs. number of channels.](image1)

![Figure 4: Delay performances vs. Load with number of channels.](image2)
In Figure 6: we see with one channel per wireless node and packet aggregation of fifteen per frame has a routing overhead of almost 102 packets while with four channels it is 76 packets. Clearly we have almost 40% improved routing overhead at four numbers of channels.

Figure 6: Routing overhead performances vs. number of channels

V. CONCLUSION

In this paper, we have studied the performance of MCMR wireless ad hoc network under IEEE 802.11n. Better network performance can be obtained by using more channels. We used NS2 tool to simulate the network. The extensive simulation results prove that throughput and delay performance improves as we use more number of channels. Similarly, the simulation results also showed that the packet delivery ratio and routing overhead decreases as the number of channels increases.

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Knowledge Discovery from Real Time Database using Data Mining Technique

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Abstract- The major aspire of this paper is to make a study and to suggest remedial measures for disease management in certain area with the help of data mining technique-clustering. Using this method, the user can identify the disease incidence and reasons with specific parameters and can obtain different solutions for its control. This paper intends to discover the data mining algorithm in the prediction of contagious disease in an area.

Index Terms- Classification rule, Cluster analysis, Data mining, Knowledge discovery.

I. INTRODUCTION

Data mining is the process of analyzing data from different perspectives and summarizing it into useful information that can be used to predict trend analysis. Data mining can discover unexpected patterns that were not under consideration when the mining process started. Prediction is a task of learning a pattern from examples and using the developed model to predict future values of the target variable.[1]

Many application can benefit the by the use of information and knowledge extracted from a large amount of data. Knowledge discovery can be viewed as the process of nontrivial extraction of information from a large database, information which is implicitly presented in the data, previously unknown and potentially useful for the users.

One of the effective ways to create and use a data mining model is to get the user to actually understand what is going on so that an immediate action can take directly. There are many tools for analyzing the data.

It allows the users to analyze data from different dimensions, categorize it and summarize the identified relationships into different formats and finding correlations among different fields in large relational databases.

II. OBJECTIVES

The purpose of the study is to develop a data mining solution which make diagnosis of the disease as accurate as possible and helps deciding if it is reasonable to start the treatment on suspected patients without waiting for the exact medical test result or not.

The study also concentrates to identify different parameters to analyze the facts and reasons behind the disease.

III. APPLICATION OF DATA MINING IN TREND ANALYSIS

In data mining the extracted data must be transform and load into the data warehouse system. Then store and manage the data into a multidimensional database system. By providing the data access to an analyst the data can be viewed in a presentable format.

The different types of analysis include data visualization, Rule induction, nearest neighbor method, clustering, generic algorithm, decision tree model etc.[2] The main advantage of data mining is the ability to turn feeling into facts. Data mining can be used to support or refuse the feelings of people. It can be used to add credibility to the feelings. Data mining can discover unexpected patterns that were not under consideration when the mining process started.

A. Advantages of data mining algorithm in prediction of contagious diseases

- Helpful in taking quick decision regarding the chances of hitting
- Systematic and smooth flow of information in functional area.
- Able to select the correct parameters
- Analyzing the facts and reasons behind the disease.
- Quick compilation and analysis of large volume of unstructured data from various sources helps to take timely decision making to better control over the system.
- Comparative reports over standard norms.

IV. PRELIMINARY STUDY

We can see the after the rainy season especially in the month of June to August, some type of epidemics were hitting. The un-improvement of living standards and un-hygienist were the major reason for the epidemics. Studies reveals that less hygienist and poor living environmental condition are is the main classes of victims of epidemics. There are different types of epidemics due to different reasons. The main factors which influencing an epidemic are Poor hygienist, Rapid climate change, Drinking water contamination Unplanned sewage disposal system etc. There are many water borne diseases such as cholera, typhoid, diarrria etc.

Through media we can understand that hundreds of people were admitted in the hospitals due to some contagious disease and some of them were even losses their life. There are many types of epidemics affecting in different season. The causes of
each disease may vary, but we can surely conclude that the contamination of drinking water is the first and main among the various reasons such as temperature extremities, climatic difference etc. Poverty and old age, personal unhygienity, unhygienity of the society, lack of health awareness or insufficient knowledge, percapita income of the inhabitance etc are also some of the reasons behind this calamity.

Water-borne disease is, simply, any illness resulting from ingestion of or contact with water. water-ingestion illnesses are either infections or intoxications. Organisms responsible for infections are mainly bacteria. These organisms usually occur in water contaminated with sewage (e.g., especially bird and mammal excrement) or by infected persons or animals. Intoxications may be chemical in nature (e.g., copper, lead, insecticide poisonings) and usually occur as a result of metal leaching into water (from pipes or containers) and through the accidental spillage or seepage of chemicals into water supplies. They can also occur through toxins produced by blue-green algae (cyan bacteria), e.g., Anabaena, Microcystis or Oscillatoria. These organisms have caused even deaths through drinking pond water; Illnesses acquired through contact with water are caused by bacteria.

A. Data Collection and Analysis

To find the prediction of contagious disease hit in a slum, different types of data were collected from different sources. The area selected for this research study is a slum, situated at Kochi, Kerala.

The sample data were collected with interview with 24 families with 96 inhabitants. After each rainy season, some contagious disease is hitting in almost all families in this area. This is happening for the last several years. So all the data have collected from each family about each member. The main parameters were education, income, hereditary factors; area located as slum, drainage facilities, drinking water facilities, toilet facility, waste disposal, electricity, approaches to hospital, roads, educational institutions, livelihood etc and created a database.

The row data used in the research were collected from health department, Hospital, Urban Local Body, inhabitants from slum, Doctors from various hospital, health officers, different records from urban local body, on site observation etc.

To ensure the consistency of result, missing values were also dealt with. Irreverent records and duplicated data were eliminated to reduce the size of data set. Data synchronization was also carried out.

B. Building of Data Mining Algorithm

The entire inhabitants in this area are divided into different clusters based on different parameters. The cluster technique, to apply the cluster technique, the data set was further reduced to include only one colony with hereditary disease history. This is to identify the people who can hit the disease and finally become inconsistent due to that particular parameter, i.e. disease history.[4]

45 inhabitants come under this category. Thus from the above data set, the unsupervised model was built only with the records of inhabitants who tends to become insolvent, means chance to become patient. The unsupervised model was built with k-means clustering algorithm. It aims to break the collected data into separate "clusters" grouped by like characteristics... [10]

Clustering is the process of grouping a set of physical or abstract objects into classes of similar objects. Cluster- collection of data objects that are similar to one another within the same cluster & are dissimilar to objects in other clusters. I am also known as data segmentation. [9]

There are different clustering approaches such as Partitioning algorithms: which construct various partitions and then evaluate them by some criterion, hierarchy algorithms that create a hierarchical decomposition of the set of data (or objects) using some criterion, density-based algorithm, based on connectivity and density functions, grid-based algorithm, based on a multiple-level granularity structure ,model-based algorithm in which a model is hypothesized for each of the clusters and the idea is to find the best fit of that model to each other.

It is selected partitioning algorithm and this method is relatively efficient in processing in large data set. The problem of predicting inhabitance insolvency may be viewed as classification problem. The distribution of inhabitants is uneven. (80% solvent and 20% insolvent). So with these characteristics the problem is difficult to solve. So a new data set had to be created specifically for data mining function.[3]

For the new set, eliminated the clusters whose hit ratio is less. By applying classification technique, reduce s the data set and calculate the percentage of insolvenly. We can see that insolvenly is higher with less population.[8]
A classification model was also made for insolvent inhabitants using supervised learning with the help of variables. The reasons to become insolvent was also identified. A classification rule was made on the inhabitants according to the way in which they become insolvent. The classifier model is used for predicting inhabitant’s insolvency. Predictive accuracy of the model can be calculated as the percentage of test samples that are correctly classified. (95% have been correctly classified). Thus the clustering model is an effective method for clustering solvent and insolvent inhabitant in this context.

VI. CONCLUSION

This research study involved a real life application problem. Two kinds of models are developed. An unsupervised clustering model for identifying the significant characteristics of insolvent customers and a supervised classification model for insolvency prediction. The clustering model allowed us to understand different group behavior for history of disease hit and accordingly take action. The knowledge extracted from the clustering model helped to identify the significant characteristics of insolvent inhabitants which formed a particular cluster. The supervised classification model was built on a data set. This model allowed predicting the insolvency of inhabitants well in advance so that the action measures can be taken against the insolvent inhabitants. 95% of the prediction accuracy was achieved employing the decision tree classification model in the research. Overall performance is also good.[5]

This model also identified two types of patients-inhabitants become patient(insolvent)due to the climatic risk factors such as seasonal climate, rainfall data, spread of deadly diseases, water surface temperature, temperature and perception measurement etc and inhabitants who became patients those due to non climatic risk factors such as population immunity and control activities, vector abundance, family history etc. The prediction interval is also a factor for the analysis.

VII. FUTURE ENHANCEMENTS

The same database can be applied with different other data mining techniques and can compare the result for better performance.

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Enhancement of Power Quality Using Active Power Filters

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Abstract- This paper introduces the terminology and various issues related to ‘power quality’. The interest in power quality is explained in the context of a number of much wider developments in power engineering: deregulation of the electricity industry, increased customer-demands, and the integration of renewable energy sources. After an introduction of the different terminology two power quality disturbances are discussed in detail: voltage dips and harmonic distortion. For each of these two disturbances, a number of other issues are briefly discussed, which are characterization, origin, mitigation, and the need for future research. Shunt, hybrid and series active power filters are described showing their compensation characteristics and principles of operation. Different power circuits topologies and control scheme for each type of active power filter are analyzed.

Index Terms- Power quality, voltage sag voltage Swell, voltage fluctuations, Active filters.

I. INTRODUCTION

The proliferation of microelectronics processors in a wide range of equipments, from home VCRs and digital clocks to automated industrial assembly lines and hospital diagnostics systems, has increased the vulnerability of such equipment to power quality problems [1]. These problems include a variety of electrical disturbances, which may originate in several ways and have different effects on various kinds of sensitive loads. What were once considered minor variations in power, usually unnoticed in the operation of conventional equipment, may now bring whole factories to standstill. As a result of this vulnerability, increasing numbers of industrial and commercial facilities are trying to protect themselves by investing in more sophisticated equipment to improve power quality [2]. Moreover, the proliferation of nonlinear loads with large rated power has increased the contamination level in voltages and currents waveforms, forcing to improve the compensation characteristics required to satisfy more stringent harmonics standard [3],[4]. Between the different technical options available to improve power quality, active power filters have proved to be an important alternative to compensate for current and voltage disturbances in power distribution systems [5],[6],[7]. Different active power filters topologies have been presented in the technical literature, [8] [9] and many of them are already available in the market [1], [2]. This paper will focus in the analysis of which to use with their compensation characteristics. Shunt active power filters, series active topologies, and hybrid schemes will be presented and analyzed. The control scheme characteristics for shunt and series schemes will also be discussed. Finally, steady state and transient results for dynamic compensation, obtained from simulated and experimental setup will be presented.

II. IMPORTANCE OF POWER QUALITY

Power quality is an increasingly important issue for all businesses. Problems with powering and grounding can cause data and processing errors that affect production and service quality.

Lost production: Each time production is interrupted, your business loses the margin on the product that is not manufactured and sold.

Damaged product: Interruptions damage a partially complete product, cause the items to be rerun or scrapped.

Maintenance: Reacting to a voltage disruption can involve restoring production, diagnosing and correcting the problem, clean up and repair, disposing of damaged products and, in some cases, environment costs.

Hidden costs: If the impact of voltage sag is a control error, a product defect may be discovered after customer delivery. The costs of losing repeat sales, product recalls and negative public relations can be significant and hard to quantify.

A recent study by IBM showed that power quality problems cost U.S. businesses more than $15 billion a year. That’s an average of $79,000 for each company.

II. POWER QUALITY

“Power quality” is defined as “the concept of powering and grounding electronic equipment in a manner that is suitable to the operation of the equipment in a manner that is suitable to the operation of that equipment and compatible with the premise wiring system and other connected equipment.

Power quality has become a strategic issue for the following reasons:

1. The economic necessity for businesses to increase their competitiveness.
2. The widespread use of equipment which is sensitive to voltage disturbances and /or generates disturbances itself.
3. The deregulation of the electricity market.
4. The power quality correction and harmonic filtering system give solution to solve the problems of harmonic disturbances and voltage fluctuations.
Power Quality Glossary:
Although specialists use complex equations for precise
descriptions and analysis, the following definitions are adequate
for most discussions
with your local utility account managers, distribution engineers,
and PQ consultants and vendors.
Harmonic distortion. Continuous or sporadic distortions of the
60-hertz (Hz) voltage sine waveform, usually caused by
microprocessor based loads in the building such as computer
power supplies, lighting ballasts, and electronic adjustable speed
drives. Harmonics can also be transmitted from an energy user
down the block. These can cause telecommunications or
computer interference; overheating in motors, transformers, or
neutral conductors; decreased motor performance; deterioration
of power factor–correction capacitors; or erratic operation of
breakers, fuses, and relays.
Interruption, momentary. A very short loss of utility power that
lasts up to 2 seconds, usually caused by the utility switching
operations to isolate a nearby electrical problem.
Interruption, temporary. A loss of utility power lasting from 2
seconds to 2 minutes, caused by a nearby short circuit due to
something like animals, wet insulators, or accidents. Corrected
by automated utility switching.
Long-term outage. A loss of utility power lasting more than 2
minutes due to major local, area, or regional electrical events.
Noise. Sporadic voltage changes consisting of frequencies higher
than the normal 60-Hz power frequency due to any number of
causes, including arc welders, loose wiring, and nearby radio and
TV transmitters.
Sag. A short-term decrease in voltage lasting anywhere from
milliseconds up to a few seconds. Sags starve a machine of the
electricity it needs to function, causing computer crashes or equipment
lock-ups. Usually caused by equipment start-up—such as
elevators,
heating and air-conditioning equipment, compressors, and copy
machines—or nearby short circuits on the utility system.
Spike. A very brief (nanoseconds to milliseconds) change in
voltage ranging from tens to thousands of volts. Can be produced
by utility and customer equipment operations, nearby lightning
strikes, falling tree limbs on power lines, and even static
discharges.
Surge. A short-term increase in voltage, lasting up to a few
seconds. They are due either to customer equipment operation,
such as air conditioners or motors switching on and off, or to
utility activities, such as capacitor switching.
Transient. A sudden momentary change in voltage. Also called a
spike.

III. VOLTAGE SAG
Voltage sag is a sudden reduction (between 10% and 90%) of
the voltage magnitude at a point in the electric System and
lasting from 0.5 cycles to few seconds. Either switching
operations or any type of faults as well as fault clearing process
can cause a voltage dip. Switching like those associated with a
temporary disconnection of the supply or flow of heavy currents
associated with the starting of large motor loads is the most
common. These events maybe originated at the utility side or at the
customer site.

IV. HARMONIC ELIMINATION TECHNIQUES
To avoid the ill effects of harmonics on the operation of
sensitive equipments, it is necessary to keep harmonic
contents below safe limit by installing filter at load end.
The simplest way of eliminating harmonics of different
orders is to install filters at the location generated by
different loads are connected in two ways in power system
network.
1.SERIES CONNECTED FILTERS: Such type of filters
are connected in series with power system network and
offer high impedance at turning frequencies high
impedance offered by filters allow very little harmonics are
passed. The drawback of series filters are high cost,
because the rating of filter component required is rated
full load current.
2.SHUNT CONNECTED FILTERS: It is most commonly
used filters in A.C. power system network and offers very
low impedance path to harmonics. Shunt type of filters are
cheaper than series type because the shunt connected
filters are designed for graded insulation levels which
makes the components cheaper than the series filter
components.

Following are the different techniques used to eliminate
harmonics of different orders to keep harmonic distortion
within permissible limit.

PASSIVE FILTERS:
These are LC resonating or parallel resonating circuits
which offer very high or low impedance at tuning
frequency. These filters are resistive at tuned frequency,
capacitive at below tuned frequencies and inductive beyond
tuned frequency.

TYPES OF PASSIVE FILTERS:
1.Series passive filters: These are connected in series and
offers very high impedance to different harmonics at tuned
frequency, because of its very high cost such type of filters
are not used.

2.Shunt passive filters: These are connected between line
and earth and offer very low impedance at resonant
frequency. Hence particular harmonic or harmonics directed to
earth and prevented from passing further. The high pass shunt
filters are connected to the point of common coupling block
all over the harmonic frequency and passes all higher
frequency.

SHUNT ACTIVE FILTER

Fig 1: Shunt Active Filter
SERIES ACTIVE FILTER

VOLTAGE FLUCTUATIONS
Voltage fluctuations are changes or swings in the steady-state voltage above or below the designated input range for a piece of equipment. Fluctuations include both sags and swells.

Causes:
Large equipment start-up or shutdown; sudden change in load; improper wiring; or grounding; utility protection devices

Vulnerable equipment:
Computers; fax machines; variable frequency drives; CNC machines; extruders; motors

Effects:
Data errors; memory loss; equipment shutdown; flickering lights; motors stalling/stopping; reduced motor life.

V. SIMULATION REPRESENTATION

VI. SIMULATION RESULTS

Fig 2 Single phase active filter

Fig 3 Three phase Active harmonic filter

Fig 4 Active power filter equalizer

Fig 5 Active power filter amplitude

Fig 6 Source voltage and source current

Fig 7 Simulated waveforms for voltage unbalance compensation. Phase to neutral voltages at the load terminals before and after series compensation. (Current harmonic compensator not operating).
Fig 8 Simulated waveforms for current harmonic compensation. 
  a) Neutral current flowing to the ac mains before and after compensation. b) Line currents flowing to the ac mains before and after compensation. (Voltage unbalance compensator not operating).

Fig 9 Simulated results for voltage unbalance and current harmonic compensation, before and after compensation. a) Ac mains neutral current. b) Phase to neutral load voltages. c) Ac source line current.

VII. CONCLUSION

In this paper the use and advantages of applying active power filters to compensation power distribution systems has been presented. The principles of operation of shunt, series, Also, a brief description of the state of the art in the active power filter market has been described. The shunt active power filter performance under fault power distribution system was discussed. Simulation results proved the viability of using active power filters to compensate active power filters.

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A survey on the Performance Optimization in Wireless Sensor Networks using Cross Layer Approach

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Abstract- The performance of Wireless Mesh Networks is not optimal by using the conventional layered protocols (TCP-IP). Then the method of optimization at different layers of the protocol stack (TCP-IP) can help to achieve optimal network performance. This method usually results in a clean-slate protocol architecture that is different from the protocol architecture of WMNs. Such a difference actually demonstrates the need for a cross-layer design. Specific features pertaining to WMNs also show the need for cross-layer optimization across different protocol layers. In this paper, the need for cross layer design in WMNs is discussed first. Later in this paper we will discuss the different cross layer optimization schemes and algorithms between different protocol layers are discussed.

Index Terms- Cross Layer Optimization, Wireless Mesh Networks (WMNs), TCP-IP, Routing

I. INTRODUCTION

Wireless Sensor Networks are one of the most promising and a discussed technology in the last decade is the wireless technology which allows users to utilize devices that enable the access to information at any time any place. Wireless networks are comprised of devices that communicate through media such as radio signals and infra-red, and they are generally classified into two categories: infrastructure-based and ad-hoc wireless networks.

- **Infrastructure-based wireless network** consists of base stations localized in convenient places, which provide wireless connectivity to devices within their coverage area. Examples of this category are Wireless Local Area Networks (WLANs) and cellular networks. A WLAN is a flexible data communication system implemented as an extension to a wired LAN within a building or campus.

- **Wireless ad-hoc networks** do not have a pre-established infrastructure. Moreover, nodes connect to each other through automatic configuration when they are in transmission range and willing to forward data for other nodes. In this way, an ad hoc wireless network is formed which is both flexible and powerful.

1.1 Wireless ad-hoc Networks

Wireless ad-hoc networks can be further classified into the following different categories according to their applications

- Mobile ad-hoc Networks (MANETS)
- Wireless Sensor Networks (WSNs)
- Wireless Mesh Networks (WMNs)
- Hybrid Wireless Networks

![Fig: 1 Wireless Networks Classification](www.ijsrp.org)

1.1.1 Mobile Ad-hoc Networks

The MANETs includes devices that are mobile nodes which provide the functionality required to connect users allowing them to exchange information in an environment with no pre-established infrastructure. Therefore, MANET is an infrastructure-less network with highly dynamic topology. Devices are free to move randomly and organize themselves arbitrarily; thus, the wireless network topology may change quickly and is unpredictable.

1.1.2 Wireless Sensor Networks

Wireless sensor networks are formed by spatially distributed tiny sensor nodes that cooperatively can gather and monitor physical parameters or environmental conditions and transmit to a central monitoring node. In addition, sensor nodes are equipped with a
radio transceiver or other wireless communication device, a small microcontroller, and usually a battery as an energy source.

1.1.3 Wireless Mesh Networks

The Wireless Mesh Network (WMN) is a highly promising technology and it plays an important role in the next generation wireless mobile network. WMNs have emerged as important architectures for the future wireless communications.

1.1.4 Hybrid Wireless Networks

The Hybrid wireless network is an ad hoc wireless network that contains a sparse wired network of base stations. The resulting network comprises regular nodes and wired connected base stations. In this way, we could have a traditional cellular network and an ad hoc network mixed together.

II. BACKGROUND AND RELATED WORKS

Cross Layer Optimization - Motivation

Why does the presence of wireless links in the network motivate designers to violate the layered architectures? There are three main reasons: the unique problems created by wireless links, the possibility of opportunistic communication on wireless links, and the new modalities of communication offered by the wireless medium [2]. On the other side, wireless links create several new problems for protocol design that cannot be handled well in the framework of the layered architectures. The classic case of a TCP sender mistaking a packet error on a wireless link to be an indicator of network congestion is an example [3]. Whereas on the contrary, wireless networks offer several avenues for opportunistic communication that cannot be exploited sufficiently in a strictly layered design. For instance, the time-varying link quality allows opportunistic usage of the channel [4], whereby the transmission parameters can be dynamically adjusted according to the variations in the channel quality, just to name one example. Additionally, the wireless medium offers some new modalities of communication the layered architectures do not accommodate. For instance, the physical layer can be made capable of receiving multiple packets [5] at the same time. The nodes can also make use of the broadcast nature of the channel and cooperate with one another in involved ways.

2.1 Different cross layer design approaches

Today there exists many cross-layer design proposals but the authors in [6] present a survey of several cross-layer design proposals from the literature based on the layers that are coupled. Here, we are more interested in how the layers are coupled, in other words, what kind of architecture violation has taken place in a particular cross-layer design. We note that the layered architecture can be violated in the following basic ways:

- Creation of new interfaces (Figs. 3A-C)
- Merging of adjacent layers (Fig. 3D)
- Design coupling without new interfaces (Fig. 3E)
- Vertical calibration across layers (Fig. 3F)

We find that most cross-layer design proposals in the literature fit into one of these basic categories. We shall now discuss the aforementioned four categories in more detail and point out some relevant examples.

2.1.1 Upward Information Flow

A higher-layer protocol that requires some information from the lower layer(s) at runtime results in the creation of a new interface from the lower layer(s) to the higher layer, as shown in Fig. 3A. Suppose, if the end-to-end TCP path contains a wireless link, errors on the wireless link can trick the TCP sender into making erroneous inferences about the congestion in the network, and as a result the performance deteriorates. Creating interfaces from the lower layers to the transport layer to enable explicit notifications alleviates such situations. For example, the explicit congestion notification (ECN) from the router to the transport layer at the TCP sender can explicitly tell the TCP sender if there is congestion in the network to enable it to differentiate between errors on the wireless link and network congestion [3].

Examples of similar upward information flow are also seen in the literature at the MAC layer (data link layer in general) in form of channel-adaptive modulation or link adaptation schemes [4]. The idea is to adapt the parameters of the transmission (e.g., power, modulation, code rate) in response to the channel condition, which is made known to the MAC layer (link layer) by an interface from the physical.

2.1.2 Downward Information Flow

Some crosslayer design proposals rely on setting parameters on the lower layer of the stack at runtime using a direct interface from some higher layer, as illustrated in Fig. 3B. For example, applications can inform the link layer about their delay requirements, and the link layer can then treat packets from delay-sensitive applications with priority [7].

A better way to look at the upward and downward information flow is to treat them as notifications and hints, respectively, as proposed in [8]. Upward information flow serves the purpose of notifying the higher layers about the underlying network.
conditions; downward information flow is meant to provide hints to the lower layers about how the application data should be processed.

Figure 3: The different types of cross layer designs

2.1.3 Back and Forth Information Flow

Two layers, performing different tasks, can collaborate with each other at runtime. Often, this manifests in an iterative loop between the two layers, with information flowing back and forth between them as highlighted in Fig. 3C. Clearly, the architecture violation here is the two complimentary new interfaces.

As an example, we refer to the network-assisted diversity multiple access (NDMA) proposal [9, references therein], wherein the physical (PHY) and MAC layers collaborate in collision resolution in the uplink of a wireless LAN system. Basically, with improvements in the signal processing at the PHY, it becomes capable of recovering packets from collisions. Thus, upon detecting a collision the base station first estimates the number of users that have collided, and then requests a suitable number of retransmissions from the set of colliding users.

2.1.4 Merging of adjacent layers

Another way to do cross-layer design is to design two or more adjacent layers together such that the service provided by the new superlayer is the union of the services provided by the constituent layers, as shown in Fig. 3D. This does not require any new interfaces to be created in the protocol stack. In general, the superlayer can be interfaced with the rest of the stack using the interfaces that already exists in the original architecture.

Although we have not come across any crosslayer design proposal that explicitly creates a superlayer, it is interesting to note that the collaborative design between the PHY and MAC layers (discussed earlier with the NDMA idea) tends to blur the boundary between these two adjacent layers.

2.1.5 Design coupling without new interfaces

Another category of cross-layer design involves the coupling of two or more layers at design time without creating any extra interfaces for information sharing at runtime. We illustrate this in Fig. 3E. While no new interfaces are created, the implementation cost here is that it may not be possible to replace one layer without making corresponding changes to another layer. For instance, [5] considers the design of a MAC layer for the uplink of a wireless LAN when the PHY is capable of providing multipacket reception capability. Multipacket reception capability implies that the PHY is capable of receiving more than one packet at the same time. Notice that this capability at the physical layer considerably changes the role of the MAC layer; thus, it needs to be reconstructed.

2.1.6 Vertical calibration across layers

The final category in which cross-layer design proposals in the literature fit is what we call vertical calibration across layers. As the name suggests, this refers to adjusting parameters that span across layers, as illustrated in Fig. 3F. The motivation is easy to
understand. Basically, the performance seen at the level of the application is a function of the parameters at all the layers below it.

For example, [11] presents an example of vertical calibration where the delay requirement indicates the persistence of link-layer automatic repeat request (ARQ), which in turn becomes an input for deciding the rate selection through a channel-adaptive modulation scheme. Vertical calibration can be done in a static manner, which means setting parameters across the layers at design time with the optimization of some metric in mind. Static vertical calibration does not create significant consideration for implementations since the parameters can be adjusted once at design time and left untouched thereafter. Dynamic vertical calibration, on the other hand, requires mechanisms to retrieve and update the values of the parameters being optimized from the different layers.

### 2.2 Cross Layer Optimization Algorithms

In the following section, instead of going through all combinations of cross-layer design, we will focus on the ones that are most critical for WMNs. Considering the TCP/IP protocol architecture, the protocol layers that contain most specific features of WMNs include MAC, routing, and physical layer as shown in fig.4. In some cases, the transport layer needs to be optimized with physical layer in WMNs. Thus, in the remaining part of this section, we will investigate the detailed protocols in cross-layer design between MAC and physical, between MAC and routing, and between physical and transport layers. Optimization algorithms across multiple layers are also discussed.

![Cross Layer design Concept](image)

**Fig: 4 Cross Layer design Concept**

#### 2.2.1 MAC/Physical Cross-Layer Design

Cross-layer design between MAC and physical layers is more common than that between any other two layers, because MAC and physical layer are so close to each other. These techniques include the following typical categories:

1) Multiple coding and modulation schemes. When a different coding and modulation scheme is used, the transmission rate on a link also changes.

2) Advanced antenna techniques. The examples include directional antennas and smart antennas.

3) MIMO. Based on multiple antennas for transmission and reception and advanced signal-processing techniques, the transmission rate of a wireless link can be significantly increased by MIMO.

4) Orthogonal frequency-division multiplexing (OFDM) technologies. OFDM can be used to build OFDM/TDD, OFDM/FDD, or OFDMA systems, as specified in IEEE 802.16. It can also be used as a building block for ultrawideband (UWB) systems.

5) UWB. Very high transmission rate is achieved using ultrawide bandwidth. UWB can be pulse-based like direct-sequence (DS) UWB as specified by UWB forum [12] or OFDM-based like multiband-OFDM (MB-OFDM) supported by WiMedia Alliance [13].

#### 2.2.2 Routing/MAC Cross-Layer Design

A routing protocol of a multihop wireless network determines a path for any packet from its source to destination. In its simplest form, a routing protocol can just consider connectivity between nodes, i.e., as long as connectivity can be maintained, a routing path is set up. However, to enhance performance, other routing metrics and mechanisms must be taken into account. Routing/MAC cross-layer can be done in a simple loosely coupled scheme as follows. A routing protocol collects information in the MAC layer, such as link-quality, interference level, or traffic-load information, to determine the best routing path. Such a method can only achieve a limited performance gain, since the MAC layer is considered but not optimized accordingly. In order to optimize the performance of routing and MAC protocols together, the working mechanisms of a MAC protocol must be explored and optimized as part of the tasks of routing/MAC cross-layer design.

It is well known that a MAC protocol can be reservation or random-access based. For a random-access-based MAC, no mechanism is available to fine-tune the MAC layer performance by considering information from the upper layer. Instead, a node just tries its best to access the medium. Such a MAC has a great advantage of simplicity and has another advantage of being decoupled from upper protocol layers. However, the shortcoming is that the MAC itself has low performance, and routing protocol can even have worse performance since no chance of cross-layer optimization is available. Such a problem reflects one of the many issues of applying CSMA/CA MAC protocol to WMNs. There are two possible solutions to this problem. One is to modify the random-access protocol so that it becomes closer to a reservation protocol. For example, the 802.11e hybrid channel-access control includes mechanism of scheduling and reservation, which works together with CSMA/CA to improve the performance of 802.11 MAC. The other solution is to have overlay protocols. For example, we can develop a TDMA protocol overlaying CSMA/CA [14].
2.2.3 Transport/Physical Cross-Layer Design

In a multihop wireless network, the capacity of a link is usually variable due to factors such as interference, time-varying channel quality, fading, and so on. Without a fixed capacity in these links, an end-to-end transmission mechanism, i.e., a transport-layer protocol, needs to be optimized by considering the varying link capacity. This motivates the need for cross-layer design between transport layer protocol and physical-layer techniques. Transport-layer protocol can be simple or complicated, depending on what services need to be provided at the transport layer. The two most well-known transport-layer protocols are TCP and UDP. For UDP, the mechanism is very straightforward; a source node just sends its desired traffic rate without considering what will happen in the intermediate nodes and links from itself to the destination node. TCP works significantly differently. A source node needs to adaptively adjust its transmission rate according to the congestion condition in the network. The congestion can be real congestion on a certain link or poor quality in a link.

Cross-layer design between TCP and physical layer for a multihop wireless network has been researched for several years. One method is the congestion-control algorithm of TCP which is optimized by considering the information collected from the physical layer in this the physical-layer information is used to differentiate packet loss due to congestion from that due to link-quality-related loss. Such optimization can only achieve limited performance improvement, because the interaction between TCP and physical layer is not considered. However, when a link is congested, the physical layer can adjust its parameters, like for example the transmit power, to avoid congestion, which will also help TCP achieve better performance. Similarly, when a link experiences low quality, the physical-layer parameters, such as coding rate or transmit power, can be adjusted to enhance the link quality.

III. CONCLUSION

As explained in previous sections, it is pretty obvious that the cross-layer design can definitely improve the network performance. However, issues can come together with benefits, as explained as follows:

System complexity: For many cross-layer design schemes, it can easily be shown that they achieve great performance through simulations or even prototypes. However, when coming to the actual implementation of these schemes, we face to several complexities in modifying protocols in different layers. These modifications can impact the maintainability of the software, stability of different protocol modules, and flexibility of porting codes to different platforms.

Protocol interoperability and compatibility: With crosslayer design, the standard working mechanism in the protocol stack is broken. Thus, a wireless network with cross-layer design can easily be incompatible with other networks, and thus, interoperation between different networks is difficult to maintain. Consequently, a cross-layer design scheme should have a remedy to standard compatibility. However, it can be imagined that, even if interoperation can be maintained via such a remedy, the benefits of cross-layer design may diminish when networks with and without cross-layer design have to work together.

Evolution capability: In a layered-protocol architecture, protocols in one layer can evolve separately without disrupting the functionalities of protocols in another layer. When cross-layer design is adopted, any upgrade or change in protocols must be coordinated among different protocol layers. This requirement significantly limits the capability of product evolution.

It should be noted that such issues usually do not exist in a layered design scheme. To avoid such issues, tradeoff should be made between performance improvement via cross-layer design and benefit loss of layered design. However, technically, it is extremely difficult to carry out a reasonable tradeoff since issues such as system complexity or protocol interoperability is not easy to quantitatively be evaluated. Thus, in this paper, we suggest several rules that can be followed to avoid blind use of cross-layer design.

1) Achieve enough margin of performance improvement. Cross-layer design brings network-performance improvement with a price of high system complexity. Thus, to compensate the cost, the performance improvement must be significant enough. Multiple performance metrics may need to be considered together to evaluate the overall network-performance improvement. In fact, using cross-layer design, we can easily see some performance improvement in throughput, delay, packet loss, etc. However, if the improvement is only a small percent, e.g., 5%, then it is not a wise strategy to adopt crosslayer design, since such performance improvement can easily vanish due to uncertainties in a wireless network like interference, noise, shadowing, etc.

2) Explore any possible opportunity that can improve network performance using layered-protocol design. For cross-layer design, benefits always come together with issues. Thus, the best strategy is to explore the capability of layered-protocol design as much as possible. The theoretical research work on “layering as decomposition optimization” can be used as guidelines in doing so.

3) Carry out cross-layer design without compromising framework specified by standards. In order to ensure standard compatibility to the great extent and, thus, to maintain interoperability and evolution capability, it is a good strategy to carry out cross-layer design under the framework of standard specifications.

4) Push standardization of cross-layer design framework and methodology. To further improve the viability of cross-layer design schemes, standardizing the framework of cross-layer design is necessary.
REFERENCES


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FRACTIONAL MELLIN INTEGRAL TRANSFORM IN
(0, 1/a)

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Abstract- The theory of integral transforms is presented a direct and systematic technique for the presentation of classical and distributional theory. In this paper, the Laplace operators are used to define The Fractional Mellin integral transform which can be a technique for solving boundary and initial value problems. This Transform is suited in the fractional interval 0 to 1/a. This work which is put forward is to understand how Laplace operator would lead to properties, propositions, theorems and relations with Fractional Mellin integral transform. The main view of our work is to give a procedure from Laplace Transform that turns out to be valid for Fractional Mellin integral transform.

The results have been modified by applying suitable functions which leads to the results in Fractional Mellin integral transform in the interval 0 to 1/a, where a is positive. To illustrate the advantages and use of this transformation, the result of Weyl fractional transform, summation of the series, and some important differential equations have been solved at the end. The graphical concept is represented by assigning different values to the parameter by using tools of Matlab, which gives a brighter view of applications of Fractional Mellin integral transforms.

Furthermore, the Laplace transform is used to obtain the Fractional Mellin integral transform in the range 0 to 1/a, properties like linearity, property, scaling property, power property, and propositions like for the functions $t^{-1}f(t^{-1})$,$\frac{d}{ds}t^{s-1} = (\log t)t^{s-1}, e^{-t}$, $\int_{0}^{x}f(u)du$,$\int_{0}^{x}u^{p}f(xu)g(u)du$,$\int_{0}^{x}u^{p}f(x/u)g(u)du$ are satisfied by the Fractional Mellin integral transform in 0 to 1/a. Theorems like inversion theorem, convolution theorem, Parseval’s theorem, first shifting theorem and second shifting theorem are valid for the Fractional Mellin integral transform in 0 to 1/a. Application of the FrMIT for Weyl Fractional Transform and summation of the series, derivatives of the Fractional Mellin integral transform in 0 to 1/a are calculated. Solution of the ordinary differential equation is exist. and it is represented graphically by using Matlab.

II. PRELIMINARY RESULTS

Let $f(x)$ be a given function of $x$ which is defined for all $x \geq 0$ and $s'$ is a parameter

$$
\int_{0}^{\infty} e^{-sx} f(x)dx
$$

$$
L[f(x)] = \int_{0}^{\infty} e^{-sx} f(x)dx
$$

Substituting, $x = -\log (a.t)$, $dx = - \frac{dt}{t}$, a > 0.
If $x = 0$ then $t = 1/a$ and if $x = \infty$ then $t = 0$, then

$$
\int_{0}^{1/a} a^{s'} t^{s-1} f(t)dt
$$

This integral is denoted by $M_2[f(t), s, 0, 1/a]$. 

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\[ \int_{0}^{1/a} a^{s} t^{-1} f(t) dt \]

\[ M_{fr} [f(t), s, 0, 1/a] = 0 \quad \text{(2)} \]

\[ a > 0, s > 0 \text{ is a parameter and } a \text{ lies in between 1 and } n, n, \]

\[ d \text{ is not equal to one, } a \text{ is finite, the } 1/a \text{ is fractional. This is a Fractional Mellin Integral Transform with its kernel } a^{s} t^{-1}, \]

\[ a \text{ is positive and } s \text{ is a parameter. If } a \neq 0 \text{ then } 1/a \text{ takes fractional values.} \]

### III. LEMMA

#### 3.1: Linearity property:

Integral Transform (FrMIT) is a linear operation. The FrMIT is a Linear operation, that is for any function \( f(t) \) and \( g(t) \) whose Mellin Type (fractional) Integral Transforms exists and \( \alpha \) and \( \beta \) are constants,

\[ M_{fr} [\alpha f(t) + \beta g(t), s, 0, 1/a] = \alpha M_{fr} [f(t), s, 0, 1/a] + \beta M_{fr} [g(t), s, 0, 1/a] \quad \text{(3)} \]

#### 3.2: Scaling Property:

\[ M_{fr} [f(bt), s, 9, 1/a] = b^{s} M_{fr} [f(p), s, 0, b/a] , \quad bt=q, \ b>0 \]

#### 3.3: Power Property

\[ M_{fr} [f(t^{b}), s, 0, 1/a] = \frac{1}{b} M_{fr} [f(q), s/b, 0, 1/a] , \quad t^{b} = q, \ b>0, \]

#### 3.4: Propositions

#### 3.4.1: FrMIT of \( t^{-1} f(t^{-1}) \)

\[ M_{fr} [t^{-1} f(t^{-1}), s, 0, 1/a] = M_{fr} [f(z), s+1, 1/a, \infty] \]

where \( M_{fr}[f(z), s-1, 1/a, \infty] \) is the new Mellin Type Integral Transform in the range \( 1/a \) to \( \infty \). (future work)

#### 3.4.2: FrMIT of \( \log(t) \)

\[ \frac{d}{dt} t^{-1} = (\log(t)) t^{-1} \]

\[ I f \quad \frac{d}{ds} t^{-1} = (\log(t)) t^{-1} \]

\[ \text{then} \]

\[ M_{fr} [\log(t)f(t), s, 0, 1/a] = 0 \]

\[ \int_{1/a}^{\infty} a^{s} t^{-1} \log(t) f(t) dt \]

\[ \frac{d}{ds} 0 = 0 \]

\[ \frac{d}{ds} \left( \int_{1/a}^{\infty} a^{s} t^{-1} f(t) dt \right) \]

\[ \frac{d}{ds} M_{fr} [f(t), s, 0, 1/a] \]

\[ \text{(7)} \]

#### 3.4.3: FrMIT of \( e^{-t} \)

\[ M_{fr} [e^{-t}, s, 0, 1/a] = 0 \]

\[ \int_{1/a}^{\infty} a^{s} t^{-1} e^{-t} dt \]

\[ 0 \]

\[ \int_{1/a}^{\infty} a^{s} t^{-1} e^{-t} dt \]

\[ \text{then} \]

\[ M_{fr} [e^{-t}, s, 0, 1/a] = a^{s} \Gamma(s) - M_{fr} [e^{-t}, s+1/a, \infty] \]

\[ \text{(8)} \]

where \( M_{fr}[e^{-t}, s+1/a, \infty] \) is the New Mellin Type Integral Transform in the range \([1/a, \infty] \).

#### 3.4.4: FrMIT of integral

\[ M_{fr} [f(t), s, 0, 1/a] = 0 \quad \text{then} \]

\[ \int_{0}^{\infty} f(u) du \]

\[ \int_{0}^{\infty} a^{s} t^{-1} f(t) dt \]

\[ \text{by the substitution } z=1/t, \text{we have} \]

\[ \int_{1/a}^{\infty} a^{s} t^{-1} f(t) dt \]

\[ \text{then} \]

\[ \int_{0}^{\infty} a^{s} t^{-1} f(t) dt \]

\[ \text{(6)} \]
\[ M_f \left[ \int_0^x f(u) \, du, s, 0, 1/a \right] = \frac{1}{s-1} M_f \left[ f(x), s, 0, 1/a \right] - \frac{a}{s} \phi(1/a) \int_0^x u^p f(xu) g(u) \, du, s, 0, 1/a \]

(9)

\[ \phi(x) = \int_0^x f(u) \, du \]

where, replace s by s+1, we have

\[ M_f \left[ \int_0^x f(u) \, du, s, 0, 1/a \right] = \frac{1}{s} M_f \left[ f(x), s + 1, 1/a \right] - \frac{a}{s} \phi(1/a) \]

(10)

\[ M_f \left[ \int_0^x dy \int_0^y f(u) \, du, s, 0, 1/a \right] = \frac{1}{s(s+1)} M_f \left[ f(u), s, 0, 1/a \right] \]

(11)

\[ a^s M_f \left[ g(u), p - s + 1, 1/a \right] M_f \left[ f(z), s, 0, u/a \right] \]

(12)

\[ M_f \left[ \int_0^x f(xu) g(u) \, du, s, 0, 1/a \right] = a^s M_f \left[ g(u), p - s + 1, 1/a \right] M_f \left[ f(z), s, 0, u/a \right] \]

(13)

\[ \int_0^x u^p f(xu) g(u) \, du \]

3.4.5: FrMIT of integral

\[ M_f \left[ \int_0^x f(xu) g(u) \, du, s, 0, 1/a \right] = \frac{1}{s} M_f \left[ f(x), s + 1, 1/a \right] - \frac{a}{s+1} \phi(1/a) \]

(14)

\[ M_f \left[ \int_0^x u^p f(xu) g(u) \, du, s, 0, 1/a \right] = a^s M_f \left[ g(u), p - s + 1, 1/a \right] M_f \left[ f(z), s + \lambda, 0, u/a \right] \]

(15)

If \( p = \lambda = 0 \) then

\[ M_f \left[ \int_0^x u^p f(xu) g(u) \, du, s, 0, 1/a \right] = a^s M_f \left[ g(u), 1 - s, 0, 1/a \right] M_f \left[ f(z), s, 0, u/a \right] \]

(16)

[IV. MAIN RESULTS]

4.1: Inversion theorem

Theorem: The FrMIT in 0 to 1/a is
Assume that $M_f[f(t), s, 0, 1/a]$ is a regular equation in the strip 
$Re(s) < r$ ($r'$ to be real number) of the $s$-plane and that

$0 < c < V, c - i \infty < s = c + i \infty,$ where $c$ is constant,

\[ M^f_{fr}[f(t), s, 0, 1/a] = \frac{1}{a} \int_0^{1/a} a^t t^{-1} f(t) dt \]

Then its inverse formula is

\[ f(t) = \frac{1}{2\pi i} \int_{c-iN}^{c+iN} t^{-s} M_{fr}[f(t), s, 0, 1/a]ds \]

\[ f(t) = \frac{1}{2\pi i} \int_{c-i\infty}^{c+i\infty} t^{-s} M_{fr}[f(t), s, 0, 1/a]ds \]

**Proof:**

Let $M^f_{fr}[f(t), s, 0, 1/a] = f(t)$

\[ M^f_{fr}[f(t), s, 0, 1/a] = \frac{1}{a} \int_0^{1/a} a^t t^{-1} f(t) dt \]

\[ f(t) = \frac{1}{2\pi i} \int_{c-i\infty}^{c+i\infty} t^{-s} M_{fr}[f(t), s, 0, 1/a]ds \]

**4.2: Convolution Theorem**

The FrMIT in $0$ to $1/a$ is

\[ M^f_{fr}[f(t), s, 0, 1/a] = \frac{1}{a} \int_0^{1/a} a^t t^{-1} f(t) dt \]

then its inverses are

\[ M^f_{fr}[f(t), s, 0, 1/a] = f(x) = \frac{1}{2\pi i} \int_{c-i\infty}^{c+i\infty} t^{-s} M_{fr}[f(t), s, 0, 1/a]ds \]

\[ M^f_{fr}[f(t) g(x-t), s, 0, 1/a] = \frac{1}{2\pi i} \int_{c-i\infty}^{c+i\infty} t^{-s} M_{fr}[f(t) g(x-t), s, 0, 1/a]ds \]

\[ M^f_{fr}[g(x-t), s, 0, 1/a] ds \]

1.4.3: Orthogonality (Parseval's Theorem)

The FrMIT in $0$ to $1/a$ is

\[ M^f_{fr}[f(t), s, 0, 1/a] = \frac{1}{a} \int_0^{1/a} a^t t^{-1} f(t) dt \]

and

\[ M^f_{fr}[g(t), s, 0, 1/a] = \frac{1}{a} \int_0^{1/a} a^t t^{-1} g(t) dt \]

then its inverses are

\[ M^f_{fr}[f(t), s, 0, 1/a] = \frac{1}{2\pi i} \int_{c-i\infty}^{c+i\infty} t^{-s} M_{fr}[f(t), s, 0, 1/a]ds \]

\[ M^f_{fr}[g(t), s, 0, 1/a] = \frac{1}{2\pi i} \int_{c-i\infty}^{c+i\infty} t^{-s} M_{fr}[g(t), s, 0, 1/a]ds \]
\[ M_f \left[ \int_{0}^{t} f(s) \, ds \right] = \frac{1}{2\pi i} \int_{c-i\infty}^{c+i\infty} e^{st} M_f(s) \, ds \]

4.5: Definitions
(a) Unit Step Function
If \( U(t) = H(t) = 1 \), when \( t > 0 \)
= 0, when \( t < 0 \), then \( U(t) \) or \( H(t) \) is known as the Unit Step Function
(b) Heaviside Unit Step Function
If \( U(t-a) = H(t-a) = 1 \), when \( t > a \)
= 0, when \( t < a \), then \( U(t-a) \) or \( H(t-a) \) is known as the Heaviside Unit Step Function.

4.6: First Shifting Theorem
The FrMIT in 0 to 1/a is
\[ M_f^a [ f(t), s, 0, 1/a ] = \frac{1}{a} \int_{0}^{1/a} a^{s-1} f(t) \, dt \]

4.7: Second Shifting Theorem
The FrMIT in 0 to 1/a is
\[ M_f^a [ f(t), s, 0, 1/a ] = \frac{1}{a} \int_{0}^{1/a} a^{s-1} f(t) \, dt \]

VI. Application of the FMIT to Summation of Series
The FrMIT is
\[ M_f^a [ f(x), r, 0, 1/a ] = \frac{1}{\Gamma(\alpha)} \int_{0}^{1/a} a^{r(\alpha-1)} f(x) dx \]
and its inverse is
\[ \frac{1}{2\pi i} \int_{c-i\infty}^{c+i\infty} x^{-\alpha} M_f^a [ f(x), r, 0, 1/a ] dr \]

V. FrMIT of Weyl Fractional Transform
The Weyl transform of the function \( f(t) \) is denoted by \( W^{-\alpha} [ f(t) ] = F(x, \alpha) \) and defined as
\[ W^{-\alpha} [ f(t) ] = F(x, \alpha) = \frac{1}{\Gamma(\alpha)} \int_{0}^{\infty} (t-x)^{\alpha-1} f(t) dt \]

The Hurwitz Zeta function is denoted by \( \xi(r, \alpha) \) and defined as
\[ \xi(r, \alpha) = \sum_{n=0}^{\infty} \frac{1}{(x + a)^r}, 0 < a < 1 \text{ and } \text{Re}(p) > 1 \]

It follows from the inversion of the Finite Mellin integral transform
\[ \frac{1}{2\pi i} \int_{c-i\infty}^{c+i\infty} (x+a)^{-\alpha} M_f^a [ f(x), r, 0, 1/a ] dr \]

f(x+a) =
\[
\sum_{n=0}^{\infty} f(x + a) = \frac{1}{2\pi i} \sum_{n=0}^{\infty} \int_{c-i\infty}^{c+i\infty} (x + a)^{-\mu} M_{r\frac{f(x), r, 0, 1}{a}} dr
\]

\[
\frac{1}{2\pi i} \sum_{n=0}^{\infty} \int_{c-i\infty}^{c+i\infty} (x + a)^{-\mu} M_{r\frac{f(x), r, 0, 1}{a}} dr
\]

\[
\sum_{n=0}^{\infty} f(n + a) = \frac{1}{2\pi i} \int_{c-i\infty}^{c+i\infty} M_{r\frac{f(x), r, 0, 1}{a}} dr
\]

\[
\int_{a}^{\infty} a^{-\mu} x^{-\mu} f(x) dx
\]

6.1. The FrMIT is:

\[
M_{r\frac{f(x), r, 0, 1}{a}} = \int_{a}^{\infty} a^{-\mu} x^{-\mu} f(x) dx
\]

, and its inverse is

\[
f(x) = \frac{1}{2\pi i} \int_{c-i\infty}^{c+i\infty} x^{-\mu} M_{r\frac{f(x), r, 0, 1}{a}} dr
\]

6.2. The FrMIT is:

\[
M_{r\frac{f(x), r, 0, 1}{a}} = \int_{0}^{1} a^{-\mu} x^{-\mu} f(x) dx
\]

, and its inverse is

\[
f(x) = \frac{1}{2\pi i} \int_{c-i\infty}^{c+i\infty} x^{-\mu} M_{r\frac{f(x), r, 0, 1}{a}} dr
\]

\[
\sum_{n=1}^{\infty} (-1)^{n-1} n^{-\mu} \xi(r)
\]

If \( \sum_{n=1}^{\infty} (-1)^{n-1} n^{-\mu} \xi(r) \), then

\[
\sum_{n=1}^{\infty} (-1)^{n-1} f(nx)
\]

\[
= \frac{1}{2\pi i} \sum_{n=1}^{\infty} \int_{c-i\infty}^{c+i\infty} (-1)^{n-1} n^{-\mu} x^{-\mu} M_{r\frac{f(x), r, 0, 1}{a}} dr
\]

\[
- \frac{1}{2\pi i} \int_{c-i\infty}^{c+i\infty} \int_{a}^{\infty} a^{-\mu} x^{-\mu} f(x) dx
\]
\[ \frac{1}{2\pi i} \int_{c-i\infty}^{c+i\infty} [1 - 2^{1-\tau}] \xi(r) M_f \{ f(x), r, 0, 1/a \} dr \]

\[ = \sum_{n=1}^{\infty} (-1)^{n-1} f(nx) \]

\[ = \frac{1}{2\pi i} \int_{c-i\infty}^{c+i\infty} [1 - 2^{1-\tau}] \xi(r) M_f \{ f(x), r, 0, 1/a \} dr \]

(26)

VII. DERIVATIVES

7.1: FrMIT of First Order Derivatives:

Theorem: Suppose that \( f(t) \) is continuous for all \( t \geq 0 \) satisfying (1.2) for some value \( \gamma \) and \( m \) and has a derivative \( f'(t) \) which is piecewise continuous on every finite interval in the range of \( t \geq 0 \). Then the Fractional Mellin Integral Transforms of the derivative

\[ f(t) \exists \text{ when } s > \gamma \text{ and } |f(t)| \leq m e^{\gamma t} \text{ for all } t \geq 0 \text{ for some constants} \]

Proof:

Considering the case when \( f'(t) \) is continuous for all \( t \geq 0 \). Then on integrating by parts, this follows

\[ M^f \{ f'(t), s, 0, 1/a \} = \int_0^{1/a} a^s t^{s-1} f'(t) dt \]

\[ = \left[ a^s t^{s-1} f(t) \right]_0^{1/a} - \int_0^{1/a} a^s (s-1) t^{s-2} f(t) dt \]

\[ = a f(1/a) - (s-1) \int_0^{1/a} a^s f(t) t^{s-2} dt \]

\[ = (1-s) M_f \{ f(t), s-1, 0, 1/a \} + a f(1/a) \]

(27)

since \( f(t) \) satisfies \( |f(t)| \leq m e^{\gamma t} \) and thus Mellin Type (fractional) Integral Transforms for derivatives is obtained.

7.2:

1: FrMIT of \( n^{th} \) order Derivatives:

By applying to the second-order derivative, \( f''(t) \) we obtain

\[ M^f \{ f''(t), s, 0, 1/a \} = \int_0^{1/a} a^{-s} t^{s-1} a^s t^{s-1} f''(t) dt \]

then on integrating by parts it follows that

\[ M^f \{ f''(t), s, 0, 1/a \} = (1-s) (2-s) M^f \{ f(t), s-2, 0, 1/a \} + (1-s) a^2 f(1/a) + a f'(1/a) \]

(28)

\[ M^f \{ f'''(t), s, 0, 1/a \} = (1-s) (2-s) (3-s) M^f \{ f(t), s-3, 0, 1/a \} + a f''(1/a) \]

(29)

This is the generalized result of the of The Mellin Type (fractional) Integral Transform. \( n^{th} \) derivative of \( f(t) \).

VIII. APPLICATIONS OF FRMIT

8.1. \( \Delta_2 f(x) = x^2 f''(x) + x f'(x) + f(x) \)

\( L_2 \{ f(t) \} = t^2 f''(t) + tf'(t) \)

\[ M^f \{ f''(t), s, 0, 1/a \} = \int_0^{1/a} a^s t^{s-1} f''(t) dt \]

\[ = (1-s) M_f \{ f(t), s-2, 0, 1/a \} \]

(29)

\[ = s(s+1) M^f \{ f(t), s, 1/a \} - (s+1) f(1/a) + f'(1/a) \]

Using (14) and it is obtained as

\[ M^f \{ \Delta_2 f(x), s, 0, 1/a \} = [1 + s^2] M^f \{ f(x), s, 0, 1/a \} - s f(1/a) + f'(1/a) \]

(30)
If $\Delta_2 f(x) = 0$, then

$$x^2 f''(x) + x f'(x) + f(x) = 0$$

R.H.S of (14a) gives value zero. From (14a)

$$[1+s^2] M^{fr}[f(x), s, 0, 1/a] = s f(1/a) + a f''(1/a) = 0$$

$$[1+s^2] M^{fr}[f(x), s, 0, 1/a] = s f(1/a) - a f''(1/a)$$

which indicates the higher order differential equations with constant coefficients. The complete solution is given by

$$M^{fr}[f(x), s, 0, 1/a] = \frac{1}{(s^2 + 1)(s f(1/a) - a f''(1/a))}$$

where constants are evaluated by solving initial value problems and problems with boundary conditions.

**IX. Functions ABS Results**

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Functions</th>
<th>$M_{fr}[f(t), s, 0, 1/a]$</th>
</tr>
</thead>
<tbody>
<tr>
<td>1)</td>
<td>$e^t$</td>
<td>$1 + \frac{1}{s} + \frac{(1/a)^2}{2!(s+2)} + \frac{(1/a)^3}{3!(s+3)}$</td>
</tr>
<tr>
<td>2)</td>
<td>$\sin(at)$</td>
<td>$\frac{(1/a)^2}{s+1} - \frac{(1/a)^6}{3!(s+3)} + \frac{(1/a)^{10}}{5!(s+5)}$</td>
</tr>
<tr>
<td>3)</td>
<td>$\tan(at)$</td>
<td>$\frac{(1/a)^2}{s+1} - \frac{(1/a)^6}{3(s+3)} + \frac{2(1/a)^{10}}{15(s+3)}$</td>
</tr>
<tr>
<td>4)</td>
<td>$t^n \sin(at)$</td>
<td>$a^{-n}\left[\frac{(1/a)^2}{s+n+1} - \frac{(1/a)^6}{3!(s+n+3)} + \frac{(1/a)^{10}}{5!(s+n+5)}\right]$</td>
</tr>
<tr>
<td>5)</td>
<td>$t^n \tan(at)$</td>
<td>$a^{-n}\left[\frac{(1/a)^2}{s+n+1} - \frac{(1/a)^6}{3(s+n+3)} + \frac{2(1/a)^{10}}{15(s+n+3)}\right]$</td>
</tr>
<tr>
<td>6)</td>
<td>$\sin^{-1}(t)$</td>
<td>$\frac{1}{s+1} + \frac{(1/a)^3}{6(s+3)} + \frac{(1/a)^5}{40(s+5)}$</td>
</tr>
<tr>
<td>7)</td>
<td>$t^n$</td>
<td>$\frac{(1/a)^n}{s+n}$</td>
</tr>
<tr>
<td>8)</td>
<td>$\log(1+t)$</td>
<td>$\frac{1}{s+1} - \frac{(1/a)^2}{2(s+2)} + \frac{(1/a)^3}{3(s+3)}$</td>
</tr>
<tr>
<td>9)</td>
<td>$\log(1-t)$</td>
<td>$-\frac{1}{s+1} - \frac{(1/a)^2}{2(s+2)} - \frac{(1/a)^3}{3(s+3)}$</td>
</tr>
<tr>
<td>10)</td>
<td>$a^x$</td>
<td>$\frac{1}{s} + \log(1/a) - \frac{1}{s+1} + (\log(1/a))^2 - \frac{(1/a)^2}{2!(s+2)}$</td>
</tr>
</tbody>
</table>
\[
\begin{align*}
11) & \quad \log(1 + \cos t) \\
& = \frac{\log(1/a) - (1/a)^2}{s} - \frac{(1/a)^4}{4(s+2) - \frac{(1/a)^4}{48(s+4)}} - \\
12) & \quad \log(1 + \tan t) \\
& = \frac{1/a}{s+1} - \frac{(1/a)^2}{2(s+2)} + \frac{2(1/a)^2}{3(s+3)} - \\
13) & \quad \log \sec \left(\frac{\pi}{4} + t\right) \\
& = \frac{1}{2s} \log 2 + \frac{1/a}{s+1} + \frac{(1/a)^2}{s+2} + \frac{2(1/a)^3}{3(s+3)} - 
\end{align*}
\]

X. **Graphical Representation by Using MATLAB**

Mellin Type (fractional) Integral Transform graph plotted between x,y for various values of 's' parameter.

Here the program has been shown with one value of the parameter.

Consider the equation (15)

Part I

\[
M^f [f(x), s, 0, 1/a] = \left(s^2 + 1\right) \left( (s f(1/a) - a f'(1/a)) \right)
\]

10.1:

\[
\begin{align*}
& \% f(x)=\log(1+x) \\
& % f(x)=\log(1+x), f'(x)=1/(1+x) \\
& % if x=a=0 then f(0)=0, f(0)=1, \\
& \frac{1}{s^2 + 1} \left( (s f(1/a) - a f'(1/a)) \right) = 0; \\
& % and if a=1 then f(1)=0.6931, f(0)=0.5, \\
& % \frac{1}{s^2} \left( (s f(1/a) - a f'(1/a)) \right) \\
& = \frac{s^2}{s^2 + 1} \left( (s f(1/a) - a f'(1/a)) \right)
\end{align*}
\]

**Graphical Representation**

Consider the equation

\[
M_2[ f(t), s, 0, 1/a] = \left(s^2 + 1\right) \left( (sf(1/a) - af'(1/a)) \right)
\]

10.2 \% f(x)=x^2

\% f(x)=x^2, f'(x)=2*x

\% if a=0 then f(0)=0, f(0)=0, y=0 for s>0,

\% \frac{1}{s^2} \left( (sf(1/a) - af'(1/a)) \right) = 0 \\
% and if a=1 then f(0)=1, f(0)=2,

\% \frac{1}{s^2} \left( (sf(1/a) - af'(1/a)) \right) = (s^3-2) \cdot (s^4-f1-f2)

**Graphical Representation**

XI. **Remarks**

1. Definition of the Fractional Mellin integral transform
2. Lemmas are defined and proved
3. Propositions are defined and proved
4. Theorems are stated and proved
5. Weyl transform is defined and obtained result by using FrMIT
6. Results of summation of the series are obtained by using FrMIT
7. Derivatives are obtained by using FrMIT
8. Cauchy Linear differential equation is stated and obtained solution by using FrMIT
9. Functions and Results
10. Graphical representation
XII. CONCLUSION

This Fractional Mellin integral transform is useful to solve the ordinary differential equations by using initial and boundary conditions solution of the ordinary differential equation is shown by some examples and it is shown graphically by using Matlab.

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Probe Feed Microstrip Patch Antenna Computer Aided Design Methodology

N.T. Markad, Dr. R.D. Kanphade, Dr. D. G. Wakade

Abstract- Antenna is a means for radiating or receiving or transmitting energy an antenna is used in an advanced wireless system is usually required to optimize the radiation energy in same direction and suppress it in others.

A microstrip patch antenna, also referred to as patch antenna is a narrowband, widebeam antenna fabricated by etching the antenna element patch in metal trace bonded to an insulating dielectric substance with a continuous metal layer bonded to opposite side of substrate which forms a ground plane.

Probe fixed microstrip antenna is simulated in Finite Difference Time Domain software IE3D. Proposed novel probe feed microstrip patch antenna is presented. It has a return loss of -30dB at a frequency of 5.102 GHz. Antenna offers a bandwidth of 150.63MHz. In this research article proposed antenna bandwidth is improved by 2.95%. Antenna offers a VSWR less than 1.1 at a frequency of 5.102 GHz. By observing two-dimensional and three-dimensional radiation pattern, it is seen that antenna offers unidirectional radiation pattern. Unidirectional radiation pattern plays an important role in next generation mobile communication and computing. Due to Unidirectional radiation pattern, the cost of power is saved. Antenna offers maximum antenna gain of 4.17 dBi. Antenna offers radiation efficiency of 72.6%. Also, proposed antenna offers antenna efficiency of 72.6%.

Index Terms- Probe feed, Antenna and radiation efficiency, return loss, radiation pattern, substrate

I. INTRODUCTION

In its most basic form, a microstrip patch antenna consists of a radiating patch on one side of a dielectric substrate which has a ground plane on the other side as shown in Figure 1.

This patch is generally made of conducting materials such as copper or gold, and can take any possible shape. The radiating patch and the feed lines are usually photo-etched on the dielectric substrate.

In order to simplify analysis and performance prediction, the patch is generally square, rectangular, circular, triangular, elliptical or some other common shape.

Microstrip patch antenna radiates primarily because of the fringing fields between the patch edge and the ground plane. For
good antenna performance, a thick dielectric substrate having a low dielectric constant is desirable since this provides better efficiency, larger bandwidth and better radiation. However, such a configuration leads to a larger antenna size.

This model represents the microstrip antenna by two slots of width $W$, and height $h$; separated by a transmission line of length $L$. The microstrip is essentially a non-homogeneous line of two dielectrics, typically the substrate and air.

II. PROBE FEED

Feed is of different types, but most popular feeds are:

1. Transformer feed
2. Microstrip line feed
3. Coaxial cable feed or probe feed
4. Aperture coupled feed
5. Proximity coupled feed

Out of the above mentioned feed for microstrip patch antenna, feed applied to it is probe feed.

III. MICROSTRIP PATCH ANTENNA DESIGN

Designed frequency for designing microstrip patch antenna design is selected to be 5/102 GHz. By using standard formulae in terms of width of patch ($W$), length of patch ($L$), dielectric constant of substrate ($E_z$), thickness of substrate ($t$), length and width of patch is to be calculated. Width of designed antenna got to be ($W = 17.6$ mm) and length of designed antenna got to be ($L = 12.3$ mm). By hit and trial method probe feed location is to be selected. Upper portion of substrate shows microstrip patch antenna and lower portion of substrate shows actual ground plane.

By taking designed dimensions, antenna is simulated in IE3D software. Proposed antenna top view is shown in Fig 4.

IV. RESULTS AND ANALYSIS

Figure 5 shows three-dimensional radiation pattern and Fig 6 shows two-dimensional radiation pattern.
Fig 5: Three-dimensional radiation pattern
Fig 6: Two-dimensional radiation pattern

By observing 3-dimension and 2 dimension radiation pattern, it is seen that pattern is unidirectional, unimportant pattern plays an important role in next generation mobile communication and computing cost of power is saved due to unidirectional radiation pattern.
Figure 8 shows VSWR offered by antenna.
Antenna offers a VSWR less than 1.1 at a frequency of 5.102GHz, bandwidth improvement is observed, it’s shown in figure 8 when there is improvement is bandwidth tracking errors are reduced a large extent when tracing errors are reduced to a large extent then mobile receiver is good aligned to a transmitter, then problem of tuning the receiver is reduced.

Antenna offers radiation efficiency of 72.6% at a frequency of 5.102 GHz also proposed offers antenna efficiency of 72.6% at a frequency of 5.102 GHz, antenna offers maximum antenna gain of 4.17db1.

V. CONCLUSION

It is seems that the design adopted for microstrip patch antenna are quite accurate. Bandwidth of antenna improved by 2.95 hence problem of tracking errors are reduced to large extent this antenna can be used at 5.102GHz frequency for mobile satellite communication and computing application where the frequency of operation is 5.102GHz for an antenna to work properly the vswr must be less than two and return loss must be less than 10db only then the antenna will radiate or receive the power with minimum reflection, as designed antenna has a return loss of -30dB at a frequency of 5.102, so this antenna is used in mobile satellite communication and computing applications where the weight is the main constraint. Due to unidirectional radiation pattern microstrip patch antenna plays important role in next generation mobile communication and computing also due to unidirectional radiation pattern cost of power for mobile for communication is saved.

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Effect of Parental Education on the Modernity of College Students of Ranchi Town

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Abstract- The present study has been carried out with the objectives to find out the effect of parental education on the modernity of college students. The sample of the study constituted of 120 students. There were two groups of students. 60 students constituting the 1st group were the son of those parents who are highly educated. The other 60 students of the 2nd group are the son of those who are illiterates. The selection was made from final year graduation students of the colleges of Ranchi town. The age of the students ranged from 19 to 25 years. A dynamic model has been used in the present study. The model is based on the assumption that if two generation continues to share the same education and environmental exposure, the differences between them will remain static. The result showed that the level of modernity of both group of students were significantly different because of the differences of the parental education. The exposure of modernity is greater in first group because their parents and they both are well educated. Education is one of the most powerful factor influencing the modernity of college students.

Index Terms- Modernity, Education, Generation Gap, Attitude

I. INTRODUCTION

India is a developing country. The nation is undergoing the process of modernization characterized by rapid social and psychological changes. In psychological sense, modernization denotes to positive change in attitudes, beliefs and values. In a traditional society younger generation shares modern attitudes and values while the older generation remains attached to the convention resisting to the change. This causes attitudinal differences leading to disruptive condition in the society.

Among several other factors influencing the attitudinal modernity, education has been considered as one of the most important one. There are number of studies which have established a positive and significant relationship between education and attitudinal modernity (Lerner, 1958).

The spread of education in India during the last few decades has widened the gulf between the educated youth and their parents. Education has; thus, lead to the creation of a sub-culture of students which signifies a transition from tradition to modernity (Damle, 1966; Shah, 1964; George, 1971) observes that attitudinal differences between the young and the old generations have been fostered by education. On the basis of their extensive researches in six developing countries, Inkeles and Smith (1974) have stressed the role of education in modernization.

The role of education in facilitating the development of modern attitudes and values has been demonstrated in a number of studies (Armer and Youz, 1971; Cunningham, 1973; Holsinger, 1973; Waisanen & Kamata 1972). Educated children compared with their less educated parents have been found to be more liberal and democratic. Research findings have also demonstrated that differences in education of the first and the second generations produced maximum gap in respect of political attitudes.

Education as a modernizing agent has been discussed by many authors and researchers. Kirpal (1976) writes: “… the new forces of modernization shook the traditional societies and sharpened intergenerational differences” and that “the serious differences are inevitable in the process of transition from tradition to modernity”. Kothari (1971) has also explained the differences between the two generations in contemporary Indian society. In his words “In the present era, sons grow in an environment different from the one in which their fathers grew. The child is now carrying a different world within himself, a world which is at variance with the world of the older generation”.

Modernity studies conducted in India during the last two decades have unanimously established the role of education in producing attitudinal differences between generations (Hassan, 1993; Halyal, 1984; Jawaid, 1989; Raghuvanshi, 1978; Sack 1973).

If can, thus, be concluded that education is a powerful factor in producing generation gap. Dube (1955) wrote of the educated: “They scoff at their parents, belittle the experience of the elder and seem to think no end of themselves…… education shakes a person’s belief in the traditional ways and creates in turn new desire and ambitions”.

Modernity denotes to positive changes in attitudes, beliefs and values. It incorporates rational ideas, secular attitudes, belief in human efficacy, and expression of personal opinion on public issues, acceptance, of democratic norms, political participation and exposure to new experiences Modernization is actually a process of change in ways of perceiving, expressing and behaving. Inkeles and Smith (1974) have written “The modern is defined as a mode of individual functioning, a set of dispositions to act in a certain way.”

Modernity is not a consequence of more difference of age between the two generations. It is an impact of urban industrial exposure, mass media exposure and more importantly education. If the two generation will have significantly different exposure to these forces the phenomenon of modernity will occur (Singh & Ara, 2009; Singh, 2010 & 2011)

The term ‘modernity’ has several usages. It is widely employed to describe the characteristics in technological, political, economic and social development. Modernity is actually a personality-cum-attitudinal characteristic of the
individual. It is a ‘broad multifaceted phenomena’ (Inkeles and Smith, 1974, P. 105).

Singh (1984) describes modernity as a purely psychological concept. He told that it is a mentality, an inner quality lying within the individual as an inseparable part of his personality. He has defined modernity as “an aggregate of certain personality-cum-attitudinal traits which facilitate individual growth and development with social responsibility and make the individual an effective agent of socio-economic and political development.”

II. OBJECTIVE OF THE STUDY
To study the influence of parental (generation I) education on the modernity of their sons (generation II).

III. MATERIALS & METHODS
A. SAMPLE
The total sample of the study consisted of 120 students. There were two groups of students. 60 students (1st group) is the son of those father’s who are well educated. The other 60 students (2nd group) is the son of those who are illiterates. The selection was made from final year graduation students of the colleges of Ranchi town.

B. TOOLS
Information Questionnaire: The questionnaire obtained personal data of the students to identify the level of education of their fathers and also their own education

The Attitudinal Modernity Scale: The Attitudinal Modernity Scale was first developed in the six –country Harvard University Project on Modernization. It was later revised by the Post -Graduate Department of psychology, Ranchi University to add certain themes unique to the Indian society, such as the joint family, the caste system, social customs etc. Recently, a dimension of health modernity has been added to it.

These four dimensions of the scale have statistically significant positive inter-correlations and therefore they were combined to make a total attitudinal modernity scale. Each dimension has five themes and each theme measured by 5 Likert type items. Thus, each dimensional scale consisted of 25 items and the Total Attitudinal Modernity Scale consisted of 100 items. The range of the score was 100-500 for the total scale and 25-125 for each dimensional scale.

IV. ANALYSIS & RESULTS
Mean, SD and ‘t’ ratios of the scores of both groups (student) has been presented in Table 1

<table>
<thead>
<tr>
<th>Table 1: Comparison of Both Groups of Students on Attitudinal Modernity</th>
</tr>
</thead>
<tbody>
<tr>
<td>N=60</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Modernity</td>
</tr>
<tr>
<td>Personality</td>
</tr>
<tr>
<td>Socio-cultural</td>
</tr>
<tr>
<td>Political</td>
</tr>
</tbody>
</table>

V. RESULTS & DISCUSSION
There was significant difference in all the dimensions of modernity as far as total modernity of both groups of Students. Education has been found to have significant influence on modernity. Education most importantly, influences the perception and vision of life style and values and there by the phenomenon of attitudinal differences. With this conceptualization the present study has empirically proved that attitudinal modernity most importantly influenced by the educational differences of the fathers.

The second theoretical contribution of the present research is the study of attitudinal modernity in relation to concept related to social change and development embracing such factors as personality variable, socio-cultural and political attitudes and values, and knowledge. Attitudes and practice about health. The present research is one of the pioneer studies which have studied modernity using a socio-psychological scale of modernity. The scale of modernity was appropriate as it measured attitudes which are influenced significantly by formal education. Education is one of the strongest factors in making men modern. Difference of educational level between the father’s of both groups of sons, is the basic factor in creating attitudinal differences.

VI. CONCLUSION
The educated youth are influences by new values; they formulate effective ideologies and they create an adequate atmosphere for change and betterment. But if their parents are
also educated the graph of modernity is high in comparison to those youth whose parents are illiterate.

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Real life problems on MAD with RTS

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Abstract- In this paper, the application of matching, using min-weight bipartite graph to find out which disease is matched to that concern treatment’s states is presented.

Index Terms- Matching, Near-perfect, Greedy algorithm, MAP, MAD, RTS, Weighted graph.

I. INTRODUCTION

Every human being has affected by some disease. There is a treatment for cure to all kinds of disease. Likewise, a few diseases are incurable such as HIV, AICD. In this paper describes about the matching between disease and the states of treatments. In particular, bipartite graph and min-weight graph is the major tool to find out proper matching.

II. LITERATURE REVIEW

The motivation for introducing matching is reflected upon by Roberts F.S., Graph Theory and its applications to the problems of society. The term matching has been used in the literature once introduced by Murugan M (1966).

Matching is also discussed in Bondy J.A. and Murthy. U.S.R, Graph Theory with Applications, Macmillan (1976). Douglas B. West, Introduction to Graph Theory, second Edition,(2006) and some other papers and books. Many real life problems have been solved by the help of Graph Theory matching and it has also proved to be an extremely useful tool for solving many tasks.

Definition: 1
A graph G= (V, E), a matching M in G is a set of pairwise non-adjacent edges.

Definition: 2
A vertex is matched (saturated) if it is incident to an edge in the matching. Otherwise the vertex is unsaturated.

Definition: 3
A maximal matching is a matching M of a graph G with the property that if any edge not in M is added to M, it is no longer a matching, that is, M is maximal if it is not a proper subset of any other matching in graph G.

Definition: 4
A maximum matching is a matching that contains the largest possible number of edges.

Definition: 5
A perfect matching is a matching which matches all vertices of the graph.

Definition: 6
A near-perfect matching is one in which exactly one vertex is unmatched. This can only occur when the graph has an odd number of vertices, and such a matching must be maximum.

Example: 1

As mentioned earlier, matching graph has a perfect matching, namely HAV is cured by simple treatment. Leucodema is cured by not simple treatment and AICD is neither cure nor death by any treatment and also Diabetes diseases has not been cured by any treatment, but it may be controlled and it tends to slow death (later) and HIV disease has no treatment and it surely tends to death.

Definition: 7
The weight of matching M is the sum of the weights on the edges in M. The min-weight matching for a graph G is the perfect matching for G with minimum weight.

Example: 2
Every disease has some states to cure or not cure. Those diseases are denoted by {D:D₁,D₂,D₃,D₄,D₅} for {Disease: Leucodema, HAV, Diabetes, HIV, AICD} respectively and their states of treatment (result) are denoted by {P:P₁,P₂,P₃,P₄,P₅} for {States: Simple treatment(for cure),Heavy treatment(for cure),Neither cure nor death, Slow death, Fast(sure)death} respectively, with min-weight 6.

Now a days, in our practical life problems, matching problems are used frequently, which has an elegant solution. Every disease has some preference order of the possible states of treatment. That preferred states do not have to be symmetric.

Example: 3
HIV disease has no treatment, which goes to sure death but if the treatment is not proper for HAV, this disease also leads to death. By heavy treatment HAV disease will be curable. But
suppose HAV is not curable and it tends to death that is more than curable state but HIV will be curable by heavy treatment.

In the fig: 3 suppose the states with disease are matched by as follows.

Suppose to match HAV tends to death and HIV disease is to be curable, that would lead to very dicey situation. It is sufficiency to say that HAV disease tends to death. The main practical problem is HAV disease is not very dangerous but HIV is very dangerous, because there is no treatment.

To show that how to find such a matching graph has a stable matching.

First look at disease verities where a proper stable matching is not possible. This idea has been created by the triangle match with a four diseases, which is last choice of every one.

It turns out HIV doesn’t have some matched disease. That’s why there is no stable matching.

Theorem: 1

There is no proper stable match for diseases and its symptom’s.

Proof:

By contradiction, assume that, there is no proper stable matching. Then there are two disease of the matching triangle that is matched.

By symmetry, assume that Jaundice disease is matched to Stomach pain. Then the other pair disease must be Head ache matched with HIV. But there is an improper (rogue) matched pair disease, since if Stomach pain comes, Head ache will come very soon and if Head ache comes, Stomach pain has comes for the disease HIV. So Stomach pain and Head ache is improper pair. Thus, there can’t be a stable match.

Next, a stable match is a hard thing to do, for that we can take always do it in bipartite graphs. That is, where the disease are only allowed to match with states of treatments and vice-versa.

We are not making a political or social statement here this is just a fact of mathematics. So let’s formalize the statement of the problem is noted here.

Setting the matching for stable between the disease and states of treatment problem:

- Assume the number of classified states of treatment process and particular diseases are same, (N states and N disease).
- Each disease has its own ranked preference list of states and also vice-versa.
- The lists are completed and have no ties, (each disease has some treatment states to take for cure or death and vice-versa).

III. MATCHING ALGORITHM

Initial condition: Each of the N disease has an ordered list of the N states (treatment results) according with its preference states. Each treatments state has an ordered list of the disease according to its preference.

MAD with RTS (matching algorithm for disease with its result of treatments states):

Every disease has some treatment period as well as concern treatments cure some concern diseases.

1. First check that concern disease nature and how it cause.
2. If the disease is simple, it needs to cure by simple treatment.
3. If the disease is like AICD, it is uncurable by simple or heavy treatment and it terminates.
4. Some case of disease needs heavy treatment to cure.
5. Some times that treatment may not suit for some bodies, it is very dangerous and it tends to death slowly.
6. Rarely, if any treatments are not suited or not properly treated, it will surely goes to sudden death.

Terminal condition: If there is a day when every disease reaches some states by treatment, stop the processes.

Example: 4

Figure out method for finding a stable matching.

Disease.....States
HIV -1-------A - Sure death
HAV -2-------B - Fast cure
LEACODERMA-3-------C - Slow cure
DIABETES -4-------D - Slow death
AICD -5-------E - Neither cure nor death

By greedy algorithm to find the proper matching.
IV. PREFERENCE ITERATION LIST

Figure: 6

Theorem: 2

MAD with RTS will be terminates within $N^2 + 1$ stages.

Proof:

By contradiction, that MAD doesn't terminate within $N^2 + 1$ stage. Assume that something must be happen on a stage in which MAD doesn't terminate-it must be that some proper treatment treats particular disease neither cure nor death .If MAD doesn't terminate, then some disease have not proper treatment. If any disease has proper treatment for cure or death, then the other simple treatments are rejected.

So if MAD doesn't terminate in $N^2 + 1$ stages ,there are at least $N^2 + 1$ stages crossed off in total. But at that start, each list is of size at most N .So the total size of all the lists put together is at most $N^2$.So we couldn't off $N^2 + 1$ stages and thus we have our contradiction.

Lemma: 1

If any patient cure or death, then that patient courted every other treatments if it is matched better.

Lemma: 2

If any patient is neither cure nor death, then the patient wants some heavy treatment.

Theorem: 3

Every disease is matched by its states of treatment in matching algorithm.

Proof:

By contradiction, assume that some treatments are not matched to some disease. But then, by lemma 2, if a treatment states are not suit, then it courted every disease. But every disease will neither cure nor death by some treatment. But since there are an equal number of states and disease, it must be the neither cure nor death that every disease is matched, which is a contradiction. Hence the theorem.

V. CONCLUSION

Every disease has some particular states of treatment by min-weighted graph.

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The Celestial Trinity of Indo-Iranian Mythology

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I. PROLOGUE

Understandably, one of the best ways to get a better grasp of the subject matter of the topic: ‘Comparative Study of Indo-Iranian Mythologies’ is to comprehend the grand, weighty, multidimensional, and acute points and sites of their similitude and co-relational originalities. In T.S.Eliot’s terms, his ‘objective correlative’ is good for broader analysis of the Arian’s feelings and thoughts that may be signaled through the texts and archaeological records and evidences, amongst other things.

Indo-Iranian myths and their concerned ancient texts of reference of the period, before and after their separation, are some signpost-points that show something to us from which certain and definite results appear. They are materials for understanding man better. The certain cores and titles of cultural phenomena of both branches of Aryan people, Indian and Iranian, can be chosen to be compared and assessed for finding out their similar characteristics, theoretical statements, and some other speculative implications. As we see them closely, and go through them systematically and measurably, then, comparatively, fruitful outcome will be acquired. Through their contexts, contents, structural textuality, and signified contextuality referring to modern and postmodern considerations we can access the most reliable data and results.

Another reason for this process is that ancient collections of both the Rig Veda and the Avesta are voluminous. Therefore, it is not possible to catch everything at once and fast. A few examples may be selected in order to show and assess the shared and common features. It is possible to point to the sites of similitude from different angles and approaches. It is also possible to look into them simultaneously from two or more positions and or theoretical attitudes.

II. THE VEDIC PANTHEON

The Vedic pantheon is to be linked up with the Avestan pantheon as they have got a common origin and homage as well as homogenous composer and constructors. They have celebrating deities, the similar set, processes of creation, and challenges in treatment of natural forces, behavior, arrangement of cosmic affairs, and ritualistic sensitivities etc.

The Indian Rig Vedic Pantheon is, perhaps, one of the most ancient and also complex Pantheons of myths in the world. It is complex because in various contexts can also be treated in a very figurative apprehension. Indeed symbolic explanation as Zimmer has held is another modern treatment. Also the mythologies of Indo-Iranian, through different critical approaches, may be explicated.

The texts of mythic expositions Indo-Iranians are one set of the most metaphoric and complex literatures of the ancient world the world has created. Although the imagery is very concrete and sensual, the meanings are eventually abstract and metaphysical. As an example look at the hymn five of mandala IV, Rig Veda, we read:

“Indra is bounteous like a tree with ripens fruits… we praise Indra in the same manner as a lusty man praises a fair maiden.”

The roles of Indra are in a great deal numerous and great. He can be compared with that of so called sin forgiving role of Christ. He is wise, mighty and grantor of wealth who “destroys all the sins of the hosts” who chant in Yagya the holy ritual. He is omniscient and everywhere.

III. THE EXTENT OF SIMILITUDE

It can never be coincidence or accidental that two kinds of texts written or composed by a separated people be so similar to such an extent: to have such a vast and numerous topics and subtopics, as well as contents and forms, layout, and streams, of romantic trends, and linguistic similarities. This matter is so serious and significant in culture and anthropological studies. One may call and gather all data and information from recent archaeological, linguistic, historical, as well as ethnographical findings of the fields of the research in order to reconstruct more and more accurate and heavily detailed configuration of such a complex bodies of common constituents and characteristics. What would be remarkable is multitude of distinctive data and knowledge on culture, myth, religion and the discovery of portions the records of people migrating and setting here and there in ancient world within and through the concerned fields of analytical approaches. An example of the parallel pantheons is common site of Mitra, Varuna, Aryman/ Mithra, Ahura, Airyman as trinity pantheon of Indo-Iranians

IV. THE CELESTIAL TRINITY OF MITRA - VARUNA, AND ARYAMAN

"Mitra, Varuna, Aryaman are free to take us through their desired path. Let Aryaman convey our wishes to the bounteous Lord. Guarded by the deities, may we be happy with their gifts in the form of wealth and noble son."

"Let Mitra, Varuna, and Aryaman grant riches for us and our sons. Let all the paths in our lives be smooth and easy to tread. O

1 Rig Veda IV. 5
2 Ibid. IV. 8-9
3 RV., 7,64,3

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God, may you guard us with your holy powers forever and bless us."  

These three deities (Adityas) in the Vedic pantheon have significant status among other Adityas most of the times. They are present in the Yagya ritual in various hymns of the Rig Veda with other Adityas.  

"Mitra, and other gods and Aditi are the leaders of this peaceful Yagya. They are the wealth gods too."  

Mitra, Varuna are majestic and king of all deities. That is what in hymns 64, 65, and 66 among others, specially addressed and introduced, we can see. In hymn 65 we read: "Let both these powerful and great gods [Mitra and Varuna] make our people prosperous."  

This triplet is responsible for wealth and health of the mortals of the earth. They are the givers of light, water, warmth, morality and order.  

Varuna specially stands for the better life of the mortal on earth. He cares about right and good of deeds and orderly practice of the earthly mortals.  

Mitra is such a significant mighty deity in the whole Indo-Iranian Pantheon to be called and requested also in madala eight hymn 25 again with Varuna, peaceful goddess: Marutus, great Indra and other gods of Indian pantheon accompanying Aryaman. Lord Vishnu also is present (VII.25.12). At the final mandala of the Rig Veda(X) hyman 132 Mitra and Varuna are present again together.  

It is necessary now to remind that those deities we are talking about in here are those Indo-Iranian ones that, according to the evidence, they are called as witnesses for a treaty between Hittite and Mitanni states. The evidence was discovered in Bogaz koi, somewhere near the north of Syria.  

So, one of the sacred gatherings of these three (Mitra, Varuna, and Aryaman) deities of Indo-Aryan and Indo-Iranian pantheon is recorded in the treaty discovered at Bogaz koi. This is what G. Dumezil (1961) also emphasizes on his "The Three Functions Theory of Myths."  

In many cases in the Rig Veda we have these three linked up deities together. "Mitra, Varuna, and Aryaman are free to take us through their desired path. Let Aryaman convey our wishes to the bounteous Lord."  

"Let Mitra, Varuna, and Aryaman grant riches for us and our sons…. O gods! may you guard us with your holy powers forever and bless us."  

"Great leaders Mitra, Varuna, and Aryaman". "At the time of sunrise, we request you to share your mighty wealth with us. O holy leaders, you have been born to perform the Yagya, you enhance the Yagya and guard it from evil and jealous demons."  

They are so majestic that in Mesopotamian and minor Asian state-level society were they called for witness (although originality can be disputed).  

Of Mithra in Khorda Avesta is also magnificently emphasized in Mihr Yast (Yasht 10).  

The characteristic of Mitra (Mithra) , Varuna, and Aryaman may be understood and illustrated from the Rig Veda as well as the Avesta texts.  

Mithra (in the Avesta) is also a deity of friendship and help, he is ever awake and sleepless. He is bright and he "wakefully guards the creation of Mazda."  

Mithra is helpful to Ahura (in Avesta) as Mitra is great co-worker with our deities such as Asura, Surya (deity of sun). In the Avesta, Yasna I we read "I announce (and) carry out (this) Yasna for the two, for Ahura and Mithra, the lofty, and the everlasting, and the Asha – sanctified and for all the stars which are Spenta Mainyu's creatures, "the Aryan prayer smites down the strength of all the creatures of Angra Mainyu, of the Yatus and Pairikas. It is the greatest of spells, the fairest of all spells, the fearful one amongst spells, the most fearful of all spells; the firm one amongst spells, the firmest of all spells; the victorious one amongst spells, the most victorious of all spells; the healing one amongst spells, the best-healing of all spells. Another significant deity who is important is Aryaman both in the Rig Veda and the Avesta Aryaman. Therefore it is evident that two mythologies had had shares before the Vedic period started.  

Mitra, with the Rig Vedic dictation and form, as a masculine deity of the early Vedic period literally means "friend, companion, and associate." As a masculine deity he is an Aditya and one of the twelve Suryas, his mother is Aditi and his father Kasypa. He is one of the most important staff members of Indra's Union, who is also "generally evoked with Varuna and Aryaman." He is, as the Rig Veda's hymns express, the earth and sky guard. He is one of the six major sovereign principles and one of the three whole realms in the world. Specifically, as F.W. Bunce emphasizes, the three are "solidarity, the sacredness of the world given, and the link of the man." Mitra (or Mithra in the Avesta) is a common deity of Indo-European, especially of Indo – Iranian, as well as of Babylonian and of Zoroastrian people.  

"Unto Mithra, the lord of wide pastures, who has a thousand ears, ten thousands eyes,"  

"To whom the chiefs of nations offer up sacrifices as they go to the field..."  

Who first of the heavenly gods reaches the Hara" (mount Alburz, Whence the sun rises) is Mithra. It is to be mentioned that one of the longest Yashts of the Khorda Avesta is the one which is especially ascribed to Mithra. He is the witness of truth and sees everywhere and looks into the depth...
of things, who is "sleepless and awake" ever and ever and ever
(Y.X. repeatedly).

He is most honoured as in the Rig Veda. Mithra (in the Avesta)
who is invoked, exposed and praised in Mihr Yast (=Yasht 10),
is one of the Indo-Iranian deities of the Indo-Iranian Pantheon.
The only difference here is that his parallel in the Rig Veda is
spelled Mitra and praised, exposed and described with his
various associations in the several hymns of the Holy Scripture.
In the third Mandala, hymn fifty nine, nine verses are addressed
to lord Mitra. 19 In other mandalas like mandala number five,
hymns sixty two to seventy two he is joined with Varuna, and
also Aryaman, whom is always associated with. 20 Also in
mandala seven, hymns sixty one to sixty five, he is a gient deity
associated with Varuna. However he is also addressed with Agni,
in hymn sixty two verse number six with Aryaman.

Aryaman is the healer deity (the Persian Avesta Yasht IV.54)
but the guard of marriage affairs in the Rig Vedic hymns. And in
Hindu culture he is still so.

He is honourable and ideal, powerful and victorious who is
created by Ahura Mazda, and is praised by him for his strength.21
Therefore, Aryaman, like Mithra, Varun, and like Ahura , is
unavoidably the ancient deity of Indo-Iranian people. He had
existed before they came into the sacred books of the Avesta and
the Rig Veda. And he is, amongst other parallel and similar
figures, one of the significant common myths of the two
separated people of the same origin of India and Iran.
The meaning of the name both in the Rig Veda and the Iranian
hymns in the Avestan scriptures is the same. He is, to Ahura Mazda,
a healing deity having his place of residence in the sky (see
Fargard 22, Vendidad, the Avesta). He is made against Angra
Mainyu, the creator of ninety nine thousands and nine hundred
and ninety nine (99999) diseases. Aryaman, his associate is
residing in an enlightening space (abode) in the sky. He is also
called the deity of the sky22.

He is significant in order to remove illnesses, dirty stains, and
the unclean. He seems to be an agent who is advanced in
functions and duties by handling the Ahura Mazda's struggle
against satanic forces of Angra Mainyu. Aryaman in Rig Veda is
usually linked up with Mitra (Mithra) and Varuna. While in the
Avesta he is independently given a magnificent, well lighted, and
enlightening, home, better to say he is lodging with brilliant
lights. 23

His nature essentially is promising. He is kind and concerned,
as it is said previously, he is with marriage affairs and
ceremonies in the Rig Veda while he is the guard and defender of
goodness, pure thoughts, privileged deeds, and clean spirits.
George Dumezil calls him Aryan supporter.

These three holy Adityas(Mithra,Varuna and Aryaman)
perform the holy ritual of Yagya and fulfill wishes of the
worshippers. They have the quantities of absolving and cleansing
their worshippers' sins. They are not only the performers, guards,
observers, controllers, but also providers and makers of holy
rituals. Mortals expect and worship them to listen to them for
being saved and cleansed: "O Adityas,. may you grant enormous
riches, comfortable dwelling to the host who is tired after
expressing the Somras…. (soma juice). " O Adityas, may you
fulfill all our wishes. ", "O Varuna, Mitra, and Aryaman, you are
great. .. we seek your blessing." 24 In one of the verses of hymn
fifty six Aditi herself is invoked with her three sons or all sons to
free the worshippers from evil's tricks and chains: " O Aditi and
Adityas..."25.

Evil demons are Mentioned again in the same mandala, hymn
thirty, verse three when all "thirty and three " deities are invoked
in verse two of the similar hymn. In the rituals of yagyas Manu
(the first man) performed the rite of worshipping. 26

Aryaman is the son of Aditi and Kasypa who represents
honour nobility, chivalry, rules, and order of the society. He is
another and the earliest common deity of Indo-Iranian Pantheon.
Aryaman is also introduced as the guard of regulations. He
concerns with the cycling and recycling of the time, calendar and
light. Aryaman is, again, one of those seven or twelve Adityas
who are immortal because their element is the everlasting light. It
is understood that Anyaman, as one Aditya is another name for
the sun.

He is constantly linked up with Mitra (Mithra), Varuna Indra,
and others repeatedly, like most deity and ritual cases. In several
Mandalas and hundreds hymns of the Rig Veda this is repeated.
AS Adityas are sons of Aditi , mother of gods , she is repeatedly
addressed too. Indra, Mitra, Aryaman, Bhaga, Varuna, Daksha,
Ansa, Savitra, Adiya, Dhatri, Vishnu, and Martanda are the
twelve Aditya as whose mother is Aditi in the Rig Vedic and
Hindu mythology (as Amshe Špendas in the Avestan Scriptures).
Aditi herself is immortal, too.27

Aryman, as one of the pillars of the trinity of Aryan
pantheon is enough old and experienced to be associated with
Ahura Mazda and at the same time be an aditya whose mother is
all deities' mother. Some scholars even realized him as an elder
twin of Ohrmazd. 28 (Ahura Mazda. His counterpart also is
significant in here to be another pillar of the trinity. He is
supremely wise and rational: Varuna, again, being an
enlightening eternally is a celestial Aditya. Being an omniscient
commander of universe, he has been said to be creating three
complex realms (heaven, earth, and the air). In addition to it, he
is well 'all seeing deity' and the inevitable judge and the scale of
the mortals' deeds. He is judge of the dead, too. He is associated
with Yama the judge of dead souls.

As we see in different hymns of the Rig Veda, he is
emphatically said to be a kind deity amongst and through other
sons of Aditi. Apart from Mitra and Aryaman, Indra, Bhaga,
Savitr, Ansa, and also Martanda (Vivasvat) and a beautiful
charming and beloved sister Ushas, are his siblings.

19 RigVeda, III. 59. 1-9
20Ibid. I. 62-72
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Effective Neural Technique to Identify Brain Tumor

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Abstract - This is the review of work for brain tumor detection using MR images. The present paper suggested Neural Network based brain tumor detection. Both hardware and software approach is proposed in this paper. The interdependency of two approaches certainly makes precise detection of maligns cells.

Index Terms - Artificial Neural Network, Brain Tumour, MRI, Neural Network.

I. INTRODUCTION

Brain tumors are composed of cells that exhibit unrestrained growth in the brain. Brain tumor by nature is malignant since it takes up space and invades brain tissue which is required for vital body functions. Because of the invading nature of the brain tumor it affects one of the most important organs in the body. Typical treatment for brain tumours is surgical in nature, although radiation therapy can also be prescribed depending on the particular case. The Brain Tumours can be classified as follows:

I. Benign Tumor i.e. Non-Cancerous Tumor
It is a type of tumor, which is Noncancerous, means they do not spread or invade the surrounding tissue.

II. Malignant Tumor i.e. Cancerous Tumor
It is a type of tumor which is cancerous, means it spreads and invades the surrounding tissue. It is categorized as Primary and Secondary Tumor.

a. Primary Tumor
They start in the brain. Benign tumours represent half of all primary brain tumours Most of them are usually successfully treated with techniques such as surgery.

b. Secondary Tumor (Metastatic)
A secondary (Metastatic) brain tumor occurs when cancer cells spread to the brain from a primary cancer in another part of the body. Secondary tumours are about three times more common than primary tumours of the brain. One of the principal problems in surgical planning is the precise localization of critical brain structures. It is difficult and time consuming to detect and localize malignant cells using 2D images. 3D views, however, is a difficult task and is traditionally carried out in the clinicians mind. However, with image processing tools, the information in the orthogonal 2D cross-sections can be enhanced and interactively displayed using 3D models. This image models considerably helps the surgeon in the trajectory Optimization process. The spatial information helps in planning of the procedure by allowing him to test and analyse alternative navigational paths through the physical space. Pathological data is in terms of CT, MRI, MR-angiography or functional imaging presenting image information in a way that is more similar to the surgical view of the patient during the operation, thus facilitating the comprehension of the entire anatomy. The images of interest are obtained by the following techniques.

1. X-Ray
2. Computed Tomography-CT Scan
3. Positron Emission Tomography-PET
4. Magneto Encephalography –MEG
5. Biopsy
6. Magnetic Resonance Imaging-MRI

1.1.1 X-rays
X-Rays of the skull were once standard diagnostic tools but are now performed only when more advanced procedures are not available.

1.1.2 Computed Tomography (CT)
Computed tomography (CT) uses a sophisticated X-ray machine and a computer to create a detailed picture of the body’s tissues and structures. It is not as accurate as MRI and does not detect about half of low-grade glimmers. It is useful in certain situations; however a CT scan helps locate the tumor and can sometimes help determine its type .It can also help detect swelling, bleeding, and associated conditions. In addition, computed tomography is used to check the effectiveness of treatments and watch for tumor recurrence.

1.1.3 Positron Emission Tomography
Positron emission tomography (PET) provides a picture of the brain’s activity rather than its structure by tracking substances that have been labelled with a radioactive tracer. PET is not routinely used for diagnosis, but it may supplement MRIs to help determine tumor grade after diagnosis. As with magnetic resonance spectroscopy (MRS), PET is also able to distinguish between recurrent tumor cells from dead cells or scar tissues, although MRS is more widely available.

1.1.4 Magneto Encephalography (MEG)
These scans measure the magnetic fields created by nerve Cells as they produce electrical currents.

1.1.5 Biopsy
A biopsy is a surgical procedure in which a small sample of tissue is taken from the suspected tumor and examined under a
In MRI, one of the principle regions of interests is the brain. Currently in clinical applications, the boundary of tumor in a head image is usually traced by hand. Thus this manual approach becomes infeasible when used with large data sets. Hence the automatic system for the detection of tumor is necessary. Recently several attempts have also been made to apply neural network architectures to brain tumor analysis.

II. AN OVERVIEW OF RELEVANT LITERATURE SURVEY

In 1997, Yan Zhu* and Hong Yan [2] presented the work on Computerized Tumor Boundary Detection Using a Hopfield Neural Network, which presented a new approach for detection of brain tumor boundaries in medical images using a Hopfield neural network. The boundary detection problem is formulated as an optimization process that seeks the boundary points to Minimize an energy functional based on an active contour model. A modified Hopfield network is constructed to solve the optimization problem. Taking advantage of the collective computational ability and energy convergence capability of the Hopfield network, our method produces the results comparable to those of standard “snakes”-based algorithms, but it requires less computing time. With the parallel processing potential of the Hopfield network, the proposed boundary detection can be implemented for real time processing. Experiments on different magnetic resonance imaging (MRI) data sets show the effectiveness of our approach.

In 1997 Wilburn E. Reddick, John O. Glass, Edwin N. Cook, David Elkin,[10] and Russell J. Deaton presented the work on Automated Segmentation and Classification of Multispectral Magnetic Resonance Images of Brain Using Artificial Neural Network, which presented a fully automated process for segmentation and classification of multispectral magnetic resonance (MR) images. This hybrid neural network method uses a Coonan self-organizing neural network for Segmentation and a multilayer back propagation neural network for classification. To separate different tissue types, this process uses the standard T1-, T2-, and Weighted MR images acquired in clinical examinations. Volumetric measurements of brain structures, relative to intracranial volume, were calculated for an index transverse section in 14 normal subjects (median age 25 years; seven male, seven female). This index slice was at the level of the basal ganglia, included both genus and selenium of the corpus callous, and generally, showed the putamen and lateral ventricle. An intraclass correlation of this automated segmentation and classification of tissues with the accepted standard of radiologist identification for the index slice in the 14 volunteers demonstrated coefficients (ri) of 0.91, 0.95, and 0.98 for white matter, grey matter, and ventricular cerebrospinal fluid (CSF), respectively. An analysis of variance for estimates of brain parenchyma volumes in five volunteers imaged five times each demonstrated high intra subject reproducibility with a significance of at least p<0.05 for white matter, grey matter, and white/ grey partial volumes. The population variation, across 14 volunteers, demonstrated little deviation from the averages for grey and white matter, while partial volume classes exhibited a slightly higher degree of variability.

This fully automated technique produces reliable and reproducible MR image segmentation and classification while eliminating intra and inter observer variability. In 1997, Phooi Yee Lau, Frank C. T. Vons, and Shinji Ozawa presented the work on The detection and visualization of brain tumours’ on T2-weighted MRI images using multiparameter feature block, which presented an analytical method to detect lesions or tumours’ in digitized medical images for 3D visualization. The authors developed a tumor detection method using three parameters; edge (E), grey (G), and contrast (H) values. The method proposed here studied the EGH parameters in a supervised block of input images. These feature blocks were compared with standardized parameters (derived from normal template block) to detect abnormal occurrences, e.g. image block which contain lesions or tumor cells. The abnormal blocks were transformed into three-dimension space for visualization and studies of robustness. Experiments were performed on different brain disease based on single and multiple slices of the MRI dataset. The experiments results have illustrated that our proposed conceptually simple technique is able to effectively detect tumor blocks while being computationally efficient. In this paper, we present a prototype system to evaluate the performance of the proposed methods, comparing detection accuracy and robustness with 3D visualization.

Even single-echo MR images are well classified into grey matter, white matter, cerebrospinal fluid, scalp-bone, and background. A simulated annealing and an iterated conditional modes implementation are presented.

In 2003, Alan Wee-Chung Lieu, and Hong Yan[3] discussed an Adaptive Spatial Fuzzy Clustering Algorithm for 3-D MR Image Segmentation. An adaptive spatial fuzzy c-means clustering algorithm is presented in this paper for the segmentation of three-dimensional (3-D) magnetic resonance (MR) images. The input images may be corrupted by noise and intensity non uniformity (INU) artefact. The proposed algorithm takes into account the spatial continuity constraints by using a dissimilarity index that allows spatial interactions between image voxels. The local spatial continuity constraint reduces the noise effect and the classification ambiguity. The INU artefact is formulated as a multiplicative bias field affecting the true MR imaging signal. By modelling the log bias field as a stack of smoothing -spline surfaces, with continuity enforced across
slices, the computation of the 3-D bias field reduces to that of finding the -spline coefficients, which can be obtained using a computationally efficient two-stage algorithm.

One other challenge is how to make use of prior information about the appearance of normal brain. In this paper we propose a vibrational brain tumour segmentation algorithm that extends current approaches from texture segmentation by using a high dimensional feature set calculated from MRI data and registered atlases. Using manually segmented data we learn a Statistical model for tumour and normal tissue. We show that using a conditional model to discriminate between normal and abnormal regions significantly improves the segmentation results compared to traditional generative models. Validation is performed by testing the method on several cancer patient MRI scans.

While surveying the literature, it has been found that no work has been done in segmentation method has been developed and validated segmentation 2D & 3D MRI Data. This method can segment a tumor provided that the desired parameters are set properly. This method does not require any initialization while the others require an initialization inside the tumor. The visualization results demonstrate the effectiveness of this approach. In this study, after manual segmentation procedure the tumor identification, the investigations has been made for potential use of MRI data for improving brain tumor shape approximation and 2D and 3D visualization for surgical planning and accessing tumor. Surgical planning now uses both 2D and 3D model that integrate data from multiple imaging modalities, each highlighting one or more aspects of morphology or functions. Firstly the work has carried over calculate the area of tumor of single slice of MRI data set and then it was extended to calculate the volume of the tumor from the multiple image MRI set.

Yan Zhu* and Hong Yan [2] suggested the Hopfield neural network for the detection of brain tumor boundaries which was based on an active contour model. This is more suitable for real time application. The desired detection strongly depends on active contour model. Hence in this work adaptive active contour model was used. The accuracy and speed of detection can further modified by modifying model and neural network training approach. In this similar kind of work Wilburn E. Reddick, John O. Glass implemented hybrid neural network method for segmentation and multilayer back propagation neural network for classification. This was fully automatic detection system. The work can be modified by using neural network approach for all stages. On the other side, Phooey Yee Lau, Frank C. T. The separate synthesizer and model creator is required for getting the results. Kirsten Held, Elena Rota Kops, have implemented a fully-automatic three-dimensional (3-D)-segmentation technique for brain magnetic resonance (MR) images based on Markov random fields (MRF’s). A simulated Annealing and an iterated conditional modes implementation were presented. This method itself is not feasible for large numbers of datasets available hence in such kind of work considerable modified algorithm is to be implemented in order to suit for large type of datasets. Alan Wee-Chung Lieu and Hong Yan [03] worked with fuzzy c-means clustering algorithm. In this work the considerable amount of work was carried out for the noisy environment. Rajeev Rattan, Sanjay Sharma, S. K. Sharma [43] pointed out the segmentation problems and in further stage morphological image processing was implemented.

The Brain Tumor Detection is valuable and hence automatic detection is the demand of new era. This is possible by using neural network method for the detection. The neural network can be trained with modified algorithms to give better results. The problem in the acquisition and quality of image will be enhanced by using adaptive filters. The adaptive filters attenuate the noise and hence suitable for noisy environment. In this work neural network based detection with the adaptive filter technique is proposed.

III. THE METHODOLOGY OF THE PROPOSED RESEARCH

A set of eight texture features will be extracted from the Tumour and the normal regions. A grey tone spatial dependence matrix approach, introduced by Horlicks which is a well-known statistical method for extracting second order texture information from images, is used for this study. This method is based on the estimation of the second order joint conditional probability density function . Each is the probability of going from grey level i to grey level j, given that the inter-sample spacing is d and the direction is given by the angle 0. This is also referred to as co-occurrence matrix. The co-occurrence matrix is calculated for the normal and tumor regions (ROI) in the brain images for 0 = 0, 45, 90 and 135 degrees. Each is the probability of going from grey level i to grey level j, given that the inter-sample spacing is d and the direction is given by the angle 0. This is also referred to as co-occurrence matrix.

Probable methods of Data Analysis:
After implementation of the proposed algorithms on MR Brain images, the results will be compared and tallied with the actual results in consultation with the specialist doctors in this field.

IV. SCHEME OF PROPOSED RESEARCH WORK

The Process of detection of Brain Tumor using MR image analysis can be broadly divided into following steps

I. Pre-processing of MR images.
1. Image acquisition
2. Adaptive filter
II. Image Analysis of MR images
1. Segmentation
2. Feature Extraction
3. Enhancement

The resizing of the Image is performed to convenient size so that processing and analysing can be carried out Effectively. The Adaptive Filter is applied to remove the Spurious signals present in the image. Then the segmentation and the feature extraction of region of interest (ROI) is obtained so that enhancement of required section can be done through software. The next block of the system is neural network control. The neural network is trained for the detection of tumor present in human brain. After testing and successful implementation of the proposed scheme with ANN using Mat lab, the real time operation can be performed on the MR Brain Images for the detection of Brain Tumor.
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Performance Evaluation of Different Phase Rotation on OFDM Signal

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Abstract- OFDM signal is a multicarrier modulation technique, one of the attractive techniques for 4th Generation Wireless communication System. One of the major disadvantages of OFDM is that in time domain, it leads to high peak to average power ratio (PAPR). Selective Mapping Phase Rotation is used in this paper for reducing the PAPR in time domain of OFDM signal. In this paper 32 sinusoids subcarriers are taken and find the value of phase rotation at which there is least PAPR obtain.

Index Terms- OFDM, PAPR, selected mapping, Phase Rotation, QPSK, IFFT, Sinusoidal Subcarriers

I. INTRODUCTION

A promising modulation technique that is increasingly being considered for adoption by 4G community is OFDM [1]. Orthogonal frequency division multiplexing (OFDM) is a promising solution for high data rate transmission in frequency-selective fading channels. Existing 3G systems uses single carrier modulation technique whereas OFDM which is otherwise known as Multicarrier Modulation (MCM) / Discrete Multitone Technique (DMT) sends a high speed data stream by splitting it up to multiple lower speed stream and transmitting it over a lower bandwidth subcarriers in parallel. OFDM has several favorable properties like high spectral efficiency, robustness to channel fading, immunity to impulse interference, uniform average spectral density, and capacity to handle very strong echoes and less non-linear distortion, immunity to inter-symbol interference. However, a major drawback of OFDM is the high peak to- average power ratio (PAPR) of the transmitted signal. As the result of large peak power, the D/A converter may become highly complex and the power amplifiers such as ClassA, Class B, Class C and Class D may have a non-linear range, which leads to an inefficiency of the amplifier. Therefore, it’s useful to reduce the PAPR of OFDM system. There are number of techniques to deal with the problem of PAPR. Some of them are amplitude clipping, filtering, coding, partial transmit sequence and selected mapping (SLM) [2], [3]. The selected mapping method (SLM) provides good performance for PAPR reduction [8], and this requirement usually results in high computational complexity. Several techniques have been proposed based on low-complexity selected mapping schemes for Peak-to-Average Power Ratio reduction in OFDM Systems [4], [5].

In recent years OFDM is employed in Digital Television Broadcasting (such as the digital ATV Terrestrial Broadcasting) [6], European Digital Audio Broadcasting (DAB) and Digital Video Broadcasting Terrestrial (DVB-T) [7], and numerous Wireless Local Area Networks (e.g. IEEE 802.11a operating at 5 GHz) and European Telecommunications Standard Institute (ETSI) Broadband Radio Access Networks (BRAN)’s High Performance Radio Local Area Network (HIPERLAN) Type-2 standard [11].

II. ORTHOGONAL FREQUENCY DIVISION MULTIPLEXING (OFDM)

OFDM is a technique in which we use both modulation and multiplexing. Multiplexing generally refers to independent signals those produced by different sources and modulation may be defined as a process by which some characteristic of a signal known as carrier is varied according to the instantaneous value of another signal known as modulating signal. In OFDM the signal itself is first split into independent channels, modulated by data and then re-multiplexed to create the OFDM carrier. OFDM is a special case of Frequency Division Multiplex (FDM) [12]. As an analogy, a FDM channel is like a shipment via a truck we have two options, one hire a big truck or a bunch of smaller

![Image: All cargo on one truck vs. splitting the shipment into more than one.]

Figure 1: All cargo on one truck vs. splitting the shipment into more than one.

Ones. Both methods carry the exact same amount of data. But in case of an accident, only 1/4 of data on the OFDM trucking will suffer. These four smaller trucks when seen as signals are called the sub-carriers in an OFDM system and they must be orthogonal. The independent sub-channels can be multiplexed by frequency division multiplexing (FDM), called multi-carrier transmission or it can be based on a code division multiplex (CDM), in this case it is called multi-code transmission.

The paper is organized as follows section II gives Orthogonal Frequency Division Multiplexing(OFDM).The importance of being orthogonality is given in section III. The PAPR of OFDM Signal in section IV and Algorithm for least PAPR is in section V Simulation Result shown in section VI. Finally conclusion are in Section VII.
III. THE IMPORTANCE OF BEING ORTHOGONAL

Figure 2: The area under a sine and a cosine wave over one period is always zero.

The main concept in OFDM is orthogonality [12] of the subcarriers. Since the carriers are all sine/cosine wave, we know that area under one period of a sine or a cosine wave is zero. This is easily shown in figure 3.

Figure 3: The area under a sine wave multiplied by its own harmonic is always zero.

Let’s take a sine wave of frequency m and multiply it by a sine (or a cosine) of a frequency n, where both m and n are integers. The integral of the area under this product is given by

\[ F(t) = \sin(mt) \cdot \sin(nt) \]

By the simple trigonometric relationship, this is equal to a sum of two cosine of frequencies (m-n) and (m+n).

\[ = \frac{1}{2} \cos(m-n)t - \frac{1}{2} \cos(m+n)t \]

\[ = 0 - 0 \]

These two components are each a sinusoid/cosine, so the integral is equal to zero over one period. We conclude that when we multiply a sinusoid of frequency n by sinusoid of frequency m, the area under the product is zero. In general for the entire integer m and n, sin mx, sin nx, cos mx, cos nx are all orthogonal to each other [12]. These frequencies are called harmonics. This idea is key to understanding OFDM. The orthogonality allows simultaneous transmission on a lot of sub-carriers in a tight frequency space without interference from each other. In essence this is similar to CDMA, where codes are used to make data sequences independent (also Orthogonal) which allows many independent users to transmit in same space successfully.

IV. THE PAPR OF OFDM SYSTEM

The PAPR of OFDM is defined as the ratio between the Maximum power and the average power. The PAPR of the OFDM signal X(t) is defined as

\[
\text{PAPR} = \frac{\text{Peak}}{\text{Average}} = \frac{\text{Max}|X(t)|^2}{\frac{1}{T} \int_{T} |X(t)|^2 dt} \quad \text{(1)}
\]

In SLM technique[17], firstly the input information is divided into OFDM data block X, which consists of M symbols, by the serial-to-parallel (S/P) conversion and then data block X is multiplied carrier wise with each one of the w different phase sequences \(B(w)\), resulting in a set of w different OFDM data block, \(X_1(w), X_2(w), \ldots, X_{w-1}(w)\). Finally the transmit sequence \(x = x(w)\), where \(w = \arg \max|X(w)|\), is selected. The information on the selected phase sequence must be transmitted to the receiver. Where \(m = 0, 1, 2, \ldots, M-1\) \(w = 0, 1, 2, \ldots, W\), to make w phase rotated OFDM data blocks. All w phase rotated OFDM data blocks represented the same information as the unmodified OFDM data block. Provided that the phase sequence is known [13]. After applying the SLM technique, the complex envelope of the transmitted OFDM signal becomes

\[
X_m^w = X_m \cdot B_m^w, m = 0, 1, \ldots, M-1, w = 1, 2, \ldots, w.
\]
X(t) = \sum_{m=1}^{M} \frac{1}{2\sqrt{N}} X_m e^{j2\pi fm t}, 0 \leq t \leq MT

Here, MT is the duration of an OFDM data block. Output data of the lowest PAPR is selected to transmit.

V. ALGORITHM FOR LEAST PAPR

1) Firstly 32 sinusoidal subcarriers are taken. These are available subcarriers (QPSK Modulation) assuming all one positive.
   \[ x_1 = \sin((2*180*100*t) + w) \]
   \[ x_2 = \sin((2*180*200*t) + w) \]
   \[ x_3 = \sin((2*180*300*t) + w) \]
   \[ \ldots \]
   \[ x_{32} = \sin((2*180*3200*t) + w) \]

These subcarriers are orthogonal [12] to each other because in general for all integers’ m and n, sinmx, sinny, cosmx, cosny are orthogonal to each other. These frequencies are called harmonics.

2) Giving these entire subcarriers phase shift (w) from 0 to 30.

3) Now sum all these subcarriers
   \[ \text{sum} = x_1 + x_2 + \ldots + x_{32} \]

4) Calculate the PAPR according to formula given in Equation number 1.

VI. SIMULATION RESULT

Simulation is carried in MATLAB 7.8 to evaluate the performance of the different phase rotation on OFDM Signal.

From the simulation result we see that if we give all these 32 orthogonal subcarriers with phase rotation (w) of 0 to 30 we get the minimum PAPR at phase rotation 11 as shown in figure 5. The PAPR value at 11 degree is found to be 7.6978dB and the resulting OFDM signal is shown in figure 7. After 11 degree Maximum PAPR is obtain at 17 degree (PAPR = 10.8175dB) then 30 degree (PAPR= 11.3961) and the corresponding OFDM signal is shown in figure 8, 9.

<table>
<thead>
<tr>
<th>SYSTEM</th>
<th>Max. PAPR in dB</th>
</tr>
</thead>
<tbody>
<tr>
<td>PAPR Without Phase Shift</td>
<td>35.0303</td>
</tr>
<tr>
<td>PAPR with Phase Shift 11</td>
<td>7.6978</td>
</tr>
<tr>
<td>PAPR with Phase Shift 17</td>
<td>10.8175</td>
</tr>
</tbody>
</table>
VII. CONCLUSION

Reducing PAPR value of OFDM signal is very important for improving efficiency of the Equipment (communication system). So, in this paper we obtain a particular phase rotation value at which least PAPR is obtained. With the rising demand for more number of users on limited frequency spectrum in radio Mobile communication, OFDM prove invaluable to fourth generation communication system.

REFERENCES


An Statistical Tool for Multi-Document Summarization

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Abstract- In this project, an auto-summarization tool is developed using statistical techniques. The techniques involve finding the frequency of words, scoring the sentences, ranking the sentences etc. The summary is obtained by selecting a particular number of sentences (specified by the user) from the top of the list. It operates on a single document (but can be made to work on multiple documents by choosing proper algorithms for integration) and provides a summary of the document. The size of the summary can be specified by the user when invoking the tool.

This paper presents a new statistical approach to automatic summarization based on the Kernel of the source text. The Kernel-based system, called KernelSum (KERNEL SUMMarizer), uses the Kernel as a guideline to identify and select text segments to include in the final extract. Automatically produced extracts have been evaluated under the light of Kernel preservation and textuality.

Index Terms- Auto-summarization, KernelSum, KERNEL SUMMarizer, Statistical summarizers, Statistical summarizers.

I. INTRODUCTION

Auto-summarization is a technique used to generate summaries of electronic documents. This has some applications like summarizing the search-engine results, providing briefs of big documents that do not have an abstract etc. There are two categories of summarizers, linguistic and statistical. Linguistic summarizers use knowledge about the language (syntax/semantics/usage etc) to summarize a document. Statistical ones operate by finding the important sentences using statistical methods (like frequency of a particular word etc). Statistical summarizers normally do not use any linguistic information.

Pre-processing interfaces are there to handle the following document types: Plain Text, HTML, Word Document. Using simple statistical measures, Kernel is identified as the most important passage of the source text, conveyed by just one sentence. It serves, then, as the guideline to identify and select other sentences to compose the final extract. Those are added to the extract provided that they satisfy summarization requirements, namely, Kernel preservation, textuality, relevance, and compression constraints.

II. FUNCTIONAL COMPONENTS OF THE TOOL

Following is a list of the functional components of the tool.

1. Text pre-processor. This will work on the HTML or Word Documents and convert them to plain text for processing by the rest of the system.
2. Sentence separator. This goes through the document and separates the sentences based on some rules (like a sentence ending is determined by a dot and a space etc). Any other appropriate criteria might also be added to separate the sentences.
3. Word separator. This separates the words based on some criteria (like a space denotes the end of a word etc).
4. Stop-words eliminator. This eliminates the regular English words like ‘a, an, the, of, from..' etc for further processing. These words are known as ‘stop-words’. A list of applicable stop-words for English is available on the Internet.
5. Word-frequency calculator. This calculates the number of times a word appears in the document (stop-words have been eliminated earlier itself and will not figure in this calculation) and also the number of sentences that word appears in the document. For example, the word ‘Unix’ may appear a total of 100 times in a document, and in 80 sentences. (Some sentences might have more than one occurrence of the word). Some min-max thresholds can be set for the frequencies (the thresholds to be determined by trial-and-error)
6. Scoring algorithm. This algorithm determines the score of each sentence. Several possibilities exist. The score can be made to be proportional to the sum of frequencies of the different words comprising the sentence (ie, if a sentence has 3 words A, B and C, then the score is proportional the sum of how many times A, B and C have occurred in the document). The score can also be made to be inversely proportional to the number of sentences in which the words in the sentence appear in the document. Likewise, many such heuristic rules can be applied to score the sentences.
7. Ranking. The sentences will be ranked according to the scores. Any other criteria like the position of a sentence in the document can be used to control the ranking. For example, even though the scores are high, we would not put consecutive sentences together.
8. Summarizing. Based on the user input on the size of the summary, the sentences will be picked from the ranked list and concatenated. The resulting summary file could be stored with a name like <originalfilename>_summary.txt.

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9. **User Interface.** The tool could use a GUI or a plain command-line interface. In either case, it should have easy and intuitive ways of getting the input from the user (the document, the size of the summary needed).

### III. EVALUATION

An ongoing issue in this field is that of evaluation. Evaluation techniques fall into intrinsic and extrinsic, inter-textual and intra-textual. An intrinsic evaluation tests the summarization system in of itself while an extrinsic evaluation tests the summarization based on how it affects the completion of some other task. Intrinsic evaluations have assessed mainly the coherence and informativeness of summaries. Extrinsic evaluations, on the other hand, have tested the impact of summarization on tasks like relevance assessment, reading comprehension, etc. Intra-textual methods assess the output of a specific summarization system, and the inter-textual ones focus on contrastive analysis of outputs of several summarization systems. Human judgment often has wide variance on what is considered a "good" summary, which means that making the evaluation process automatic is particularly difficult. Manual evaluation can be used, but this is both time and labor intensive as it requires humans to read not only the summaries but also the source documents. Other issues are those concerning coherence and coverage. One of the metrics used in NIST’s annual Document Understanding Conferences, in which research groups submit their systems for both summarization and translation tasks, is the ROUGE metric (Recall-Oriented Understudy for Gisting Evaluation). It essentially calculates n-gram overlaps between automatically generated summaries and previously-written human summaries. A high level of overlap should indicate a high level of shared concepts between the two summaries. Note that overlap metrics like this are unable to provide any feedback on a summary's coherence. Anaphor resolution remains another problem yet to be fully solved. Evaluating summaries, either manually or automatically, is a hard task. The main difficulty in evaluation comes from the impossibility of building a fair gold-standard against which the results of the systems can be compared. Furthermore, it is also very hard to determine what a correct summary is, because there is always the possibility of a system to generate a good summary that is quite different from any human summary used as an approximation to the correct output.

### IV. KERNELISM DESCRIPTION

By making KernelSum Kernel-based, we assume it emulates human summarization in that, when a person summarizes a text, s/he first tries to identify the Kernel and, then, adds information drawn from the text to complement it. Considering that the amount of complementary information to appear in the extract depends on how long the extract is intended to be and, extraction is based, thus, on two parameters: the Kernel, which triggers the process, and the intended compression rate of the corresponding extracts. Kernel can be determined through either the Keywords or the Text Mining method. Its determination itself is very simple: a) based on the former method, Kernel is calculated on the basis of a list of keywords of the source text, considering a threshold of word significance; b) based on the latter, it is the result of the measurement of the representativeness of intra- and interparagraphs sentences. In both cases just one sentence is assigned to Kernel: in the former, it is the sentence that corresponds to the most significant distribution of keywords; in the latter, it is that whose frequency distinguishes it as the most representative of the source text, similarly to the way a topic or a search phrase is derived.

**KernelSum Processes**

KernelSum comprises three processes, namely, segmentation, sentence ranking, and extract production. Segmentation addresses sentences as minimal units. After delimiting them, sentence ranking proceeds to Kernel determination through the selected ranking method (either Keywords or Text Mining). Hereafter, we will refer to KernelKey to signal the use of the Keywords method by KernelSum; otherwise, as KernelTFIF, after the measure TF-IF (Term Frequency – Inverse Sentence Frequency). Besides indicating the Kernel sentence, sentence ranking also classifies the other sentences to identify those that will appear in the extract. In this stage, for a more accurate calculation KernelSum makes use of the following sub-processes: stopwords removal, stemming and case folding. Extract production finally identifies sentences to include in the final extract that satisfy

1. (1) Kernel correlation, (2) relevance and (3) compression rate constraints. In what follows, sentence ranking and extract production are detailed and exemplified for the sample text shown in Figure 1, whose sentence segments are numbered. This has been extracted from a corpus of scientific texts in Computer Science.

### V. SENTENCE FEATURES

In our current system, every sentence \( s \) is represented by five normalized features:

- **Location of the Paragraph (P):**

  \[
  P = \frac{Y}{M} (1)
  \]

  where \( M \) is the total number of paragraphs in a document; \( Y \) is the index of the paragraph \( s \) belongs to.

- **Location of the Sentence (S):**

  \[
  S = \frac{X}{N} (2)
  \]

  where \( N \) is the total number of sentences in the paragraph; \( X \) is the index of sentence \( s \).

- **Length of the Sentence (L):**

  \[
  L = \frac{1 - e^{-\frac{x}{\mu}}} {1 + e^{-\frac{x}{\mu}}} \quad \alpha = \frac{\mu(\hat{u}(s)) - \mu(\nu(s))} {std(\nu(s))}
  \]

  Where \( u(l(s)) \) is the average length of sentences, and \( std(l(s)) \) is the standard deviation of the sentence lengths.

- **Heading Sentence (H):**

  \[
  H = 1, \text{ if } s \text{ is a title, subtitle or heading, 0 otherwise.}
  \]

- **Content-word Frequencies (F):**

  \[
  F(s) = \frac{1 - e^{-\frac{x}{\mu}}} {1 + e^{-\frac{x}{\mu}}} \quad \alpha = \frac{CWF(s) - \mu(CWF(s))} {std(CWF(s))}
  \]

  \[
  CWF(s)(x+y)^{a} = \sum_{i=1}^{k} \log \left( \text{Freq}(w_{i}) \right), \quad w_{i} \in S
  \]

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We process the text summarization learning task in two stages: training and testing. In the training stage, a set of training documents with their summaries are provided, and the text features are preprocessed using statistical methods and natural language processing methods as defined, then each sentence in a document is scored based on a sentence ranking function constructed by GEP. Fitness value of the summarization task is the standard deviation.

A. Sentence ranking function

We assume that for a certain type of documents, the mechanism to perform summarization would be the same. Therefore, we only need to find one algorithm that links a collection of documents and their corresponding summaries. We process the text summarization learning task in two stages: training and testing. In the training stage, a set of training documents with their summaries are provided, and the text features are preprocessed using statistical methods and natural language processing methods as defined, then each sentence in a document is scored based on a sentence ranking function constructed by GEP. Fitness value of the summarization task is the standard deviation.

Table 1 shows the sentence scores for the sample text shown in Figure 1. As it can be seen, the Keywords method signals sentence 4 as the Kernel sentence, but the TF-ISF one pinpoints sentence 3 (the highest-scored ones). By thoroughly reading the sample text and comparing it with such choices, we confirm that the former method identifies more clearly the Kernel sentence, since it mirrors the main idea more properly than sentence 3. Indeed, if we discourse-analyze the sample text based on the RST Theory, for example, sentence 3 still refers to background information.

<table>
<thead>
<tr>
<th>Sentence</th>
<th>Keywords</th>
<th>TF-ISF</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>24</td>
<td>0.465</td>
</tr>
<tr>
<td>2</td>
<td>22</td>
<td>0.628</td>
</tr>
<tr>
<td>3</td>
<td>23</td>
<td>0.671</td>
</tr>
<tr>
<td>4</td>
<td>42</td>
<td>0.598</td>
</tr>
<tr>
<td>5</td>
<td>22</td>
<td>0.643</td>
</tr>
<tr>
<td>6</td>
<td>37</td>
<td>0.663</td>
</tr>
<tr>
<td>7</td>
<td>17</td>
<td>0.571</td>
</tr>
<tr>
<td>8</td>
<td>25</td>
<td>0.575</td>
</tr>
</tbody>
</table>

So, it could not be the Kernel sentence. Alternatively, the main topic refers to a tool to help nonnative English speakers. So, sentence 4 suffices well such a role, being pretty satisfactory as the Kernel of the text. Corroborating this, we can also acknowledge that the remaining sentences 5-8 just add further details on the tool itself. Having determined the Kernel sentence, KernelSum can now proceed in selecting complementary sentences to build the corresponding extract.

B. Extract production

To build the extract, KernelSum executes the following steps:

- It averages the sentence scores, determining their threshold;
- Besides the Kernel sentence, KernelSum selects others that both:
  - Contain at least one word whose stem also corresponds to some word in the Kernel sentence (i.e., it assures that lexical cohesion be observed);
  - Have scores above the threshold (i.e., it guarantees that only relevant sentences to Kernel will be chosen).

The above steps are also constrained to satisfying the compression rate. If this is too strict that only the Kernel sentence satisfies it, the extract will be mono-sentential and as informative as its Kernel sentence (step 2 will thus be excluded). So, there is a compromise between informativeness and compression that will even delineate if Kernel can be complemented or not. Clearly, step (2a) is responsible for the distinctive idea underlying KernelSum when compared with other extractive approaches: it is this step that is intended to prove Hypothesis (II). This is addressed in Section 3 along with the proof of Hypothesis (I).

Figures 2 and 3 show extracts of the sample text for a 60% compression rate, respectively referring to KernelKey and KernelTFISF methods. It is possible to notice that the first extract conveys the Kernel, while the second one does not. Besides not resolving anaphors, KernelSum also does not.

VI. EVALUATING KERNELISM PERFORMANCE

Our evaluation of KernelSum has been carried out aiming at two distinctive goals: 1) to see how effective the proposed ranking methods are in identifying the Kernel sentence of a source text, i.e., to certify Hypothesis (I) is pertinent; 2) to assess KernelSum performance as such, by means of focusing on the quality of the generated extracts, i.e., to certify Hypothesis (II) is attainable.

English is the dominant language in the writing and publishing of scientific research in the form of scientific articles. In order to ease these users' problems, we developed a learning environment for scientific writing named AMADEUS (Amiable Article Development for User Support). The main goal of this research is to implement AMADEUS as an agentbased architecture with collaborative agents communicating with a special agent embodying a dynamic user model. We also provide details about intelligent agents which were used to implement the user model for the AMADEUS environment.

However, many non-natives users of English suffer the interference of their mother tongues when writing scientific papers in English. These users face problems concerning rules of
grammar and style, and/or feel unable to generate standard expressions and clauses, and the longer linguistic compositions which are conventional in this genre.

Figure 3 – KernelTFISF-based Extract 2

Experiment 1: Evaluating the extracts overall quality

A different test corpus has been used in this experiment, composed of 20 newspaper texts in English, from the WSJ financial section (c.a. 410 words). For each text, 2 extracts were automatically generated considering also the 60% compression rate. We had 12 human judges reading the source texts and scoring their extracts based on two decision points:

Table 2 – Possible scores for quality

<table>
<thead>
<tr>
<th>Kernel</th>
<th>Textuality</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Preserved</td>
<td>Assured</td>
<td>9</td>
</tr>
<tr>
<td>Preserved</td>
<td>Partially Assured</td>
<td>8</td>
</tr>
<tr>
<td>Preserved</td>
<td>Not Assured</td>
<td>7</td>
</tr>
<tr>
<td>Partially Preserved</td>
<td>Assured</td>
<td>6</td>
</tr>
<tr>
<td>Partially Preserved</td>
<td>Partially Assured</td>
<td>5</td>
</tr>
<tr>
<td>Partially Preserved</td>
<td>Not Assured</td>
<td>4</td>
</tr>
<tr>
<td>Not Preserved</td>
<td>Assured</td>
<td>3</td>
</tr>
<tr>
<td>Not Preserved</td>
<td>Partially Assured</td>
<td>2</td>
</tr>
<tr>
<td>Not Preserved</td>
<td>Not Assured</td>
<td>1</td>
</tr>
</tbody>
</table>

Kernel preservation and textuality (see Table 2). Textuality, here, is the property of a text being both cohesive and coherent.

Table 2 shows the distribution of the extracts according to the means, i.e., the scores average. Although only 55% of the ones generated through GistKey are above the means, this still outperforms GistTFISF. Table 4 shows the figures for gist and textuality. When using GistKey, 90% of the extracts have been judged to totally or partially preserve the gist. Textuality was also highly graded: 85% of them were totally or partially coherent and cohesive.

Table 3 – Means distribution

<table>
<thead>
<tr>
<th>Methods</th>
<th>Means Above</th>
<th>In It</th>
</tr>
</thead>
<tbody>
<tr>
<td>KernelKey</td>
<td>55%</td>
<td>14%</td>
</tr>
<tr>
<td>KernelTFISF</td>
<td>39%</td>
<td>10%</td>
</tr>
</tbody>
</table>

Again, GistKey significantly outperformed GistTFISF.

Table 4 – Extracts quality

<table>
<thead>
<tr>
<th>Methods</th>
<th>Kernel Preservation</th>
<th>Textuality</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Total</td>
<td>Partial</td>
</tr>
<tr>
<td>KernelKey</td>
<td>50%</td>
<td>40%</td>
</tr>
<tr>
<td>KernelTFISF</td>
<td>10%</td>
<td>20%</td>
</tr>
</tbody>
</table>

VII. Conclusion

KernelSum has been devised to produce extracts from texts of any domain, genre, and natural language, provided that the corresponding NL resources (i.e., stopwords repository and stemmer) are assembled into it. So far, we have explored it for Brazilian Portuguese and English. We have chosen two simple statistical methods in order to determine a Kernel sentence, which is the backbone of text extraction, for two reasons: they are easy to implement and they do not demand complex and sophisticated linguistic resources. So, they seemed appealing for us to verify and compare their effectiveness in determining the Kernel sentence. The experiments described here made evident that the correct determination of the Kernel sentence usually influences the quality of the related extracts. Moreover, they show that Kernel conveys better the content of the corresponding source text when it is computed through KernelKey, instead of KernelTFISF. Two conclusions can be withdrawn from this: the Kernel identification method based on the keywords distribution performs better than that based on the inverse distribution of sentences in the source text, for the test corpus adopted so far. However, further investigations should explore more deeply such a difference, for other text genres and domains and for more significant corpora.

Although many authors have stressed the need to convey the main idea and to warrant the textuality of the results in automatic summarization, KernelSum is novel because of both the way Kernel is determined and used as a guide for extraction (through lexical cohesion): by observing the words co-occurrence, the extracts are more likely to be coherent; by including Kernel, they are more likely to convey well the main idea of their source texts.

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Effectiveness of Social Media as a tool of communication and its potential for technology enabled connections: A micro-level study

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Abstract- With the world in the midst of a social media revolution, it is more than obvious that social media like Facebook, twitter, orkut, MySpace, Skype etc., are used extensively for the purpose of communication. One of the most important advantages of the use of social media is the online sharing of knowledge and information among the different groups of people. This online sharing of information also promotes the increase in the communication skills among the people especially among the learners/students of educational institutions. Online tools and technology has not only mediated communication in countless ways, but that the very ways we communicate and even the ways we talk and think about communication are changing as a result. Social media have the potential to fundamentally change the character of our social lives, both on an interpersonal and a community level.

Index Terms- Social media, communication tool, publicity, branding, Social media tools

I. INTRODUCTION

The term Social Media refers to the use of web-based and mobile technologies to turn communication into an interactive dialogue. Social media takes on many different forms including magazines, Internet forums, weblogs, social blogs, microblogging, wikis, podcasts, photographs or pictures, video, rating and social bookmarking. With the world in the midst of a social media revolution, it is more than obvious that social media like facebook, twitter, orkut, myspace, skype etc., are used extensively for the purpose of communication. This form of communication can be with a person or a group of persons. Today most of the people specially the youngsters are hooked on to the different social media for keeping in contact with their peers. Social media is media for social interaction as a superset beyond social communication. There are pros and cons to the use of social media. One most important advantage is the online sharing of knowledge and information among the different groups of people. This online sharing of information also promotes the increase in the communication skills among the people especially among the learners/students of educational institutions. There is also a flip side to the use of social media tools. Sometimes, such tools are misused by people which leads to interference into one’s privacy. Such instances can lead to dangerous proportions keeping in view the ethical aspect of the use of such media. The social media tools have virtually bought people close to one another specially those living in far off places.

However, these days it has been witnessed that most of the business houses also engage in social networking while promoting their products and services. Very often, the head honchos of the business groups tries to maintain a healthy relationship with their valued customers. Social networking sites are now seen as a promising means of publicity, which every ‘brand’ must embrace. Social media as a medium of promotion contributes, through its immediacy, to a healthy and direct relation between brands and their public in an online environment. This immediacy offers the public the ability to be present, to communicate, to influence and retain a stronger position towards brands. In addition to using social platforms to monitor conversations about their industry, competitors, and products, companies are increasingly reaching out to their customers via the social Web to communicate messages about what they have to offer. In fact, social media is transforming the way organizations communicate — the many social tools that are available today are very cost-effective compared to traditional approaches such as email and online advertising. Blog posts and tweets enable businesses to create communities, offer immediate feedback or assistance, and promote their products and services. This paper basically tries to analyze the effects of the growth of social media and its implications in the society. This paper also tries to find out the usefulness of social media as a tool of communication.

II. OBJECTIVES OF THE STUDY

The main objectives of the paper are –
(i) To analyse the impact of Social Media as a means of communication tool
(ii) To assess the usefulness of social media as a too, of communication
(iii) To assess the potential of social media as a tool for technology enabled connections

III. METHODOLOGY OF THE STUDY

The study is basically a qualitative and quantitative analysis of the role and importance of social media as a tool of effective communication. In order to empirically examine the effectiveness of social media, survey method was used for investigation, as this was found to be the most appropriate
method to carry out a survey in order to find out the growing importance and the use of social media as a tool of communication. Observation method was also used for the present study.

The area that has been selected for the present study is Guwahati city which is fast becoming an industrial region in the north-eastern part of India. A sample survey was carried out among the residents of Guwahati city. A total of randomly selected 200 sample of people residing in the urban areas of Guwahati city has been taken into consideration.

Sources of data: Data have been collected from both primary and secondary sources. Primary sources include survey work done among the residents of Guwahati city. Document analysis of the secondary sources includes internet, magazines, books and journals has been carried out to study the impact and the sue of social media in the social context and its potential for future growth.

IV. REVIEW OF PAST LITERATURE

In the paper ‘Predicting the Future With Social Media’ by Sitaram Asur and Bernardo A. Huberman. They demonstrate how demonstrate how social media content can be used to predict real-world outcomes. They further demonstrates how sentiments extracted from Twitter can be further utilized to improve the forecasting power of social media. In the paper ‘Workplaces and Social Networking’, the authors Andrea Broughton, Tom Higgins, Ben Hicks and Annette Cox talks at length the policy and practice relating to the use of social media by employees. They were guided by the fact that they had already engaged to some extent with the issue of social media, what it might mean for their organization and how they were going to formulate and communicate a policy to staff in two major UK employers. The first organisation was British Telecom (BT), and the second organization was Her Majesty’s Revenue and Customs (HMRC). In the paper, ‘Predicting tie strength with Social Media’, Eric Gilbert and Karrie Karahalios, d presents a predictive model that maps social media data to tie strength. The model builds on a dataset of over 2,000 social media ties and performs quite well, distinguishing between strong and weak ties with over 85% accuracy.

V. AN OVERVIEW OF SOCIAL MEDIA

The term ‘Social media’ refers to the use of web-based and mobile technologies to turn communication into an interactive dialogue. In the words of Andreas Kaplan and Michael Haenlein, social media is "a group of Internet-based applications that build on the ideological and technological foundations of Web 2.0, and that allow the creation and exchange of user-generated content.” Social media is media for social interaction as a superset beyond social communication. Enabled by ubiquitously accessible and scalable communication techniques, social media has substantially changed the way organizations, communities, and individuals communicate. Social media takes on many different forms including magazines, Internet forums, weblogs, social blogs, microblogging, wikis, podcasts, photographs or pictures, video, rating and social bookmarking. By applying a set of theories in the field of media research (social presence, media richness) and social processes (self-presentation, self-disclosure) Kaplan and Haenlein created a classification scheme for different social media types in their Business Horizons article published in 2010. According to Kaplan and Haenlein there are six different types of social media: collaborative projects (e.g. Wikipedia), blogs and microblogs (e.g. Twitter), content communities (e.g. Youtube), social networking sites (e.g. Facebook), virtual game worlds (e.g. World of Warcraft) and virtual social worlds (e.g. Second Life). Technologies include: blogs, picture-sharing, vlogs, wall-postings, email, instant messaging, music-sharing, crowdsourcing and voice over IP, to name a few. Many of these social media services can be integrated via social network aggregation platforms. An overview of social media has been shown below-

![Figure 1: Overview of social media](www.ijsrp.org)
Massively Multiplayer Online game (MMO) is a multiplayer video game which is capable of supporting hundreds or thousands of players simultaneously. By necessity, they are played on the Internet, and usually feature at least one persistent world. Cartrider, World Warcraft are some of the examples of MMO. Through social media, a person can also publish any news and views via web. Digg is one prime example of such media. It is a social news website. Facebook Connect, Digg Dialog, Digg Bar, Digg API (Application Programming Interface) are the important features of Digg. A person can discuss on any issues on skype, yahoo or google talk, and also there is the option of bulletin boards. Social networking is fast catching up as a means of keeping contacts and also sharing information with others. Microblogging is another way of posting messages online. Twitter is a popular microblogging website. There are also livestreaming of videos available online for the viewers to see. A virtual world is an online community that takes the form of a computer-based simulated environment through which users can interact with one another and use and create objects. The term has become largely synonymous with interactive 3D virtual environments, where the users take the form of avatars visible to others. These avatars usually appear as textual, two-dimensional, or three-dimensional representations, although other forms are possible (auditory and touch sensations for example). Virtual worlds are not limited to games but, depending on the degree of immediacy presented, can encompass computer conferencing and text based chat rooms.

Livestream, formerly known as Mogulus, is a live streaming video platform that allows users to view and broadcast video content using a camera and a computer through the internet. Users can stream live video or broadcast pre-recorded video in their channels, utilizing multiple cameras and on-screen graphics. Social gaming commonly refers to playing games as a way of social interaction, as opposed to playing games in solitude, like some card games (solitaire) and the single-player mode of many video games.

Social networks sites like orkut, MySpace, YouTube etc. and numerous other similar sites (including the social bookmarking ‘sites like www.reddit.com, www.digg.com and www.facebook.com) on the Web help create new virtual communities where discussion and exchange of ideas through words, images and sounds take place across national and regional borders. He basic features of communication that are included in any social networking sites are inboxes, walls, status messages, notes, and comments. Most of the people prefer using social network as the primary means of communication. Initially social networks started with simply a profile picture, profile details, and some form of a wall, and drove most of their usage via communication. Social network is a new communication medium along which people broadcast and receive various bits of information.

A. History of social media

When we think of social media, the we generally think of facebook and twitter. However, in reality it is more than that. The earliest ways to send messages over long distances were probably both audio and visual. People used to communicate smoke signals by day and beacon fires by night in ancient China, Egypt, and Greece. Drums were used in many parts of the world to extend the range of the human voice for communication as well. The seeds of social media were sown during 550 BC when the regular postal system was established in Iran where horse riders and horse-drawn wagons carried mail. Usually, mail consisted of governmental dispatches and was delivered from one place to another. The evolution of social media can be gauged from Figure 2 as given below-

Figure 2: History of social media
The 18th and 19th century were breakthrough period where devices like the telegraph (1792), telephone (1890) and radio (1891) ushered in a new era of the sending and receiving messages over long distances. The increasing number of express messages between businesses, financial and legal offices and banks in growing cities, as well as busy street traffic, gave rise to new methods of telegram and letter transportation. The pneumatic post was introduced to combat the shortcomings of the telegraphic network in Paris. The invention of telephone and radio took the meaning of communication to another level. The 20th century was marked by the growth and development of internet. With the growth and development of internet, there came era of exchange of messages from one person to another digitally or via web. Email, ARPANET, USENET, BBS (Bulletin Board System), IRC (Internet Relay Chat), LISTSERV, BLOGGER, SIX DEGREES, LIVEJOURNAL, NAPSTER were some of the important sites for social interactions and sharing.

The 21st century saw a spurt in the growth of social networking sites by the launching of FRIENDSTER, FOTOLOG, PHOTOBUCKET, FLICKR, ORKUT, FACEBOOK, NING, DIGG, TWITTER, NETLOG, YOUTUBE etc. Social media has come a long way since the days of the telegraph and even the more recent days of Internet relay chats (IRC), and it continues to evolve. In the last few years, social media has become a convention of the online landscape. Major social networks and social media websites make changes and improvements on a fairly regular basis, so it’s sure to keep evolving in coming years.

B. Social media classification

Social media can be classified into the following categories—

Social networking sites: A social networking site provides a web-based platform for building social networks or social relations amongst people, e.g., shared interests or activities. They provide a means to interact over the internet, e-mail and now even the mobile phones. The most popular websites offering social networking currently are MySpace (started in 2003), LinkedIn (started in 2003), Facebook (started in 2004) and Twitter (started in 2006). A social networking site would allow a user to create profiles or personal homepages online and build up a social network. The profile page thus created is like the user’s personalized webpage and contains profile information of the user like gender, religion, orientation, interests, place of birth, current location, marital status, books liked etc. The page can be customized as the user wants and include video clips, music files or photos on their page. Also included on the page is a list of friends that form the user’s network. Typically, these friends are actual friends, acquaintances, and even strangers, who may have sent a friend request and the user has included them in his/her list.

Blogs: A blog (derived from the word weblog) is an “online journal where an individual, group, or corporation presents a record of activities, thoughts, or beliefs”. There are many websites that allow users to create blogs without any paying any fee like Wordpress.com, Blogspot.com, and blogger.com. Anyone can create a blog on these websites and these blogs can be accessed by anyone by typing the web address or URL (Uniform Resource Locator). Another popular sub category of blogs is microblogging. A microblogging site is like any blog except for it limits the number of words that can be published in one message. Twitter.com is an example of microblogging.

Content generating and sharing sites: These sites serve as sources of information for various topics. Photo-sharing sites like Flickr.com, picasaweb.google.com, Video sharing sites like youtube.com, slide sharing sites like slideshare.com, document sharing sites like docstoc.com etc all fall under this category. These sites serve as free content for all users of internet. Users can search for content, download and use the content available on these sites without any fee. The content is also generated by the users. This type of user generated content is also known as crowdsourcing. Video and powerpoint presentation can be shared and uploaded in youtube and slideshare. This is a major advantage to most of the people who are unable to get access to the educational resources.

User appraisal sites: User appraisal sites serve as a platform for appraisals of various products and services. Though it is possible for consumers to express their view in any of the medium, user appraisal sites mainly deal with such reviews. Sites like www.mouthshut.com, www.pagalguy.com are prime examples of such websites. These websites serve as a starting point of consumer’s decision making model for gathering information about products or services they are contemplating of buying. As such these sites serve as important word of mouth for consumers and a source of expressing post purchase feedback.

VI. Social media as a tool of communication: current trends and future possibilities

Social media offers a variety of avenues through which we can communicate with people. In fact, social media is known to have been used widely in educational field also. Over the last 30 years the nature of communication has undergone a substantial change and it is still changing. Email has had a profound effect on the way people keep in touch. Communications are shorter and more frequent than when letters were the norm and response time has greatly diminished. Instant messaging has created another method of interaction, one where the length of messages is shorter and the style of the interaction is more conversational. Broadcast technologies like Twitter transform these short bursts of communication from one-on-one conversations to little news (or trivia) programs: which we can ‘tune in’ whenever we want an update or have something to say.

Online communication tools also have the potential to increase our awareness of the movements of our professional or social contacts. Twitter, for instance, offers us an update of things people we know happen to be doing at a particular point of time. This phenomenon has been referred as social proprioception by Clive Thompson (2007), named after the physical quality of proprioception that tells a creature where its extremities are by the reception of stimuli produced within the organism. Social proprioception tells us where the nodes of our community are and provides a sense of connectedness to and awareness of others without direct communication. Internet is the third place where people connect with friends, build a sense of togetherness.

Increasingly, a computer with an Internet connection is the locus of a range of interactions in a variety of media and a gateway to an array of social spaces for work and play. Social
networking sites like Facebook and MySpace and virtual environments like Second Life and World of Warcraft have become online meeting spaces where users—members, residents, or players—can interact and express themselves. They offer a way to keep in touch with existing communities that users belong to offline, such as social and professional groups. They also make it possible for people who would not normally communicate more than a few times a year to keep in touch—colleagues met at conferences, for instance, or friends met through the online community itself. Sites like YouTube and Flickr represent another forum for online communication that is centered on sharing, preference, and popular culture. Visitors can browse movies (in the case of YouTube) or photos (in the case of Flickr), express personal preferences, add commentary, and upload their own creative work. YouTube is also a repository of popular culture in the form of newscasts, television shows, movies, or music videos that are of current interest. The kinds of interaction that occur on these sites center around shared interests and include not only verbal commentary, but commentary in the form of original or derivative works based on popular pieces.

One of the reasons people prefer such form of media is because of the interactions they can have there, both social and professional. Whether it is as simple as checking back to see what other comments have been added to yours or as involved as attending a workshop or presentation in a virtual world, the nature of the attraction lies in the connections between people that these online spaces afford.

VII. DISCUSSION AND FINDINGS

A survey was conducted among the residents of Guwahati city in the urban areas. Guwahati is the gateway of North-East India. The spurt in the growth of industries have truly made it a world class city. The total sample size was 200 which consisted of students, teachers, engineers, marketing professionals, businessmen etc. A careful analysis of the data reveals the following results:

On being asked whether social media is a major form of communication tool, 125 respondents said that social media is indeed a major form of communication tool while 75 respondents have replied in negative. This is indicated in Fig – I and Fig - i

On the question of utilisation of social media for educational purposes, 138 respondents have replied in affirmative that social media is widely used for educational purposes while 62 respondents said that social media is not used for educational purposes. This is represented in Fig-II and Fig – ii as given below.
The above data is represented in the form of percentage as given below:

![Percentage of respondents on the use of social media for educational purposes](image)

On being asked the major forms of social media tools which the respondents preferred the most, 50 (25%) respondents said that they prefer social networking the most, 32 (16%) respondents giving their preference for wikis, 26 (13%) respondents for video sharing, 25 (12.5%) respondents for microblogging, 23 (11.5%) respondents for blogs, 18 (9%) respondents for social news and bookmarking, 10 (5%) respondents for photo sharing, 9 (4.5%) respondents for podcasts and 7 (3.5%) respondents have preferred RSS (Really Simple Syndication) as a potent social media tool. This can be represented in the following diagram (Fig – III and Fig – iii) given below:
As regards the usefulness of social media, 52 (26%) respondents said that social media plays the role of an interactive medium, 38 (19%) respondents said that social media acts as a source of information, 35 (17.5%) respondents said that social media bridges communication gap, 32 (16%) respondents opined that social media helps in sharing of ideas, 21 (10.5%) respondents said that social media is an important customer interaction tool, 12 (6%) respondents said that social media is an important crisis communication tool while the remaining 10 (5%) respondents said that social media is an important marketing tool. This is represented in Fig – IV and Fig - IV given below.
A careful analysis of the above mentioned data brings to light the fact that social media has indeed done a commendable job in bridging the communication gap among people. The different social media tools helps the people to interact with one another within the shortest possible time. Social media have the potential to fundamentally change the character of our social lives, both on an interpersonal and a community level. Changes in interaction patterns and social connections are already evident among young people, who are the heaviest users of social media. Thus one can say that social media has grown by leaps and bounds. This is evident from the fact that 62.5% of respondents consider social media as a tool of communication in a place like Guwahati while 37.5% respondents replied in negative. Among the major tools of social media, 25% respondents have preferred for social networking sites followed wikis (16%) and video sharing (13%) and micro blogging (12.5%). The fact that social media is an important interactive medium has been well justified as 26% of respondents have said it is an interactive medium while another 19% have said that social media is an important source of information. 17.5% of respondents have said that social media helps in bridging communication gap and another 16% have said that it helps in sharing of ideas. In the business sector, social media is used as an important tool of crisis communication and also a customer interaction tool. Growth of social media has revealed the following advantages and disadvantages. The main advantages of social media are –

**Sharing of ideas:** Social networking sites allow users to share ideas, activities, events and interests within their individual networks. Web based social networking services make it possible to connect people who share interests and activities across political, economic and geographic borders.

**Tool of communication:** Social networks are increasingly being used by teachers and learners as a communication tool. Teachers create chat rooms, forums and groups to extend classroom discussion to posting assignments, tests and quizzes, to assisting with homework outside of the classroom setting. Learners can also form groups over the social networking sites and engage in discussion over a variety of topics.

**Bridges communication gap:** Social media bridges the distance among different people. It offers platforms for online users to find others who share the same interests and build virtual communities based on those shared interests. With the availability of social media technologies and services, content sharing and user interaction has become relatively easy and efficient.

**Source of information:** Content generating and sharing sites serve as sources of information for various topics. Users can search for content, download and use the content available on these sites free of cost.

**Important marketing tool:** Social media is widely used by most of the firms/organizations to market their products/services in the society. The companies resort to social networking sites to generate opinions on the existing and future products that are available in the market. This is an excellent marketing strategy undertaken by most of the companies to draw consumers and elicit public opinion. Such comments or opinions help the organization to redesign their products. Such social networking and user appraisal sites are an important way of promoting products and generating opinions.

**Important customer interaction tool:** Social Media Networking is perfect for customer interaction, customer feedback, and customer support. New business contacts can be obtained for networking purposes.

**Important crisis communication tool:** When the major forms of public relations tool fail, social media can be used extensively to communicate with the general public regarding any crisis situation that might have gripped the nation or any organization. But it is important to remember that while social media can have a positive impact during natural disasters, it can have a
less favorable effect during business crises, in which case, corporate communication teams need to understand how they can use social media to their advantage. Communications landscape has changed thanks to social media, especially during times of crisis. For instance after the earthquake in Japan in March, 2011, millions of people logged on to YouTube and twitter to post messages and videos and also to check out updates about the devastating natural disaster.

**Low Costs/ Cost effective**: It is cheaper to use online social networking for both personal and business use because most of it is usually free. Unlike in other forms of media like electronic or print, one has to pay a certain amount of money for a news item to get published. A person can scout out potential customers and target markets with just a few clicks and keystrokes.

**Less time consuming**: Social media is an effective time management medium of communication both for business as well as for academic purposes. One can post a message or browse for any information at the click of a button. This is an added advantage in comparison to print and other electronic media like television and radio. Though one can get the updates in television, yet social media channels provide impromptu information and connection with the people that matters most. However, in spite of being an important tool of communication, social media has its own set of disadvantages which are given below –

**Intrusion into privacy**: Social Networking are part of everyday life and for many of us a primary way in which we keep in touch with friends and family. Privacy is a huge problem in such networks. This becomes a serious issue when the users are targeted on the basis of their location, age etc. leading to kidnapping and murder. Very often it has been seen that most of the people who have opened accounts in social networking sites does not reveal their true identity leading to fake personal information and misleading people. The younger lot are at a serious danger of being misled by such people. Problems of harassment, cyber stalking and online scams can frequently be seen in day to day affairs.

**Breakdown in familial ties**: When people get addicted to social networking sites, there is a breakdown in the family ties. This is because the person gets hooked on the sites for communication with friends. Youngsters specially feel free to discuss their problems and share stories with their peer rather their parents or close relatives. So, in the long run, the close bond with the immediate family breaks down.

**Reduction in worker productivity**: Frequent usage of social media can have an influence on worker productivity. Employees may waste valuable time using Social Media Networking.

**Slightly Impersonal** – Social media will never be able to beat the advantage of dealing with consumers face-to-face, yet many organizations still make it seem like they don’t really care about their followers by using things such as auto DMs on Twitter. When an organisation auto DMs a new follower it makes it seem like they don’t have time to have a quick look at the followers profile for a few seconds. It is far better to say nothing than to send an automated, uncaring message to a potential custom.

**VIII. conclusion**

Collaboration through online mode becomes easy if it is facilitated by social media technologies. For instance, learners can collaborate on team projects. Learners in the same study groups can co-draft documents, spreadsheets, presentation slides and more with Google Docs. Faculty members are cashing on the growing popularity of blogging and micro-blogging by using blogs as additional teaching/learning resources. Social media provide simple, inexpensive ways to organize members, arrange meetings, spread information, and gauge opinion. As more systems emerge, there will be greater capacity for groups to organize and participate in collective action, a hallmark of civil society. Social media can be effective for building social authority; individuals or organizations can establish themselves as experts in their fields, and then they can begin to influence these fields. Thus, one of the foundational concepts in social media is that, with social media, one cannot control one’s message completely, but one can contribute to discourses. Social media technologies are capable of reaching audiences all over the world.

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Comparative Study of Steel Fiber Reinforced Over Control Concrete

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Abstract- This paper deals with Experimental investigation for M-20 grade of concrete to study the compressive strength, and tensile strength of steel fiber reinforced concrete (SFRC) containing fibers of 0% and 0.5% volume fraction of hook end Steel fibers of 50 and 53.85 aspect ratio were used.

A result data obtained has been analyzed and compared with a control specimen (0% fiber). A relationship between Compressive strength vs. days, and tensile strength vs. days represented graphically. Result data clearly shows percentage increase in 7 and 28 days Compressive strength and Tensile strength for M-20 Grade of Concrete.

Index Terms- control concrete, fiber reinforcement, tensile strength.

I. INTRODUCTION

Concrete is characterized by brittle failure, the nearly complete loss of loading capacity, once failure is initiated. This characteristic, which limits the application of the material, can be overcome by the inclusion of a small amount of short randomly distributed fibers (steel, glass, synthetic and natural) and can be practiced among others that remedy weaknesses of concrete, such as low growth resistance, high shrinkage cracking, low durability, etc. The strength and durability of concrete can be changed by making appropriate changes in its ingredients like cementitious material, aggregate and water and by adding some special ingredients. Hence concrete is very well suited for a wide range of applications. However concrete has some deficiencies as listed below. Low tensile strength, Low post cracking capacity, Brittleness and low ductility, Limited fatigue life, not capable of accommodating large deformations, Low impact strength.

For long term, strength and toughness and high stress resistance, steel fiber reinforced Concrete (SFRC) is increasingly being used in structures such as flooring, housing, precast, tunneling, heavy duty pavement and mining. Generally, aspect ratios of steel fibers used in concrete mix are varied between 50 and 100. The most suitable volume fraction values for concrete mixes are between 0.5% and 1.5% by volume of concrete.

The fibers can be imagined as an aggregate with an extreme deviation in shape from the rounded smooth aggregate. The fibers interlock and entangle around aggregate particles and considerably reduce the workability, while the mix becomes more cohesive and less prone to segregation. The fibers are dispersed and distributed randomly in the concrete during mixing, and thus improve concrete properties in all directions. Fibers help to improve the compressive strength, tensile strength, flexural strength, post peak ductility performance, pre-crack tensile strength, fatigue strength, impact strength and eliminate temperature and shrinkage cracks. Essentially, fibers act as crack arrests restrict the development of cracks and thus transforming an inherently brittle matrix, i.e. cement concrete with its low tensile and impact resistances, into a strong composite with superior crack resistance, improved ductility and distinctive post-cracking behavior prior to failure. Hence this study explores the feasibility of steel fiber reinforcement; aim is to do parametric study on compressive strength, flexural strength, tensile strength study etc. with variables of grade of concrete, aspect ratio and percentage of steel.

II. EXPERIMENTAL PROGRAMME MATERIAL USED

In this experimental study, Cement, sand, coarse aggregate, water and steel fibers were used.
Cement: Ordinary Portland cement of 43 grade was used in this experimentation conforming to I.S.8112-1989.
Water: Potable water was used for the experimentation.
Steel Fibers: - In this experimentation, two different Hook end Steel fibers were used.
The Steel fibers with aspect ratios, its length and diameter adopted were shown in table 1.

<table>
<thead>
<tr>
<th>Notation</th>
<th>Aspect Ratio</th>
<th>Length (mm)</th>
<th>Diameter (mm)</th>
<th>Shape of fiber</th>
</tr>
</thead>
<tbody>
<tr>
<td>SF1</td>
<td>50.0</td>
<td>50</td>
<td>1.0</td>
<td>Hook end</td>
</tr>
<tr>
<td>SF2</td>
<td>53.85</td>
<td>35</td>
<td>0.65</td>
<td>Hook end</td>
</tr>
</tbody>
</table>

Concrete for M20 grade were prepared as per I.S.10262:2009 with w/c 0.5. Mix proportion for M20 grade concrete for tested material as follows:

<table>
<thead>
<tr>
<th>Material</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cement</td>
<td>383 Kg/ m³</td>
</tr>
<tr>
<td>Sand</td>
<td>672 Kg/ m³</td>
</tr>
<tr>
<td>Coarse Aggregates</td>
<td>1100 Kg/ m³</td>
</tr>
</tbody>
</table>
Where, \( P \) = failure load, \( D \) = diameter of cylinder, value is reported.

For compressive strength test, both cube specimens of dimensions 150 x 150 x 150 mm and cylindrical specimens of length 200 mm and diameter 100 mm were cast for M20 grade of concrete. The moulds were filled with 0% and 0.5% fibers. Vibration was given to the moulds using table vibrator. The top surface of the specimen was leveled and finished. After 24 hours the specimens were demoulded and were transferred to curing tank where in they were allowed to cure for 7 days and 28 days. After 7 and 28 days curing, these cubes and cylinders were tested on digital compression testing machine as per I.S. 516-1959. The failure load was noted. In each category, three cubes and three cylinders were tested and their average value is reported. The compressive strength was calculated as follows:

Compressive strength (MPa) = Failure load / cross sectional area.

b) Tensile strength test:
For tensile strength test, cylinder specimens of dimension 100 mm diameter and 200 mm length were cast. The specimens were demoulded after 24 hours of casting and were transferred to curing tank where in they were allowed to cure for 7 days and 28 days. These specimens were tested under compression testing machine. In each category, three cylinders were tested and their average value is reported. Tensile strength was calculated as follows as split tensile strength:

Tensile strength (MPa) = \( 2P / \pi DL \),
Where, \( P \) = failure load, \( D \) = diameter of cylinder, \( L \) = length of cylinder.

### III. EXPERIMENTAL METHODOLOGY

a) Compressive Strength Test:
For compressive strength test, both cube specimens of dimensions 150 x 150 x 150 mm and cylindrical specimens of length 200 mm and diameter 100 mm were cast for M20 grade of concrete. The moulds were filled with 0% and 0.5% fibers. Vibration was given to the moulds using table vibrator. The top surface of the specimen was leveled and finished. After 24 hours the specimens were demoulded and were transferred to curing tank where in they were allowed to cure for 7 days and 28 days. After 7 and 28 days curing, these cubes and cylinders were tested on digital compression testing machine as per I.S. 516-1959. The failure load was noted. In each category, three cubes and three cylinders were tested and their average value is reported. The compressive strength was calculated as follows:

Compressive strength (MPa) = Failure load / cross sectional area.

b) Tensile strength test:
For tensile strength test, cylinder specimens of dimension 100 mm diameter and 200 mm length were cast. The specimens were demoulded after 24 hours of casting and were transferred to curing tank where in they were allowed to cure for 7 days and 28 days. These specimens were tested under compression testing machine. In each category, three cylinders were tested and their average value is reported. Tensile strength was calculated as follows as split tensile strength:

Tensile strength (MPa) = \( 2P / \pi DL \),
Where, \( P \) = failure load, \( D \) = diameter of cylinder, \( L \) = length of cylinder.

### IV. EXPERIMENTAL RESULTS

1) Compressive Strength Test:
A) Using cube Specimen:
The compressive strength test is consider the most suitable method of evaluating the behavior of steel fiber reinforced concrete for underground construction at an early age, because in many cases such as in tunnels, steel fiber reinforced concrete is mainly subjected to compression.[8]

Results of Compressive strength for M-20 grade of concrete on cube and cylinder specimen with 0% and 0.5% steel fibers for aspect ratio 50 and 53.85 are shown in table and Figure below:

Table 3: Results of Compressive strength using cubes specimen

<table>
<thead>
<tr>
<th>Days</th>
<th>Average Compressive Strength (MPa)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0%</td>
</tr>
<tr>
<td>7</td>
<td>24.25</td>
</tr>
<tr>
<td>28</td>
<td>31.78</td>
</tr>
</tbody>
</table>

Figure 1 indicates the comparison of result of compressive strength using cube specimen of M20 grade of concrete. It is observed that for addition of 0.5% Fiber SF1 gives slightly more compressive strength than SF2 at same volume fraction.

A) Using cylindrical Specimen:
Results of Compressive strength for M-20 grade of concrete on cylinder specimen with 0% and 0.5% steel fibers for aspect ratio 50 and 53.85 are shown in table and Figure below:

Table 4: Results of Compressive strength using cylinder specimen

<table>
<thead>
<tr>
<th>Days</th>
<th>Average Compressive Strength (MPa)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0%</td>
</tr>
<tr>
<td>7</td>
<td>14.10</td>
</tr>
<tr>
<td>28</td>
<td>21.67</td>
</tr>
</tbody>
</table>

Figure 2 indicates the comparison of result of compressive strength using cylindrical of M20 grade of concrete. It is observed that for addition of 0.5% Fiber SF1 gives slightly more compressive strength than SF2 at same volume fraction.

b) Tensile strength test:
Results of splitting tensile strength for M-20 grade of concrete with 0% and 0.5% steel fibers for aspect ratio 50 and 53.85 are shown in table and Figure below:

<table>
<thead>
<tr>
<th>Days</th>
<th>Average Split Tensile Strength (Mpa)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0%</td>
</tr>
<tr>
<td>7</td>
<td>1.26</td>
</tr>
<tr>
<td>28</td>
<td>2.12</td>
</tr>
</tbody>
</table>

Table 5: Results of splitting tensile strength using cylinder.

Figure 3 indicates the result for M20 grade of concrete. It is observed that for addition of 0.5% SF2 fiber gives maximum tensile strength at 28 days.

V. DISCUSSION

The study on the effect of steel fibers with different sizes can still be a promising work as there is always a need to overcome the problem of brittleness of concrete.

The following conclusions could be drawn from the present investigation:

1. It is observed that the compressive strength for M20 grade of concrete from two different dimensional fibers at same volume fraction shows nearly same results with minor increase.
2. By addition of 0.5% hook end steel fibers increases compressive strength of concrete up to 10%.
3. With same volume fraction, change in dimensional properties of fiber result nearly minor effect on compressive strength of Fiber Reinforced concrete.
4. It is observed that, the split tensile strength of fiber reinforced concrete was dependent on length of fiber used. By addition of longer length fiber, the split tensile strength increases. Used of 50 mm long fiber with same volume of fraction gives 20% extra split tensile strength over fiber 35 mm in length.
5. Addition of steel fiber in the concrete effect the workability of concrete. Addition of 0.5% steel fiber reduces the slump value of fresh concrete. This problem of workability and flow property of concrete can be overcome by using suitable admixtures such as Superplasticizers.

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Simulation of Optical CDMA using OOC Code

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Abstract- This paper examines optical CDMA (OCDMA) communication techniques with optical orthogonal codes. These optical orthogonal codes (OOC) set are constructed by using difference set methods. Simulations that show OOC reduce interference due to other users and channel noise. Probability of error can be reduce by selection of proper weight (w), length (n) & cardinality(C) of OOC.

Index Terms- OCDMA, OOC encoder, OOC decoder, Probability of error.

I. INTRODUCTION

The increasing demands for higher speed and advanced services in access networks require a bandwidth of above 50 Mbps for next-generation services to end users. The use of technologies based on optical fibers can easily achieve bandwidths higher than 100 Mbps and at the same time can reduce maintenance and repair costs.

CDMA was first applied to the optical domain in the mid-1980s by Prucnal, Salehi, and others [4]. Traditional fiber optic communication systems use either TDMA or WDMA schemes to allocate bandwidth among multiple users. Unfortunately, both present significant drawbacks in local area systems requiring large numbers of users. Optic code-division multiple-access (CDMA) system is a multiplexing system based on special codeword’s which own good correlation properties. Optical orthogonal codes (OOCs) have application in OCDMA system because of their good correlation properties. Optical orthogonal codes have also found applications in mobile radio, frequency-hopping spread-spectrum communications, radar, sonar signal design, collision channel without feedback, neuromorphic networks, etc [2]. To establish the optical CDMA, we have to overcome the code orthogonality problem. Many researchers have proposed several codes such as prime code, optical orthogonal code, and so on.

Optical code-division multiple accesses (OCDMA) is one of the most important techniques supporting many simultaneous users in shared media so as to increase the transmission capacity of an optical fiber. Optical CDMA operate asynchronously, without centralized control, and it does not suffer from packet collisions. As a result, optical CDMA systems have lower latencies than TDMA or WDMA. Furthermore, since time and frequency (or wavelength) slots do not need to be allocated to each individual user, significant performance gains can be achieved through multiplexing. Also, TDMA and WDMA systems are limited by hardware because of the slot allocation requirements. In contrast, CDMA systems are only limited the tolerated bit error rate relationship to the number of users.

In section II, we introduce the optical orthogonal codes. Section III discusses optical CDMA technique. Section IV shows simulations of OCDMA with OOC set constructed by difference set methods. Section V evaluates the probability of error as a function of weight, length & no. of users.

II. OPTICAL ORTHOGONAL CODES

To reduce the crosstalk between users, an important property of the sequences (codewords) is that they produce a low correlation. OOC are a set of binary sequences with special auto- and cross-correlation properties. The correlation being low tells us that each sequence in the code can easily be distinguished from a shifted version of itself i.e. the autocorrelation is low, and it can easily be distinguished from any combination of shifted versions of other sequences in C i.e. the crosscorrelation is low. The size of the code is the number of codewords in C and is called its cardinality and is denoted |C|.

An optical orthogonal code is a family of (0, 1) sequences with good auto- and cross-correlation properties. Thumbtack-shaped auto-correlation enables the effective detection of the desired signal and low-profiled cross-correlation makes it easy to reduce interference due to other users and channel noise. The use of optical orthogonal codes enables a large number of asynchronous users to transmit information efficiently and reliably. The lack of a network synchronization requirement enhances the flexibility of the system. In [3] Let (n, w, λa, λc) be positive integers. An (n, w, λa, λc) optical orthogonal code, or briefly a (n, w, λa, λc) - OOC, C, is a family of (0, 1) - sequences of length n and weight w satisfying the following two properties:

The Autocorrelation Property

\[ \sum_{\tau=0}^{n-1} x_i x_{i+\tau} = \{ -λc \cdot 1 \leq \tau \leq n-1 \} \ldots (1) \]

For any x ∈ C and any integer τ, 0 < τ < n.

The cross-correlation property:

\[ \sum_{\tau=0}^{n-1} x_i x_{j+\tau} = \{ -λ\cdot 1 \leq \tau \leq n-1 \} \ldots (2) \]

For x ≠ y ∈ C and any integer τ.

Largest possible cardinality of OOC: \[ \phi(n, w, \lambda) = \frac{(n-1)(n-2)\ldots(n-\lambda)}{\lambda^w} \ldots \frac{\lambda^w}{(n-1)(n-2)\ldots(\lambda+1)} \frac{\lambda^w}{\lambda^w} \ldots \frac{\lambda^w}{\lambda^w} \frac{\lambda^w}{\lambda^w} \]

Often an OOC is denoted by the positions where C has ones. As an example consider the code

\[ C = \{ c1, c2 \} = \{ 11010000000000, 10001000100000 \} \]

Which is an (15, 3, 1) OOC with two codewords. This can be written as C = \{1, 0, 1, 3\}15, \{0, 4, 9\}15.

What the correlation constraint (\( \lambda = 1 \)) also say is that no distances between the positions of ones in the code (C) are repeated. For example the distance

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between the first and the second one in c1 is 1, but as we look at two consecutive1’s (cyclic shifted) the distance 14 will also be taken into consideration. In the codes above the distances are \{1, 14, 3, 12, 2, 13, 4, 11, 9, 6, 5, 10\}. The distances \{14, 12, 13, 11, 6, 10\} are due to cyclic shifts of the codeword’s (when we look at two consecutive codewords). We see here that no distance is repeated and therefore the code is an OOC with \( \lambda_a = 1 \). If \( \lambda_c = 2 \) it means that any distance between the positions of ones cannot be repeated more than once.

A desirable property of a code is that it should be as large as possible, i.e. contain as many codewords as possible. This to enable more users to access the channel. An OOC is said to be optimal if it has the maximum cardinality for a given \((n, w, \lambda_a, \lambda_c)\). As mentioned in the previous section the codeword length \( n \) increases with increasing cardinality and weight.

### III. OPTIMAL CDMA SYSTEM

Fiber optic code-division multiple accesses (FO-CDMA) is one technique to allow several users to transmit simultaneously over the same optical fiber. A FO-CDMA system can, for each user, is described by a data source, containing the data that will be sent, followed by an encoder and then a laser that maps the signal from electrical form to an optical pulse sequence. At the receiver end an optical correlator is used to extract the encoded data.

![Fig. 1: The Block diagram of OCDMA Network](image)

In a FO-CDMA system it is common that each user is assigned one signature sequence called codeword. Each bit of information data is encoded by the signature sequence consisting of a number of shorter bits called chips. When this sequence is sent it represent 0 that a user with that unique signature has sent the information bit ‘1’. If the information bit is ‘0’ it simply means that we send the corresponding length of zeros i.e. no light pulses during that interval. All users encoded data are then added together chip by chip and the result, which is called the superposition, are sent over the channel. If a light pulse represent the binary bit 1 (mark that this is a chip and not an information bit) and the absence of a light pulse represent the binary bit 0 the superposition mechanism has the following properties.

\[
0 + 1 = 1 + 0 = 1 + 1 = 1 \\
0 + 0 = 0
\]

The individual receivers, consisting of optical correlators, continuously observe the superposition of all incoming pulse transmissions and recover the data from the corresponding transmitter. This is done by correlation between the incoming signal and stored copies of that user’s unique sequence. The correlator will give a peak if the incoming stream of optical pulses contains the unique sequence and the presence of other users will be considered as noise. The decoding process is accomplished by using optical correlation.

The block diagram of CDMA system topology is shown in Fig. 1. The all user’s signals are transmitted to the all users receivers by star topology of optical network. In incoherent time spread optical CDMA systems a specific binary codeword is assigned to each user. If the user is transmitting the data bit one, its transmitter sends codeword otherwise no signal is sent. Each user’s optical CDMA decoder is matched to its intended signal.

![Fig. 2: The block diagram of proposed optical CDMA decoder](image)

The Fig. 2 shows the block diagram of proposed optical CDMA decoder. The proposed decoder consists of optical correlator, two optical hard-limiters (HL) and device of optical shaping. Its own correlator detects each user’s signal by the means of the autocorrelation pulse, other users this signal appears as a noise. The optical HL is a non-linear device whose output optical intensities \( \text{OUT} \) depend on the input optical intensity \( \text{IN} \). Using the first and the second optical hard-limiters minimizes the multiple access interference in the system. It will be shown in the next part of this paper. The circuit of optical shaping changes optical pulse time duration. The function of optical CDMA decoder is to select the desired user’s signal from received signal, which is a sum of all active users’ transmitted codewords. This is achieved using Optical Orthogonal Codes (OOC), which have good correlation properties. The definition of OOC is reported in [1]. OOC allow multiple access and asynchronous transfer mode in the incoherent time spread optical CDMA system.

### IV. SIMULATION OF OCDMA WITH OOC SET

![Fig. 3: Simulation steps for OCDMA with OOC set](image)
In FO-OCDMA, first create information bits of users & then encoded with OOC set. We used OOC set from table I, which are constructed by difference set methods [1].

Table I: OOC set using difference set methods [1]

<table>
<thead>
<tr>
<th>Sr. no.</th>
<th>w</th>
<th>n</th>
<th>OOC set</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>3</td>
<td>13</td>
<td>{0, 1, 4}, {0, 2, 7}, {0, 5, 11}, {0, 9, 12}</td>
</tr>
<tr>
<td>2</td>
<td>4</td>
<td>29</td>
<td>{0, 1, 3, 8}, {0, 4, 13, 19}, {0, 3, 22, 28}, {0, 9, 14, 27}</td>
</tr>
<tr>
<td>3</td>
<td>5</td>
<td>29</td>
<td>{0, 1, 4, 11, 29}, {0, 2, 8, 17, 22}, {0, 1, 4, 11, 29}, {0, 5, 14, 20, 22}</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>{0, 1, 4, 11, 29}, {0, 9, 15, 17, 36}</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>{0, 7, 9, 12, 20}, {0, 16, 17, 31, 35}</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>{0, 16, 22, 26, 40}, {0, 21, 29, 32, 34}</td>
</tr>
</tbody>
</table>

We consider an incoherent time spread optical CDMA system with N transmitters and receiver pairs (Fig. 1). N users share the same optical medium usually, but not exclusive, in a star topology. Each information bit from user k is encoded into a codeword.

\[ C_k(t) = \sum_{i=1}^{n} C_i(t) p(t-iT_c) \]

where n is the length of the codeword, \( C_i(t) \in \{0,1\} \) for \( 1 \leq i \leq n \), is the i-th chip value of the k-th user's codeword and Tc is the chip duration. Let \( C_k = \{ c_1, c_2, \ldots, c_n \} \) is a vector representing the discrete form of the code. The chip signaling waveform \( p(t) \) for \( 1 \leq i \leq n \), is assumed to be rectangular with unit energy. Each transmitter broadcasts its encoded signal to all the receivers in the system.

Fig.4 (a) & (b) shows the original data & encoded data of user1, which are transmitted through the optical channel. OOC set are the signatures code are available at the transmitter as well as the receiver. The received signal is a sum of all the active K user's transmitted signals.

\[ R(t) = \sum_{k=1}^{K} b_k c_k(t) \]

where \( b_k \in \{0,1\} \) is the k-th user’s information bit and \( 0 \leq t_k \leq T \) is time delay for \( k = 1, \ldots, K \). The receiver applies an optical correlator to the incoming signal to extract the desired user’s information bit. We assume that the desired user's signal is denoted by \( k = 1 \).

Fig4(c) shows the received data from the channel. The signal of desired user's optical correlator output is thus,

\[ y_L = \int_{0}^{T} c_1(t) R_1(t) \, dt = b_1 \quad N + MAI \quad \ldots \ldots \ldots \quad (6) \]

Where \( T \) is the time duration of one information bit. The first term in (4) corresponds to the desired users and the second one is multiple access interference (MAI). MAI is produced by simultaneously present optical codewords in the system. This model has neglected the effects of quantum noise and thermal noise in the photo detection process.

The received signals are passed through the hard limiter. An ideal optical hard-limiter is defined as

\[ g(x) = \begin{cases} 1 & x \geq 1 \\ 0 & 0 \leq x < 1 \end{cases} \]

Therefore, if an optical light intensity (x) is bigger than or equal to one, the hard-limiter would clip the intensity back to one, and if the optical light intensity is smaller than one, the
response of the optical hard-limiter would be zero. This ideal nonlinear process would enhance the system performance because it would exclude some combinations of interference patterns from causing errors as in the soft-limiter case, i.e., the patterns that caused errors by analog summation of light intensity rather than by exact reproduction of the particular pattern with no analog effect. The threshold value can be chosen under the following condition.

\[ 0 \leq \text{threshold} \leq w \] ................................ (7)

Fig.4(d) shows output of hard limiter of a receiver. Then this signal is get decoded with OOC decoder at the receiver side. Fig.4(e) shows the decoded output, which is nothing but original data of a user. As for ten bit information there is no error bit. Similarly we can calculate probability of error as a function of weight, length of OOC & no. of users.

\[ PE = \frac{1}{2} \sum_{i=0}^{n} \left( \frac{K-1}{C_i} \right) \left( \frac{1}{2w} \right)^i \left( \frac{1}{2w} \right)^{K-i} \] ................................ (8)

Where PE & k are probability of error and no. of users respectively. Fig.5 shows several dependency of PE. Fig.5(a) shows w-dependency of PE. As the sum of 1s in the code, w, goes up, PE gets lowered. Note that the highest threshold value under (4) would make the lowest PE on the same w. In the Fig. 5(b), we can find K-dependency of PE. As the number of accommodated users, K, goes up, PE gets higher. This is definitely due to the increasing interference. In Fig.5(c), a length of code, n, is tested in different values, 100, 200, 300, 1000 and 2000. As n goes up, PE gets lowered resulting in long processing time. So we need to deal with the trade off problem on the low error rate and processing time.

V. CONCLUSION

In this report, we introduced the optical CDMA with the OOC set constructed by difference set methods. OCDMA scheme was successfully applied by using the optical orthogonal codes. OOC reduce interference due to other users and channel noise. OOC enables a large number of asynchronous users to transmit information efficiently and reliably. However, OOC revealed some drawbacks, requirement of long sequences resulting in long signal processing time and severe degradation due to fast adding of cross correlation. Optical hard-limiter showed remarkable improvement in reducing interference due to other users. We also presented that the threshold value, code length, and total numbers of users are important factors for the probability of error.

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Comparative Study of the Selected Apparel Retail Stores in the Organized Sector

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Abstract- With more and more people becoming fashion-conscious including men and with shopping now being looked upon as a leisure activity with Malls and mega-stores becoming a place for hang out rather than shopping, there was a need to profile retail customers based on this. Also with lots of stores coming up in organized sector, measuring customer satisfaction in such stores becomes important. This study focuses on profiling retail customers and measuring their level of satisfaction in the selected stores in the city of Ahmedabad. Primary data has been collected using structured questionnaire. It has been found that visiting retail outlets have become a group activity. Advertisements, friends and Colleagues influence majority of shoppers. Only 80 respondents out of 150 came for shopping inside store, rest came for hang out, enjoy crowd, meeting friends and getting refreshed. Lifestyle was found to have higher level of satisfaction followed by Pantaloons and Westside.

Index Terms- Customer Satisfaction, Shopping, Retail Outlets, Malls, Hang Out

I. INTRODUCTION

Retailing is considered to be the world’s largest industry with US $ 6.6 trillion sales annually. The retailing industry in India is worth around 300b$ (Indian Management-January 2007). According to a report compiled by Ganguly (www.indiaonestop.com/retailing.htm), there are around 5 million retail outlets of all sizes and styles. The retail market is likely to increase by 20% annually. Moreover, Lifestyle in India is changing from soberness to hedonism due to dual-income nuclear family unit, a steady shift towards an ambition of a nuclear family unit, a steady shift towards an ambition of a global lifestyle. A consumer of today spends to attain the “feel good” factor. Shopping, therefore has developed from a need-based activity to a spare-time entertainment.

With the advent of modern format retailers, prosperous urban Indian customers are shopping like never before. They spend mornings surfing in stores looking for latest styles or deals. In the large urban centres, apparel retailers like Shopper’s Stop, Pantaloons and others have popularized their private labels which have attracted urban shoppers. It is said customers have loyalty to a store rather than a particular garment brand which has led to thriving local brand market for ready-to-wear clothes leading to severe competition. According to a report by Datamonitor 2006, global apparel, accessories and luxuries market is likely to expand by 4.5% annually and Asia pacific region is expected to acquire leadership position by 2011.

II. CHARACTERISTICS OF APPAREL RETAIL SECTOR

As retail is led by fashion, a player needs to keep a close watch on fashion amongst teenagers as they are the trend setters. Role of Bollywood in spreading fashion needs to be understood. Seasonal variations on stocking pattern and need to clear inventory at the end of season should be understood by retailer. Typically once an item is sold from the outlet, retailer ensures that there is no repetition of same. It gets replaced by different design, style, colour. Importance of store layout, décor is very critical. A browser visiting the store frequently likes to see changes in the layout otherwise he may carry the impression that stocks are not moving out of the store. Category management becomes very crucial function as transformation of design into production and delivery has to be completed before fashion or fad changes in the market.

This highlights the importance of profile of retail customers and level of satisfaction with the retail outlets. Retailer needs to understand the profile of retail customers first. Understanding the level of satisfaction and providing the same can accelerate purchases which substantially reduce retailer’s financial and inventory risk.

This paper compares profiling of retail customers and the level of satisfaction in the selected retail stores in organized sector.

III. REVIEW OF LITERATURE

The study briefly reviews the existing literature in the area of factors influencing shopping behavior and store choice behavior. There are a few common characteristics among the different classifications of shoppers as proposed by different authors. Kopp et al (1989) proposed price consciousness, quality consciousness, fashion consciousness, Nicholl et al.’s (2002) window (leisure) driven shoppers, Kopp’s recreational shopping, Boedekar’s (1995) search for experience and recreation, Arnold and Reynolds’ (2003) hedonic shopping motivations and Jin and Kim’s (2003) leisurely motivated shoppers.

With reference to store choice variables, Moye and Kincade (2003) reported that the occasion for which an apparel item is bought does influence the consumer’s importance rating of the store environment and there were higher expectations for the environment of a store offering formal merchandise than a store offering casual merchandise.

Leung and Taylor (2002) in a study on fashion buying criteria of X generation consumers in Hong Kong found that X-ers are attracted by a good interior store layout; and feel good service is essential when buying fashionable clothing. In the Indian context, a study was done by Sinha et al. (2002) on store choice
behavior that indicated Indian shoppers on an overall basis give importance to proximity of the store, merchandise and service provided by the store and stores dealing in apparel are also chosen based on ambience.

As far as interpersonal influence is concerned Nicholls et al. (2002) discussed the role of companions in shopping and Kopp et al. (1989) proposed advice-seeking tendency.

Magleburg et al. (2004) suggested that the teenagers who shop often with their friends are more vulnerable to informational influence and less prone to normative influence. Prus (1993) in a qualitative study said that a number of dilemmas for consumers are created by shopping companions like additional definitions (encouragements, discouragements and distractions) of products, money, users as well as their concerns with the identities and ensuing relationships implied by the presence of their companions. Mascarenhas and Higby (1993) have discovered the interpersonal influences in teenagers and found three major influence sources were considered-peers, parents and the media.

The above studies do not specifically focus on apparel retail sector in Indian context. Moreover, the above studies focus more on factors influencing store choice behavior as well as shopping behavior and do not identify the profile of customers who are visiting this new-generation retail outlets which is very important for the marketer to attract customers inside the store. Also it is very important to know as the retail stores in organized sector are growing day by day in numbers whether customers are actually satisfied with the retail outlets. However, this study specifically focuses on apparel retail sector in the Indian context to identify profile of retail customers and measure their level of satisfaction with the present day retail outlets.

IV. MOTIVATION FOR STUDY

In spite of the understanding that customer’s level of satisfaction with the retail outlets also influence customer selection of a store and sales, very few studies were found examining customer level of satisfaction in apparel retail sector. Moreover, most of the studies were in global context and lack comparisons in the organized retail sector. Lifestyle, Pantaloons and Westside are the most sought after retail stores from the point of view of customers. Understanding the level of satisfaction of customers in these stores is crucial for the betterment of customers. Moreover, it becomes necessary for a retailer to understand the critical role of the profile of retail customer for accelerating purchases. Apparel sector is on the edge for growth in domestic and global markets due to liberalization. With the rapid growth of organized retailing in India, there is a dire need to understand these, explore reasons behind it and pose managerial challenges.

V. SCOPE OF STUDY

The present study is undertaken to understand the profile of customers visiting new-generation retail outlets like Lifestyle, Pantaloons and Westside Store and to know the customer's level of satisfaction of the present day retail outlets in a city like Ahmedabad where the demographic and psychographic profile of the shoppers will be quite different as compared to the big cities like Mumbai, New Delhi, Bangalore, Pune, Chennai and Kolkata.

VI. OBJECTIVES

The study was made with the following objectives:
1. To present a brief profile of customers in the apparel retail outlets
2. To understand the customer’s level of satisfaction in the selected retail outlets
3. To have a comparison of the selected Apparel retail stores in organized sector in Ahmedabad

VII. METHODOLOGY

A structured questionnaire was used to collect primary data. Convenient random sample of 150 respondents (50 from Lifestyle, 50 from Pantaloons and 50 from Westside Store) were asked to fill the questionnaire consisting of both open-ended and closed questions. Respondents were randomly intercepted in the shopping malls and information elicited from the co-operative ones. Five-point Likert Scale was used to record and measure the satisfaction level. Primary data was analyzed using percentages and inferences were drawn.

VIII. FINDINGS

Table 1: Customer Profile

<table>
<thead>
<tr>
<th>No.</th>
<th>Parameter</th>
<th>Lifestyle</th>
<th>Westside</th>
<th>Pantaloons</th>
<th>Combined</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Age</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A</td>
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<td>9</td>
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1. Majority of shoppers were in the age-group of 21-30 in Lifestyle and Pantaloons whereas in Westside Store, they were in the age group of 31-40. This is because Lifestyle stores have trendy outfits to suit the needs of the young fashionable population.

2. Most of the people who visited these outlets were Salaried people followed by Student and Housewife.

3. Most of the people shopping in Lifestyle, the average income was 20,000 to 30,000. This is because the average billing per customer is Rs. 800 whereas in Westside, majority of the customers were in the income category of less than 10,000. This is because the average billing per customer in Westside is Rs. 199-1999.

4. Majority of the shoppers were Single in Lifestyle whereas in case of Westside and Pantaloons, they were married.

5. The preferred shopping time was Evening across all the three outlets. This implies that as majority of the shoppers were salaried people, they may be shopping in the evening.

6. Frequency of visit was during weekends in most of the cases followed by first time shoppers and people who come to stores rarely.

7. Advertisements were found to be the most influencing followed by Colleagues and Friends.

8. As most of the people were Salaried class, Single and Shopping in the evenings, Friends accompanied them during shopping in case of Lifestyle whereas in case of Westside and Pantaloons, as most of the people were married, Family accompanied them during shopping in the evening.

9. Majority of the customers came by car, followed by Two-wheeler and Auto.

10. Customers in Westside spend 1-2 hours and rest of them spend less than 1 hour in the stores for shopping. It implies majority of time was used to hang out outside stores with friends after shopping.

11. The basic purposes for visit were found to be Shopping in Pantaloons followed by getting refreshed in case of Westside. It was found majority of the people used to come for spending time with friends in case of Lifestyle. This is because majority of shoppers were found to be in the age group of 21-30, Single and salaried people who come in the evenings to spend time with their friends.

12. Out of the 150 respondents surveyed, only 80 had purchased something on that day whereas the rest came for spending time with friends and getting refreshed.

13. Most of them bought Apparel followed by Accessories.

14. Most of them paid by cash instead of the credit card as majority of them didn’t own the credit card.

**Measuring Customer Satisfaction**

<table>
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<th>Pantaloons</th>
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<td>3.35</td>
<td>3.325</td>
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<td>Store has adequate parking space</td>
<td>3.75</td>
<td>3.25</td>
<td>3.70</td>
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<tr>
<td>3</td>
<td>Store has good ambience</td>
<td>3.725</td>
<td>3.25</td>
<td>3.225</td>
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<tr>
<td>4</td>
<td>Merchandise sold is of high quality</td>
<td>3.575</td>
<td>3.25</td>
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<td>5</td>
<td>I am satisfied with the Price of Products I purchased</td>
<td>3.75</td>
<td>3.20</td>
<td>3.925</td>
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</table>
Satisfaction was measured using a 5 point rating scale and the averages were found for easy comparison.

15. Lifestyle was found to be the most convenient store among the three. As most of the respondents were staying in Satelite area or near SG highway which is near to the store would have contributed to this.

16. Lifestyle was found to have adequate parking space as compared to other outlets.

17. Lifestyle offers good ambience in comparison to others. This may be because it has great crowd, hoardings and has proper lighting arrangements and glitter in comparison to other outlets.

18. Highest quality ratings in terms of Merchandise sold was found in Lifestyle as well as Pantaloons.


20. Lifestyle enhanced the prestige of the shopper followed by Pantaloons. This is because the name itself speaks of the customers high profile and enhances the status of customers. Most of the customers would feel proud to shop in Lifestyle.

21. Highest satisfaction with the wide selection of multi-brand Merchandise was found in case of Lifestyle followed by Pantaloons.

22. Lifestyle has good layout in comparison to other stores.

23. Pantaloons was found to offer great discounts during festive seasons in comparison to other outlets.

24. Staff in case of Lifestyle was found to be very helpful assisting customers followed by Westside.

25. Lifestyle was found to offer great variety in terms of apparel, accessories, cosmetics, etc. This is because the store is multi-brand and in case of apparel, clothes which are trendy in design and style factor are available.

IX. IMPLICATIONS

Most of the people who visited these stores were salaried people. In general, people have belief that new-generation outlets are more visited by Business-class people which proves to be wrong. Retail organizations both existing and new should take note of this and keep trendy outfits which are demanded by the salaried people to remain updated about fashion when working in corporates. This is because corporate dressing has undergone a change these days. Stores like Westside and Pantaloons were more visited by people having income less than Rs.10,000. This casts a serious doubt that these outlets are meant for higher class people only and are visited more by them. Stores should take note of this and should keep prices for certain outfits as low as 199-399 which are more affordable by people in such income category for increasing more footfalls inside the stores. Westside and Pantaloons has succeeded in attracting people from such low income category also because of its pricing strategy affordable to every class.

X. CONCLUSION

From this study, it can be concluded that (1) Visiting retail outlets have become a group activity. (2) No matter whatever the income level is, people do visit mall at least once. (3) People who are Single come for spending time with friends in the evening during weekends rather than shopping whereas Married people come in the evenings with family for shopping and getting refreshed during weekends (4) Mostly, Advertisements, friends and Colleagues influence shoppers. (5) Only 80 respondents out of 150 came for shopping inside Mall, rest came for hang out, to enjoy crowd, to meet friends and for getting refreshed.

REFERENCES


AUTHORS

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has been a guest faculty for number of Institutes at Bangalore. He has also contributed various articles in Times of India and at various National and International Conferences and has guided over 45 MBA research projects. Prof. Rajesh Faldu is also a Soft Skills Trainer and has trained various students at Veta, Station Language Lab and London School of Speech.

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Self Help Groups – Its Rural Impediments

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Ranchi University, Ranchi, Jharkhand, India

I. INTRODUCTION

A small group (15 to 20 members) voluntarily formed and related by affinity for specific purpose, it is a group whose members use savings, credit and social involvement as instruments of empowerment.

The Anti poverty Programme are a to dominant feature of government initiatives in the rural areas. The programmes pertaining to these efforts have been reviewed and strengthened in successive years in order to sharpen their focus on reduction of rural poverty.

Poverty is widespread in India, with the nation estimated to have a third of the world’s poor.

According to 2005 World Bank estimate, 41.6% of the total Indian population falls below the International poverty line of US $ 1.25 a day (PPP, in nominal terms Rs. 21.6 a day in urban areas and Rs. 14.3 in rural areas.). According to 2010 data from the United Nations Development programme, an estimated 37.2 % of Indians live below the Country’s national poverty line.

In percentage terms, rural poverty has reduced from 56.44 percentage of the country's population in 1973-74 to 32.27 percentage in 1993-94. However, the cause for concerns is that the estimated number of rural poor is still about 193 million, which has led to further review and restructuring of the anti poverty programmes.

The Swaranjayanti Gram Swarojgar Yojana (SGSY) is the result of such latest review and restructuring of programmes. The SGSY is different from earlier programmes in terms of strategy envisaged for implementation and has been conceived as a holistic programme of self employment viz , organization of rural poor into Self Help Groups. SGSY was launched in April 1999 and is the only self employment programme currently being implemented. It aims at promoting micro enterprises and to bring the assisted poor families (Swarozgaries) above the poverty line (probable range to poverty line is 22,000 to Rs. 24,000 p.a in Xth plan) by insuring appreciable sustained level of income over a period of time. The poverty line varies from state to state.

The SHG approach help the poor to build their self confidence through community action. Inter-action in group meetings and collective decision making enables them in identification. This process would ultimately lead to the strengthening and socio-economic empowerment of the rural poor as well as improve their collective bargaining power.

II. THE CONCEPTUAL BACKGROUND

Despite the vast expansion of the formal credit system in the country, the rural poor especially small and marginal farmers and landless labourers, petty traders and artisans, continue to depend on money lenders for their emergent credit needs. Their needs are small but frequent. They have little or no savings at all. Banks have, so far been shy of dealings individually with these small due to high transaction cost and risk involved. However, the experience in many countries reveal that when these resources poor people are organized into small thrift and credit management groups or Self Help group (SHGs) they not only become bankable but also reveal an inner strength to fight the socio economic injustice to which they have been subjected for decades.

Objectives of Swarnajayanti Gram Swarojgar Yojana (SGSY) is to bring the assisted poor families (Swarozgaries) above the poverty line (probable range to poverty line is 22,000 to Rs. 24,000  p.a) by insuring appreciable sustained level of income over a period of time. The poverty line varies from state to state.

The SHG approach help the poor to build their self confidence through community action. Inter-action in group meetings and collective decision making enables them in identification. This process would ultimately lead to the strengthening and socio-economic empowerment of the rural poor as well as improve their collective bargaining power.

III. STRUCTURE OF SHG

For identifying the key activities that can be taken up by block level SGSY Committee and for selection of key activities, a profile of the poor families as reflected in the BPL census should be analysed. The block level SGSY Committee should analyse the potential for farm activities on priority. Another category would be the unemployed educated youth. Generally, the people who are assets- less and skill less are poorest of poor and get our under the Programme.

Such category of people may require small doses of multiple credit over a period of time coupled with emphasis on awareness creation, training and capacity building. The activities which are easier to handle and product is easily marketable could be identified for such category of people to ensure sustainable income, so that they do not fall into debt trap.

The process of SHG formation could be divided into different phases or stages as follows:-

- Group formation at grassroots level. Our society, members are linked by various common bounds like
Under SGSY, generally a self help groups consists of 10 to 20 persons. However, it case of deserts, hills and areas with scattered population and disabled persons, this number may be from 5-20 under following conditions:

a. Generally all member of the group should belong to BPL. However, upto 20 percent are acceptable to the Group but subsidy will not to be given to the API members.

b. The group shall not consists of more than one member from the same family persons should not be a member of more than one group.

c. The group should organize a regular meeting weekly or fortnightly or monthly.

d. The group should build their corps fund which should be used to advance loans to the members through a participating decision making process.

e. The group should be able to fix repayment schedule, fix appropriate rate of interest for the loans advances and closely monitor the repayment of the loan installment from the loanees.

f. The group should maintain simple ledger records such as minutes book, attendance register, loan ledger, general ledger, cash book, bank passbook and individual passbooks.

g. 50 percent of the group formed in each block should be exclusively for the women.

A large number of DWCRA group have been formed and assisted by DRDA is the past. Likewise there as a number of Self Help Groups formed by NABARD, other banks, Rastriya Mahila Kosh, State level Education Projects etc. The DRDA may act as nodal agency for developing the database, which should include Self Help group formed under all the schemes. 

Every SHG that is in exercise for at least 6 months and has demonstrated the potential of viable groups enters the second stage. Wherein they receive the revolving fund provided by the DRDA.

On the receipt of the revolving fund the group shall utilize the fund in the manner and for purpose it deems fit. The idea is that the group should development the capacity to utilize fund it has received from outside. The revolving fund can be used by the group for purpose of raw materials marketing or infrastructure support for income generating activist. It can be alternatively used for lending to individual members for their own purpose.

Once the SGH has demonstrated that it has successfully passed through their third stage, it is eligible to receive the assistance for economic activities. This is in the form of loan & subsidy. The group is entitled to subsidy of 50 percent of the project cost subject to per capita subsidy of Rs.10,000 or Rs. 1.25 lakh. DRDA entitled to conduct training programmes to the members of the group so that the group becomes fully self managed and evolve into among groups. DRDA will utilize to meet the expenses incurred by the training institution for both orientation and skill development training fund out of the SGSY fund.

SHG programme is the safeguard for the weaker section. Accordingly, the SC/ST will account for a minimum of 50 percent for 40 percent and disabled for 3 percent of the total Swarozgaries assisted during the year.

IV. ISSUES AND PROBLEMS

Working of Self Help Groups forms a major chunk of society. Its presence, aspirations and problems cannot be ignored. It is imperative that these groups are looked upon as engaged in gainful employment. These groups should be given he due care and status in the society.

Though, development policies and performances have created a positive impact on the self help group in the society, they are facing many problems and difficulties in making – groups and lending financial support from banks and financial institutions. Some major issues and problems indicates SHG status, which as follows:

- Most members of the SHG are innocent and illiterate.
- They have no knowledge about the SHG.
- They do not have a principal occupation.
- Women member perform dual role in society relating to production and reproduction so they are over burdened.
- Their contribution to the family economy and national economy remains largely invisible and under valued.
- Women have a low nutrition status.
- The existing communication channels are not adequate and do not reach to the BPL members of the society.
- Lack of integrated approach in macro policies in tackling its issues.
- Unchecked exploitation of SHG women members in houses, at working place and public place.

V. SUGGESTIONS

The problem of self-help groups in the Jharkhand state are multifarious and multidimensional. These problems can be solved by changing the attitude of society, family and nation towards the weaker sections of the society, poor men and women. Some suggestions are as follows:

- Members of the SHG should be educated and when she is educated she can manage her dual responsibility of home and work.
- Member of the each SHG should be given vocational training in their work so that their efficiency increases. They should be trained to develop their capabilities of decisions making and individual thinking.
- Women member of the self-help group should be made aware of their constitutional and legal rights both in their work and in the social sphere.
- The attitude of husband and family member should be changed towards her occupation and husband should come forward to share her burden.
e. They should be given adequate facilities.
f. They should be given financial freedom.
g. Baby care centre should be opened at the work place where she can leave her child.
h. Maternity benefit schemes should be enhanced in self-help groups Swarozgaries.
i. Women should also change their attitude about themselves. They should be self confident in their approach.
j. More seminar, workshop and conference on SHG should be organized. They should be encouraged to participate in them and express their views.
k. There should be almost need of direct co-relation between education and employment among the SHG members. Let us hope that the future is rosy for SHG.

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Green House Monitoring and Automation using GSM

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Abstract- Wireless Sensor Networks (WSNs) have played major role and attention in recent years. The ambiguous applications of WSNs are immense. These networks used for collecting, storing and sharing sensed data among them self’s and to external node. WSNs have been used for various applications such as habitat monitoring, agriculture, nuclear reactor control, security, tactical surveillance and many more applications where human cannot monitor.

The monitoring and GSM systems and developed in this project is for use in green house applications, where real time data of climate conditions and other environmental properties are sensed and control decisions are taken by monitoring system and they are modified by the automation system and sends SMS that what operation is performed by them to user.

The architecture of a green house monitoring system comprises of a set of sensor nodes and a control unit that communicate with each sensor node and collects local information to make necessary decisions about the physical environment. The Temperature sensors LM 45 senses the temperature and send to SCU, it will amplify and send to Control Unit. The Humidity Sensor is used to find the humidity of the Greenhouse. The control units have the MCU to check the reading and make the fan ON or OFF. Then status of the Greenhouse will send to the user Mobile through GSM Module.

Index Terms- Sensor; Automation; SMS; GSM; Monitoring System

I. INTRODUCTION

The concern with a lot of consumer needs and demand for the agriculture products has stimulated awareness among the farmer that increases their products in the market by implementing advance technologies in this industry. The products that are important that may come to the farmers’ interest that controls the use of natural sources and natural environment which controls agriculture with various aspects. Therefore, this problem makes farmers’ interest to implement agro-conditions sending alert notification messages to farmers using GSM and SMS technology. The proposed system is aimed to be a reliable and cost.

environmental with remote monitoring method in their agriculture fields. The agro-environmental remote monitoring system can be implemented in various conditions such as in monitoring temperature, soil and water levels. However this paper focuses solely in remotely monitoring levels of temperature in greenhouse. By utilizing existing technology, the natural environment and resource which we get naturally, the temperature is very important criteria for the plants to be monitored efficiently.

Previously, human labor plays major role in the monitoring farm and plants in the agriculture field. For some crucial plants such as vegetarian and flowers plants, which need 24 hours attention from human so that the plant quantities and qualities are controlled with proper management by the collected data and information from the fields. This will provide enormous foundation for future growth and future development of their plants in the green house. However, with the increasing size in farming areas, this type of manual practice is increases time consuming and cost of the labor.

However, with the growth of management in agriculture techniques and with modern telecommunication technologies which provide great assistance with the implementation in the agriculture industry.

With the rapid development in telecommunication and wireless technologies, it is proved that wireless communication has good practice for remote sensing in the agriculture industries. In this paper uses wireless sensor network, Global System for Mobile Communication (GSM) and short message service (SMS) to carry out data from the green house with sensors directly alert the farmers to their mobile phone. This type of practice can eliminate the use of wires and improved the old method of collecting data in the farming areas. This technology has seen to be suitable for these modern days

Moreover, this paper focuses on the monitoring and automation system in greenhouse which has capability of controlling
II. BLOCK DIAGRAM OF THE SYSTEM

![Block Diagram of System](image)

Fig. 1: Block Diagram of system

III. SYSTEM DESIGN

The hardware unit of the prototype of the system is represented by the block diagram below. It contains a PIC16F877A microcontroller as the main processing unit and it gets inputs from the temperature sensor (LM35) and a soil moisture sensor (simulated using a variable resistor). From the data obtained from the sensors the program controls the actuator components such as fans and sprinkler to achieve the system requirements. It also uses a GSM module which sends information from the microcontroller to the user from which the data obtained from the sensors.

The system consist of two subsystems temperature monitor and soil moisture control system. The system operates according to the flow chart show. The temperature monitor and control system consists of a LM35 temperature sensor a user mode switch the fan for cooling. The user mode switch is connected to RB7 pin in the microcontroller and tested whether the switch is ON, if it is ON (RB7 read as high) the microcontroller saves the value to the EEPROM set by the user by means of the potentiometer connected to the RA1 pin.

The soil moisture level is also controlled to a predefined ideal value like temperature monitor and control system. The sensor was simulated using a non-linear potentiometer and it is an input to the microcontroller at RA1 pin. The analogue value is converted to a digital value and saved in EEPROM. Then this value is subtracted from the ideal value which is assumed to be ‘70’ and if the result is zero then RB6 pin made high and sends SMS alert to user mobile. When the result is negative again the valve is RB6 pin is low and sends SMS alert to user mobile.
IV. SYSTEM FLOW CHARTS

**Fig. 2: System process**

1. Start
2. Initial process
3. Check if system is on or off
   - Yes: Store the A/D value EEPROM after performing
   - No: Sends SMS stores the A/D value
4. Compare A/Dx value and check switch is on/off
   - Yes: Get the soil moisture sensor A/D value
   - No: Store the value to EEPROM
5. Check if temperature value is equal or greater to user given value
6. Switch on fan

**Fig. 3: Temperature process**

1. C
2. Get the soil moisture sensor A/D value
3. Store the value to EEPROM
4. Check if moisture value is less than to user given value
5. Switch on sprinkler

**Fig. 4: Soil moisture process**
V. CONTROL UNIT

A. PIC Microcontroller
PIC is a family of modified Harvard architecture microcontrollers made by Microchip Technology, derived from the PIC1650 originally developed by General Instrument's Microelectronics Division. The name PIC initially referred to "Peripheral Interface Controller". [3]

B. Peripheral features
- 8-bit RISC based CPU architecture having 14.3K program memory, 368 SRAM, 256 EEPROM and 33 I/O lines.
- Timer0: 8-bit timer/counter with 8-bit prescaler
- Timer1: 16-bit timer/counter with prescaler, can be incremented during Sleep via external crystal/clock
- Timer2: 8-bit timer/counter with 8-bit period register, prescaler and postscaler
- Two Capture, Compare, PWM modules
- Synchronous Serial Port (SSP) with SPI™ (Master mode) and I2C™ (Master/Slave)
- Universal Synchronous Asynchronous Receiver Transmitter (USART/SCI) with 9-bit address detection
- Parallel Slave Port (PSP) – 8 bits wide with external RD, WR and CS controls (40/44-pin only)
- Brown-out detection circuitry for Brown-out Reset (BOR)

Control Unit consists of PIC Microcontroller. Temperature sensor senses the temperature and gives the reading in variation with voltage. So using the analog signal we can't directly send to the GSM modem. But, the PIC Microcontroller have the in-built 10/8-bit ADC with 10-channel. We are using the ADC in 8-bit, ADC will convert the two channel into equivalent reading.[3]

VI. CIRCUIT DIAGRAM

VII. GSM MODULE
A GSM modem is a wireless modem that works with a GSM wireless network. A wireless modem behaves like a dial-up modem. The main difference between them is that a dial-up modem sends and receives data through a fixed telephone line while a wireless modem sends and receives data through radio waves. Like a GSM mobile phone, a GSM modem requires a SIM card from a wireless carrier in order to operate.[4]

VIII. SCREEN SHOTS OF RESULTS
These screen shots contains information in the user mobile. Which the SMS received from the GSM module number which gives alert information during automation and monitoring.

Fig. 6: This shows that system is ready for the process.
IX. FUTURE SCOPE

The system which we are discussed above is implemented on the board and results are shown. But the system can work more efficiently with present technology and may improve the existing technology in the field of wireless communication and with the wide improvement of GSM technology which can improve Short Message Service with the help of embedded technology anything may become possible and easy.

X. CONCLUSION

With the wide improvement of wireless and GSM technology. The system may be cost with wireless sensors may little cost but it works with more effectively. The system may be implemented with the help of many technologies but these technologies more reliable, easy to implement, works effectively and easy to operate.

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Design and Development of ZNO Nanotube Based Photo-Electrodes for Dye-Sensitized Solar Cells


Abstract- Surface-grown ZnO nanotubes have been synthesized by a chemical solution method, hydrothermal method and by surfactant-assisted in-situ chemical etching on a glass plate coated with ZnO seed layer via thermally decomposing zinc acetate at 280°C. The morphological and structural analyses have been investigated by optical polarizing microscopy, Atomic Force Microscopy (AFM), Field-emission scanning electron microscopy (FE-SEM) and X-ray diffraction (XRD) spectral analysis. It was found that the ZnO nanotubes synthesized via surfactant-assisted in-situ chemical etching strategy produced mesoflower-like structures with hexagonal structure everywhere and has been confirmed through FE-SEM analysis. The ZnO nanotube based photo-anodes produced by the present investigations are highly expected to contribute towards the improvement in the efficiency of nanocrystalline Dye-Sensitized Solar Cells (DSSCs).

Index Terms- ZnO nanotubes, Dye-sensitized solar cell, Wet-Chemical Method, in-situ Chemical Etching, zinc nitrate hydrate

I. INTRODUCTION

Dye-sensitized solar cells (DSSC) have been studied extensively as a potential alternative to conventional inorganic solid solar cells. Considerable efforts have been devoted to the development of more efficient photoanode materials including ordered meso-structured materials. Highly ordered semiconductor oxide nanotube arrays are particularly attractive, which enhances power conversion efficiency due to its enhanced surface area for the attachment of dye molecules on the photoactive oxide material. ZnO is a promising, but less explored wide band gap semiconductor oxide used for DSSC fabrication. It’s much higher carrier mobility is more favorable for the collection of photo induced electrons. Taking into account of these factors the present problem is framed to have a detailed study of the effect of morphological and structural parameters on the fabrication of photoelectrodes for DSSC applications. The present investigation provides simple and efficient methods for the construction of nanostructured photoelectrodes for solar cell applications and also provides a strategy for constructing self-powered nano devices.

II. EXPERIMENTAL METHODS

A. Synthesis of ZnO Nanotubes: Wet-Chemical Method

In this method (seed layer deposition) ZnO seed layers were first deposited on glass substrates. Zinc acetate dehydrate (0.005M) was dissolved in anhydrous ethanol with continuous stirring for 45 minutes Clean glass substrates were dipped into this clear solution for 10 minutes and drawn out at 2 cm/min and dry in the air, then the second time dipping was carried out. The process was repeated for many times. Subsequently, the substrates were heat-treated at 280°C for 2-hours to obtain seed layers. In the second step for nanotubes growth, zinc nitrate hydrate (Zn(NO$_3$)$_2$·6H$_2$O) (0.025M) and Tri-ethyl amine (TEA) solution (0.025M) were mixed and stirred to get a uniformly growth solution, then the substrate with ZnO seed layers was horizontally suspended in aforementioned growth solution at 85°C for 6 hours, then the growth solution was cooled down to room temperature naturally. The substrate was pulled out and thoroughly washed with and allowed to dry in air at room temperature.

B. Surfactant-Assisted In-Situ Chemical Etching

In this method[3], the glass substrates with seed layers were suspended upside down in an autoclave filled with an aqueous solution of 6 ml ammonia (25 wt%) and 80 ml zinc chloride solution (0.1 M) at 95°C for 70 min (growth step). After growth, the glass plates were thoroughly rinsed with de-ionized water and suspended once again into a 90 ml solution containing ammonia (0.5 wt%) and cetyltrimethyl ammonium bromide (CTAB; 0.5 wt%) at room temperature for 3.5 h (etching step) and then washed with de-ionized water.

C. Hydrothermal Method

An equimolar (0.1M) aqueous solution(MilliQ, 18.2MΩ cm) of zinc nitrate, Zn(NO$_3$)$_2$·4H$_2$O, and diethyl amine was prepared in a bottle with an auto-clavable screw cap. A glass substrate with seed particles was placed inside. The bottle is then heated at a constant temperature of 90°C for 2 days in a hot air oven. Subsequently, the homogenous thin films are thoroughly washed with (MilliQ) water to remove any contamination from residual salts or amino complex [4].

III. RESULTS AND DISCUSSION

Surface Grown ZnO Nanotubes are produced by Chemical Methods. The preparation of ZnO nanotubes was carried out through all of the three procedures mentioned in the experimental session and the characterization of as-synthesized ZnO nanotubes were done using AFM, SEM and XRD. The seed layers served as nucleation centers for the subsequent growth of nanotubes. The surface morphology of the ZnO nanotubes was studied using Atomic Force Microscopy Fig.1(A-B) shows the 2 and 3-Dimensional AFM images of ZnO nanotubes grown on the glass substrates respectively.

Further morphological characterization of the ZnO nanotubes was performed by FE-SEM.

FE-SEM images (Fig.1(C-D)) at low magnification indicated that ZnO nanotubes grow uniformly in large area. The size of the ZnO nanotubes is estimated to be about 1-5 µm which is much larger than the nanotubes synthesized by the reported chemical solution method. This implied that the as-prepared ZnO nanotubes films had high porosity and large surface area which would be of benefit to adsorption of more dyes, when the ZnO
nanotubes films are used as photo-anodes of dye sensitized solar cell, the light harvest efficiency can be improved.

**A. ZnO Nanotubes Prepared by Surfactant-assisted In-situ Chemical Etching**

Fig. 2 A and B shows the FE-SEM images of the mesoflower-like ZnO nanotubes obtained using surfactant-assisted in-situ chemical etching method in which the nanotubes with an average size of about 5-10 µm and flat termination can be clearly seen. The mesoflower-like structures have been formed; which may be due to the aggregation of the seed particles during dip-coating in the first step, leading to the formation of mesoflower-like nanotubes. Representative SEM images showing the contrast between the tube wall and the inner part can be clearly observed, providing a direct evidence of the tubular structure.

**B. ZnO Nanotubes Prepared by the Hydrothermal Method**

Using this method, ZnO micro tubes were formed successfully on the glass substrates and the morphological characterization was performed using AFM (Fig. 4). The presence of tubular structure can be seen from the 2-Dimensional image of ZnO tubes as well as in the 3-Dimensional image.
IV. CONCLUSION

In conclusion, ZnO nanotubes were synthesized via a simple chemical solution method, hydrothermal method and a surfactant-assisted chemical strategy. The as-prepared ZnO nanotubes were characterized by AFM, FE-SEM and X-ray diffraction analysis. The ZnO nanotubes synthesized via surfactant-assisted chemical etching method is found to have a meso-flower-like structure which has confirmed through FE-SEM studies and the ZnO nanotubes were found to have hexagonal structure. Since the nanotubes have high surface area and porosity it can be utilized as the photo-anodes in the formation of the DSSCs.

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Green Synthesis of Gold Nanoparticles and Silver Nanoparticles from Leaves and Bark of *Ficus Carica* for Nanotechnological Applications

Prasoon Pal Singh, Chittaranjan Bhakat

Abstract- Green synthesis is an emerging nanotechnological tool for medicines and nanotechnology. In green synthesis we used natural reducing agents to synthesize nanoparticles (in this case these are gold nanoparticles and silver nanoparticles). Conventionally, gold and silver nanoparticles are synthesized by wet chemical technique where toxic and/or flammable chemicals are used. The present study focus on a cost effective and safe technique to synthesize Gold and Silver nanoparticles by using leaves and bark of *Ficus carica* with aqueous solution of 1mM HAuCl4 and 1mM AgNO3 respectively. The leaves and bark were found to be a reducing agent as well as capping agent which can rapidly reduces auric ions (Au+ to Au0) and silver ions (Ag+ to Ag0). UV-VIS spectroscopy and Scanning Tunneling Microscopy (STM) were used to characterize Gold as well as Silver nanoparticles.

Index Terms- Green technology, microwave irradiation, microscopy, spectroscopy, and *Ficus carica*.

I. INTRODUCTION

Nanoscience and nanotechnology has the ability to provide solutions to the society in various areas like the environment challenges viz. water treatment, sustainable chemical production etc. as well as in fields like medicine, solar energy conversion etc. [1-2]. At nano scale the properties of the materials are different from their same bulk size counterparts. These changes in properties may be due to quantum size effects [3]. Metal nanoparticles exhibit unusual optical, thermal, chemical, and physical properties which could be due to the combination of a large proportion of high energy surface atoms relative to the bulk solid and the nanometer scale, mean free path of an electron changing its conductivity and mobility [4]. Metal particles at nano dimension have wide range of applications due to their unique properties. The most important property of silver nanoparticles is its antimicrobial effects [5], while gold nanoparticles show optical properties and many other properties such as surface-energy absorption and catalytic in chemical reaction [6]. Some of the chemical reducing reactions can be carried out at room temperature. But most of them need elevated temperatures for a higher reaction rate [7]. The energy used to heat up the media can be conventional thermal heating [8], fixed frequency microwave radiation [9], solvothermal [10] etc.

Recently it has been demonstrated that thermal factor affect the size and uniformity of nanoparticles [11]. So by controlling the temperature we can prevent the growth of nanoparticles. Here in, three different techniques have been used for the synthesis of nanoparticles of silver and gold; these are (a) thermal reduction process, (b) microwave irradiation, and (c) solvothermal reduction process. These routes can be termed as green routes as they avoid the use of harmful reducing agents. Leaves and bark of *Ficus carica* are used as a reducing agent for the reduction of auric tetra chloride and silver nitrate. This route can be termed as green routes as it avoids the use of harmful reducing agents. *Ficus carica* belongs to the plant family of Moraceae; it is widely cultivated throughout of the world. *Ficus carica* generally grow in wild dry areas in India, it’s a moderate sized tree grows up to 15 meter in height. It contains a medicinal properties plant and used in various medicine like Ayurveda, siddha, Unani and Homoeopathy [12]. Different biologically active compounds were isolated from this plant. The barks, leaves, fruits are considered to be very effective in various treatments, such as diabetes, skin diseases, ulcers, dysentery, diarrhea, stomachache, piles [13].

II. EXPERIMENTAL

Materials used: Auric tetra chloride (HAuCl4) 20 ml of 1mM, Silver Nitrate (AgNO3) 20 ml of 1mM, *Ficus carica* leaves and bark.

Synthesis: The synthesis has been done by three methods at moderate temperature. Method 1- Solvothermal reduction process (ST), at 15 psi and 1210 C for 15 min. Method 2- Microwave irradiation (MW), medium cycle (2450 MHz; 700 W) for 5 min. Method 3-Thermal heating (TR), at 800 C (Magnetic stirrer) for 15 min.

In a typical experimental procedure 20 ml of 1 mM metal salt is mixed with 1gm of *ficus carica* leaves and 1 gm. of bark separately. It is then subject to the reduction process using each of the three processes mentioned above.

A. Synthesis Of Gold Nanoparticles: In case of synthesis of gold nanoparticles from auric tetra chloride through *Ficus carica* leaves and bark, 20 ml of metal salt taken with 1gm of leaves and 1 gm. of bark separately and processed according to the three method given above. There was a color change after proceeding accordingly to dark purple or wine red color. This color change shows that there were gold nanoparticles (GNPs) present in the solution.

B. Synthesis of Silver Nanoparticles: Now in this case 20 ml silver nitrate solution was mixed with 1gm of *Ficus carica* leaves and 1gm of bark. Same above given three methods applied to synthesize silver nanoparticles (SNPs). Again there was a color change in purple or wine red color.

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changed to dark yellow color. This shows that there were silver nanoparticles (SNPs) present in the solution.

For the confirmation of these gold nanoparticles and silver nanoparticles sample used to characterize by U-V spectroscopy and Scanning tunneling microscopy.

III. CHARACTERIZATION

Gold and Silver Nanoparticles synthesized by the various methods were characterized using UV – VIS spectroscopy (Thermo Scientific UV- 10) and Scanning Tunneling Microscope (Nano Surf Easy Scan 2).

IV. RESULTS AND DISCUSSION

The mechanism of the reaction is the reduction of aqueous metal ion with Ficus carica leaves and bark, and the formation of silver nanoparticles and gold nanoparticles is confirmed using uv-vis spectroscopy. Color change appear after the completion of the
reaction, it is well known that silver nanoparticles exhibit yellowish brown and gold nanoparticles exhibit dark purple or red wine color respectively based on their size [14]. Under uv-vis spectroscopy gold nanoparticles and silver nanoparticles shows surface Plasmon absorption in the range of 560-580 nm and 380-410 nm respectively in case of Ficus carica bark and in case of Ficus carica leaves, the surface Plasmon absorption for gold nanoparticles is 540-580 nm and 420-440 nm for silver nanoparticles. Broadening peak indicates the particles are poly dispersed. Ficus carica leaves and Ficus carica bark extracts are showing different Plasmon resonance since, leaves organic acids profile presented reducing agents like oxalic, citric, malic, quinic, shikimic and fumaric acids and most important phenolic compounds, while bark extract contains relatively less amount of all such reducing agents (15). Phenolic compound shows redox compounds, while bark extract contains relatively less amount of all such reducing agents (15). Phenolic compound shows redox properties, which make them acts as a reducing agent since, it is present in leaves, the extract shows best result for synthesis SNP's and GNP's as compare to bark extract (16,17). Surface Plasmon resonance in nanoparticles is strongly depends on the shape, size and dielectric constant. Noble metal particles specially silver and gold exhibit a strong absorption band in the visible region and giving specific color to the solution [18]. Some graph shows broadening peak i.e. due to larger particles size. Sharpe peak indicates that the particle sizes are uniform. Based on the color observation we can say that the particles size range is from 10 to 20 nm [19]. Fig 5 and Fig 6 shows the surface morphology of gold and silver nanoparticles. After investigation of images it is clear that the particles are in cluster form. From the figure shown above it is clear that nanoparticles are in cluster form. STM images for GNP’s show Surface morphology at the distance of 94.4 nanometer while for SNP’s STM Shows surface morphology at the distance of 47.2 nanometer. Basically STM Shows the lattice structure i.e. arrangement of atoms, of any nanoparticles ( in this case these are GNP’s and SNP’s)The line graph for both silver and gold nanoparticles is almost straight this indicates the preparation of tip, sample and approach were done successfully and it also indicates towards good tunneling contact. It is more difficult to obtain good image of gold and silver, atomic structure are difficult to observe because the electrons are distributed homogeneously on the surface [20]. Table -1 and table- 2 explain the absorption spectra with maximum wavelength.

Table-1 Surface Plasmon Absorbance of Gold nanoparticles (GNPs) for Ficus carica (Bark &Leaves).

<table>
<thead>
<tr>
<th>Methods</th>
<th>Reducing Agent</th>
<th>Bark</th>
<th>Leaves</th>
<th>Bark</th>
<th>Leaves</th>
<th>Bark</th>
<th>Leaves</th>
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</thead>
<tbody>
<tr>
<td>Absorbance (A)</td>
<td>0.540</td>
<td>2.300</td>
<td>0.774</td>
<td>0.947</td>
<td>0.768</td>
<td>2.058</td>
<td></td>
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<tr>
<td>Maxima (nm)</td>
<td>575</td>
<td>548</td>
<td>576</td>
<td>548</td>
<td>566</td>
<td>550</td>
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</tr>
</tbody>
</table>

Table-2 Surface Plasmon Absorbance of Silver nanoparticles (SNPs) for Ficus carica (Bark & Leaves).

<table>
<thead>
<tr>
<th>Methods</th>
<th>Reducing Agent</th>
<th>Bark</th>
<th>Leaves</th>
<th>Bark</th>
<th>Leaves</th>
<th>Bark</th>
<th>Leaves</th>
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</thead>
<tbody>
<tr>
<td>Absorbance (A)</td>
<td>0.955</td>
<td>1.483</td>
<td>0.644</td>
<td>2.506</td>
<td>1.162</td>
<td>1.443</td>
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<tr>
<td>Maxima (nm)</td>
<td>385</td>
<td>421</td>
<td>405</td>
<td>426</td>
<td>387</td>
<td>439</td>
<td></td>
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</table>

V. CONCLUSION

The study of green synthesis of Gold and Silver Nanoparticles exploiting three physical techniques – Thermal Reduction, Solvothermal and Microwave, reducing agent used for synthesis Ficus carica leaves and bark, gave the change in Plasmon Resonance. The results obtained by characterization of synthesized materials are compared and the study shows the change in physical techniques in Green synthesis indirectly speculates on the orientation and nucleation of nanoparticles.

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Home Environment, Mental Health and Academic Achievement among Hr. Secondary School Students

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Abstract- The impact of home environment and academic achievement on mental health were investigated in a 12th grade higher secondary school students sample consisting of 300 participants, 150 of whom were females and 150 were males. The data was collected by Home Environment Inventory developed and validated by Dr. Karuna Shankar Misra Prof. & head, department of Education, Allahabad University, Allahabad and Mental Health Battery which was developed and validated by Arun Kumar Singh and Alpana Sen Gupta data collected was analyzed using mean, standard deviation and Three-Way ANOVA (2x2 Factorial Experiment). Results revealed that mean value of mental health of girls is 74.76 and boys is 70.76. Therefore, this was revealed after analyses that the mean value of mental health of girls is more in comparison to boys.

Index Terms- Home environment, mental health, higher secondary school students

I. INTRODUCTION

Mental health is perceived as a positive source contributing to asset development individually, socially, and economically (WHO, 2004). The World Health Organization conceptualized mental health separate from mental ill-health and defined the concept as: a state of well-being in which the individual realizes his or her own abilities, can cope with the normal stresses of life, can work productively and fruitfully, and is able to make a contribution to his or her own community. Better mental health outcomes in adolescents are characterized by greater adaptation in family, society, and school environment, improved quality of life (Hoagwood et al., 1996; USDHHS, 1999). The rise in mental health issues in adolescents is a growing concern in the school and for the community counsellors, and educators. Research has revealed an increasing incidence of depression and other mental health issues among youth (U.S. Department of Health and Human Services, 1999, Cash, 2003). As the aim of education is to provide healthy personality for individuals and one of the important ingredients of education, the role of mental health is crucial not only in formal education centers but also, in informal education—such as family and societies. Various studies have been carried out in different parts of the world to identify factors that impact on students’ mental health since poor mental health has been recognised as the leading cause of suicidal behaviour, a sense of helplessness (Kay, Li, Xiao, Nokkaew & Park, 2009) and lower academic achievements (Puskar & Bernardo, 2007). According to previous studies, factors that influence mental health are demographic backgrounds such as age and gender (Yen, Hsu, Liu, Huang, Ko, Yen & Cheng, 2006), academic field and academic year (Dahlin, Joneberg, & Runeson, 2005), personality traits (Goodwin & Friedman, 2006) and loneliness (Wang, Yuen & Slaney, 2009) Human mental health has not been a focus of attention until the beginning of the 20th century with the formation of Mental Hygiene Movement by Clifford Beers in 1908 (Turner 1971).

Home environment is the most important institution for the existence and continuance of human life and the development of various personality traits. An ideal home environment is one where there is proper reward to strengthen the desired behavior, a keen interest in and love for the child, provision of opportunities to express its views freely, where parents put less restrictions to discipline the child, not preventing the child from acting independently and not continuing infantile care, optimum use of physical and affective punishment, where the children are not compelled to act according to parental desires and expectations. Studies show that high parental involvement leads to high achievement and low parental involvement leads to low achievement (Ahuja and Goyal 2005). Family being the first and major agency of socialization plays a pivotal role in styling child’s life. It has been shown that most of children who are successful and well adjusted come from families where wholesome relationships exist between children and their parents. Parental involvement is much more likely to promote adolescent school success when it occurs in the context of an authoritative home environment (Steinberg et al. 1992). Parental acceptance and encouragement are positively related with academic school success and competence (Lakshmi and Arora 2006). Daulta (2008) studied the impact of home environment on the scholastic achievement of children and found that good quality of home environment had significant positive correlation with ‘high’ level of scholastic achievement in boys than among girls. Shek (1997) has found that family factors play an important role in influencing the psychosocial adjustment, particularly the positive mental health, of Chinese adolescents. Whether parents are involved in and support their adolescents’ school life can directly affect their personal and social development as well as their academic success (Gecas & Schwalbe, 1986; Harris & Goodall, 2008; Jeynes, 2007). Indeed, a substantial body of literature documents the existence of such a relationship (Christenson, Rounds & Gorney, 1992; Epstein, 1992; Izzo et al., 1999; Keith et al., 1998). Kim’s (2002) research findings indicate that parental involvement makes a positive contribution to children’s educational achievement. Epstein (1992) argues that “students at all grade levels do better academic work and have
more positive school attitudes, higher aspirations, and other positive behaviors if they have parents who are aware, knowledgeable, encouraging, and involved”

II. OBJECTIVES OF THE STUDY
1. To find significant sex differences in mental health among secondary school students.
2. To find significant differences in mental health among secondary school students with good and poor home environment.
3. To find significant differences in mental health among secondary school students with high and low academic achievement.
4. To find significant interaction between sex and home environment among secondary school students with mental health as dependent variable.
5. To find significant interaction between sex and academic achievement among secondary school students with mental health as dependent variable.
6. To find significant interaction between home environment and academic achievement among secondary school students with mental health as dependent variable.
7. To find significant interaction among sex, home environment and academic achievement among secondary school students with mental health as dependent variable.

III. HYPOTHESIS OF THE STUDY
1. There will be no significant sex differences in mental health among secondary school students.
2. There will be no significant differences in mental health among secondary school students with good and poor home environment.
3. There will be no significant differences in mental health among secondary school students with high and low academic achievement.
4. There will be no significant interaction between sex and home environment among secondary school students with mental health as dependent variable.
5. There will be no significant interaction between sex and academic achievement among secondary school students with mental health as dependent variable.
6. There will be no significant interaction between home environment and academic achievement among secondary school students with mental health as dependent variable.
7. There will be no significant interaction among sex, home environment and academic achievement of secondary school students with mental health as dependent variable.

IV. METHOD
Home Environment Inventory developed and validated by Dr. Karuna Shankar Misra Prof. & head, department of Education, Allahabad University, Allahabad. The Home Environment Inventory is an instrument designed to measure the psychosocial climate of home as perceived by children. It provides a measure of the quality and quantity of the cognitive, emotional and social support that has been available to the child within the home. HEI has 100 items belonging to ten dimensions of home environment. The ten dimensions are (A) control, (B) Protective (C) Punishment (D) Conformity (E) Social isolation (F) Reward (G) Deprivation of privileges (H) Nurturance (I) Rejection and (J) Permissiveness. Each dimension has ten items belonging to it. The instruments requires pupils to tell the frequency with which a particular parent –child interaction behaviour has been observed by them in their homes i.e. he/she is requested to tell whether a particular parental behavior (as mentioned in an item) occurs- ‘Mostly’, ‘often’, ‘sometimes’, ‘least’, and ‘never,’. There are five cells belong to five responses. Assign 4 marks to ‘Mostly’, 3 marks to ‘often’, 2 marks to ‘sometimes’, 1 mark to ‘least’, and 0 mark to ‘never’ responses. Count the marks assigned to A, B, C, D, E, F, G, H, I, J, and J dimension. There is no time limit for this tool, but on an average participant took 30 minutes to complete the tool.

V. MENTAL HEALTH BATTERY (MHB)
In the study the investigator employed English version of Mental Health Battery which was developed and validated by Arun Kumar Singh and Alpana Sen Gupta (1971). MHB intends to assess the status of mental health of persons in the age range of 13 to 22 years. As it is a battery of six tests. There are set of 130 items in the MHB with six dimensions emotional stability (ES), over all adjustment (OA), Autonomy (AY), security – Insecurity (SI), self -concept (SC) and Intelligence (IG) this battery is satisfactorily reliable and valid.

VI. ACADEMIC ACHIEVEMENT
In the present investigation academic achievement constitutes the aggregate marks obtained by the subjects in their 10th class examination.

VII. POPULATION
In the present study the students studying in class XII of higher secondary schools located in the Jammu City constitute the population and a representative sample from this population has been selected by the investigator. The sample of the present investigation was drawn from five schools located in Jammu city. The total sample of the students in the present research is 300 consisting of 150 boys and 150 girls.

VIII. RESULT
Table displays the results of our comparison

<table>
<thead>
<tr>
<th>Source of Variation</th>
<th>SS</th>
<th>df</th>
<th>MS</th>
<th>F = MS/df</th>
<th>Significant</th>
</tr>
</thead>
</table>

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Perusal of table 1 revealed that the value of F for the variable of sex is 2.8 which is significant at 0.01 level of significance for df 1 and 72. It can thus be said, that there are significant sex differences in mental health among secondary school students. Furthermore, table 2 revealed that girls more mentally healthy in comparison to boys. The results were in line with Sanwal et. al (2006) who inferred that girls were mentally healthier than boys as they have more patience, tolerance and were better adjusted than boys.

Hence the hypothesis that there will be no significant sex differences in mental health among secondary school students was rejected.

Review of table also revealed that value of F for Home Environment is 0.9 which is insignificant at 0.05 level of significance for df 1 and 72. It can thus be said, that there are insignificant differences in mental health among secondary school students with good and poor home environment. Hence the hypothesis that there are no significant differences in mental health among secondary school students with good and poor home environment was accepted. Shrivastava and Sharma revealed that healthy and good parent child relationship in the family greatly influences the mental health of adolescents in various aspects.

Review of table 1 also revealed that value of F for the variable Academic Achievement is 0.54 which is insignificant at 0.05 level of significance for df 1 and 72. It can thus be said, that there are insignificant differences in mental health among secondary school students with high and low academic achievement. Hence the hypothesis that there will be no significant differences in mental health among secondary school students with high and low academic achievement was accepted. Results of the study are in contrast to the study conducted by Kasinath (2003) who revealed that there is a significant effect of mental health on academic achievement.

Review of table 1 also revealed that value of F for the interaction between sex and home environment with mental health as the dependent variable is 0.07 which is insignificant at 0.05 level of significance for df 1 and 72. It means the variable of home environment and sexes are independent of each other with mental health as the dependent variable among hr.secondary school students. Hence the hypothesis that there will be no significant interaction between sex and home environment among secondary school students with mental health as dependent variable was accepted.

Again review of table 1 revealed that value of F for the interaction between sex and academic achievement is 1.37 which is insignificant at 0.05 level of significance. It means that sex and academic achievement are independent of each other with mental health as the dependent variable among hr. secondary school students. Hence the hypothesis that there will be no significant interaction between sex and academic achievement among secondary school students with mental health as dependent variable was accepted. Thus, the results were not in conformity with Yousefi (2010) and Fergussan and Harwood (1997) who there is a significant impact of home environment and sex on mental health.

Furthermore, review of table 1 revealed that value of F for the interaction between home environment and academic achievement is 0.06 which is insignificant at 0.05 level of significance. It means the variable of home environment and academic achievements are independent of each other with mental health as the dependent variable among secondary school students. Hence the hypothesis that there is no significant interaction between home environment and academic achievement among secondary school students with mental health as dependent variable is accepted. Muola, J.M reveals that academic achievement of the individual to some extend dependent on the nature of their home environment.

Review of table 1 revealed that value of F for the interaction among sex, home environment and academic achievement is 1.05 which is insignificant at 0.05 level of significance. It means the variable of home environment, sex and academic achievements are independent of one another with mental health as the dependent variable among hr. secondary school students. Hence the hypothesis that there will be no significant interaction among sex, home environment and academic achievement among hr. secondary school students with mental health as dependent variable was accepted.
IX. CONCLUSION

The main purposes of the present study was to see the impact of home environment, academic achievement on mental health of hr. secondary school students. Maintaining a healthy attitude involves not only the physical health, psychological development, the shape of the good moral character and the cultivation of the perfect personalities of majorities of students but also the overall quality of the talents, for the full realization of higher education goals and the smooth progress of modernization construction and progressive development of society. This is important since previous studies indicate that poor mental health status have a negative effect on students’ academic performance (Puskar & Bernardo, 2007), and promote negative behaviour and hopelessness (Kay et al., 2009). Rohner and Britner’s (2002) longitudinal evidence reveals that parental rejection tends everywhere to precede the development of a variety of mental health problems, such as depression and depressed affect, conduct problems and behavior disorders, and substance abuse. Therefore, this information is important to community counsellors, teachers, school counsellors, and parents; all of whom are concerned with both the academic and social-spiritual development of children, and with the climate of children’s learning environment. given area of learning or in other words, achievement is reflected by the extent to which skill and knowledge has been imparted to him. Academic achievement also denotes the knowledge attained and skill developed in the school subject, usually designed by test scores. The level of achieving is how far a student succeeds in a particular exam or standardized test (Reber, 1985).

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Agent Based Architecture in Distributed Data Warehousing

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Abstract- The distributed data warehousing is mainly based on how the data is used in the dynamic data distribution on a set of servers. Currently Query cycling process is used in distributed data warehousing for searching the relevant information from a large database. In this Process of query cycling, if the searching query is not in the required data mart then this agent will automatically redirects that request to the other data marts for searching queries, until it found. But the network load and execution time is more and the data management also needs the collaboration and interaction between the machines in order to reply the user queries. So in our approach we will use multi agent based architecture in distributed DWH. The data distribution is different from the classical one which depends on the data use. The distribution consists in distributing data when the server reaches its maximum storage capacity limit. And we will use an individual buffer for storage of results. Now, Client has no need to be connected with dispatcher all the time to get result. The result will be stored in its own buffer by dispatcher.

Index Terms- Data warehousing, dynamic distribution, Data access, Multi-agent System, Query cycling process

I. INTRODUCTION

In distributed database, the Individual data marts are built, managed, and maintained flexibly in distributed data warehousing. However, the data mart does not solve the problems of storage space and performance. It is stand-alone and has data integration problems in a global data warehouse context [9]. Also, the performance of many distributed queries is normally poor, mainly due to the load balance problems. Also individual data mart are designed and tuned to answer the queries related to its own subject area, whereas the response to global queries depends on the global system tuning and the network speed. The Complexity of the global schema remains a big problem in distributed data warehousing.

To solve this problem of complexity, we use multi agent based architecture in distributed data warehouse. It will also facilitate the collaboration, interaction and independency of the different machines and to improve the parallel execution of the user queries. In this case, the distribution consists in distributing data when the server reaches its storage capacity limit. This distribution assures the scalability and exploits the storage and processing resources available in the organization using the data warehouse. The materialized views and indexes will be used on each individual machine that must be tuned and optimized for performance. Our work aims is 1) to develop a dynamic system that can manage the DWH automatically, 2) taking advantage of the storage and processing resources available in the organization, 3) Reduce the network load, 4) improve the query response time, 4) use of individual buffer for client, therefore no need to be connected with dispatcher all the time to get result.

This paper is organized as follows: Sect. 2, gives the information about our finding related to multi agent based architecture and distributed data warehouse. In sect. 3, we will show our experimental results related to our work. In sect. 4, we mention the reviews that we have got. In sect 5, we will improve our work. Finally, in sect. 6, a conclusion is made.

II. RESEARCH ELABORATIONS

Data Warehousing is a collection of decision support technologies, aimed at enabling the knowledge worker to make better and fast decisions [3]. Centralized databases are very expensive due to its large set-up cost and are very flexible due to its centralized nature [9]. Making data marts was the first attempt to solve the problem of space and performance. Distributed data warehouse represents the enterprise DW but has smaller data stores that are built separately and merged physically over a network, providing users with access to relevant reports without impacting performance. But Data marts are basically stand alone and have data integration problems in global data warehouse context. An overview of distributed data warehousing and OLAP technologies [3], describes the back end tools for extracting, cleaning and loading the data into a data warehouse, and the front end client tools for querying and data analysis. An Efficient Approach for Data Placement in Distributed Systems [6], explains different types of fragmentation. Fragment allocation is a distribution design technique to improve the system performance by reducing the total query costs [6]. The allocation problem involves finding an optimal distribution of fragments to sites. DWS-AQA: A Cost Effective Approach for Very Large Data Warehouses [7], provide the technique data warehouse striping with approximate query. This focuses on query redirection process in distributed system. This operation is done when the query optimizer determines that a materialized view or other table processing a query request with less overhead than the requested table. The query redirection process determines which table delivers the answers effectively. A scalable architecture handles very large amount of data but also to assure interactive response time to the users. Agent based data storage and distribution in data warehouses [8], the used data distribution technique is different from the “classical” one which depends on data use. The distribution in this approach consists in distributing the data when server reaches its storage capacity limit. The proposed multi-agent model is composed of stationary agent
classes: Client, Dispatcher, Domain and server, and a mobile agent class called manager. These agents collaborate and achieve automatically the storage, splitting operation and the distributed data warehousing. But we also find that the client has to connect to dispatcher all the item to get the result back. This is also the disadvantage of this approach. So with reference to the above mentioned issues we are going to focus on a query cycling process using multi agent based architecture in the distributed DWH and will limit the above problems also.

III. PROPOSED METHOD

The query cycling agent will play an important role here. Cycling is the process of diverting a data from their normal destination to another one i.e. if the searching query is not in the required data mart then this agent is automatically send that request to the other data marts for searching queries, until it found. Using multi agent system the network loads and the execution time is decreased. Iteration agent is used to maintain that how many times the requested queries is to be recycle.

And also it facilitates the collaboration, interaction and independency of the different machines and to improve the parallel execution of the user queries.

Fig. 2 shows the proposed multi agent based architecture in distributed data warehousing. The Client agents act as an interface between the user and the DWH management system (Dispatcher agent). The users send the data storage and the data access queries to the Dispatcher agent. Client knows with which it can communicate and how to interact and cooperate with other agents. Its static knowledge is made up of its name and its address. This agent class does not have a dynamic knowledge.

As in existing approach in multi agent systems, the Dispatcher agent arranges the received operations according to their arrival order. These operations will be treated by the Messenger agent. When the Dispatcher agent receives the operation results from the Messenger agents, the Dispatcher can send the result to client only if client is connected otherwise; the result is stored in dispatcher’s queue until the client will be connected again. Also if the queue is full then the result of the searched query which is arriving from the dispatcher agent will overflow.

Dispatcher agent has two queues. The first queue is used to store operations received from the Client agents. The second one is used to store the results provided by the Messenger agents. Then, the Dispatcher agent sends these results to the buffer of sending Client agent. So in our approach, there will be an individual buffer for client in multi agent system. Each client agent has its own buffer. This buffer is used to store a result of the searched queries which is received by the dispatcher agent. Now, Client has no need to be connected with dispatcher all the time to get result. The result will be stored in its own buffer by dispatcher.

The Messenger agents execute each operation found in the operations waiting queue of the Dispatcher agent. Each Messenger agent makes the execution plan of this operation. Then, it visits all the Domain agents concerned with this operation. The domain agents are responsible for sending the operations to the server agents which they control. Then they collect the replies sent by the server agents and transmit the final result to the messenger agent. It contains two queues. The first queue is used to store the operations brought by the messenger agents. The second one is used to store the replies sent by the server agents.

The splitting operation will start when the machine reaches its storage capacity limit [8]. The role of this agent consists of the following steps. First, it creates a new Domain agent when it receives a splitting request. Then, it informs the Domain agent, asking for splitting of the location and the characteristics of the new one. Finally, it sends to the Dispatcher agent the new information concerning the two Domain agents in order to update the Domain agents list. The Splitting agent has as acquaintances the Dispatcher agent and the Domain agents that ask for splitting. Its static knowledge consists of its name and its address. Its dynamic knowledge is the list of splitting requests sent by the Domain agents.

The Meta base can be managed by the domain agents. It manages the data distribution on the domain agents, the network status, and the messenger agents load rate. This Meta base is also used by the messenger agents to make the execution plans of the received operations and determine the domain agents to visit. The splitting agent also used for updating it at the end of each splitting operation by Meta base.

**Query Cycling Processor Agent:**

In fig.1, there are different data marts. The query cycling agent will play an important role here. Cycling is the process of diverting a data from their normal destination to another one i.e. if the searching query is not in the required data mart then this agent is automatically send that request to the other data marts for searching queries, until it found.
IV. RESULTS

In this section, experimental results have been shown in the form of screen shots. Snapshots shows that the given input field data have been searched in the Datamart1 and produce the output. If the result is not found then it will send it to the next Datamarts2 and 3 respectively. We can search data by query or by attribute name as shown in fig.3. Finally it searched all the Data marts and produces the results is shown in the Figures.
V. CONCLUSION

The overview of data warehousing and multi agent based architecture in it were discussed. We have presented some researches that deal with the data distribution in the data warehousing context and the multi agent based systems. We discussed about the existing problem and our proposed method for that problem. We described here is multi agent based system based query cycling process in distributed DWH and also remove the disadvantage of multi agent approach by placing an buffer, so that there will be no need for client to connect at all the time to get the results. Now it is not connected approach. Buffer will be on client side. This architecture ensures high performance to dynamic content applications even during overload conditions such as those during time-of-day effects. We have concentrated only on query cycling agent and an iteration agent in distributed data warehousing and limit some disadvantages of this architecture. In future we can implement the remaining agents which we can propose in our system.

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Measurement Disturbs Explanation of Quantum Mechanical States-A Hidden Variable Theory

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Abstract- A system of ‘measurements’ dissipating explanation of quantum mechanical states’ and parallel system of’ quantum mechanical states ‘that contribute to the dissipation of the velocity of’ measurements’ done of the’ quantum mechanical states’ is investigated. It is shown that the time independence of the contributions portrays another system by itself and constitutes the equilibrium solution of the original time independent system. With the methodology reinforced with the explanations, we write the governing equations with the nomenclature for the systems in the foregoing. Further papers extensively draw inferences upon such concatenation process, ipso facto, fait accompli desideratum. It is our thesis that accentuation and dissipation coefficients themselves are hidden variables that manifest the reality from perception.

Index Terms- Bells Inequality, Copenhagen Interpretation, Quantum Superposition, EPR Paradox, Uncertainty Principal

I. INTRODUCTION

Quantum entanglement occurs when particles such as photons, electrons, molecules as large as "bucky balls", and even small diamonds interact physically and then become separated; the type of interaction is such that each resulting member of a pair is properly described by the same quantum mechanical description (state), which is indefinite in terms of important factors such as position, momentum, spin, polarization, etc.

According to the Copenhagen interpretation of quantum mechanics, their shared state is indefinite until measured. Quantum entanglement is a form of quantum superposition. When a measurement is made and it causes one member of such a pair to take on a definite value (e.g., clockwise spin), the other member of this entangled pair will at any subsequent time be found to have taken the appropriately correlated value (e.g., counterclockwise spin). Thus, there is a correlation between the results of measurements performed on entangled pairs, and this correlation is observed even though the entangled pair may have been separated by arbitrarily large distances.

This behavior is consistent with quantum mechanical theory and has been demonstrated experimentally, and it is accepted by the physics community. However, there is some debate about a possible underlying mechanism that enables this correlation to occur even when the separation distance is large. The difference in opinion derives from espousal of various interpretations of quantum mechanics.

The counterintuitive predictions of quantum mechanics about strongly correlated systems were first discussed by Albert Einstein in 1935, in a joint paper with Boris Podolsky and Nathan Rosen. In this study, they formulated the EPR paradox; a thought experiment that attempted to show that quantum mechanical theory was incomplete. They wrote:

We are thus forced to conclude that the quantum-mechanical description of physical reality given by wave functions is not complete.

So, despite the interest, the flaw in EPR's argument was not discovered until 1964, when John Stewart Bell demonstrated precisely how one of their key assumptions, the principle of locality, conflicted with quantum theory. Specifically, he demonstrated an upper limit, known as Bell's inequality, regarding the strength of correlations that can be produced in any theory obeying local realism, and he showed that quantum theory predicts violations of this limit for certain entangled systems. His inequality is experimentally testable, and there have been numerous relevant experiments, starting with the pioneering work of Freedman and Clauser in 1972 and Aspect's experiments in 1982. They have all shown agreement with quantum mechanics rather than the principle of local realism. However, the issue is not finally settled, for each of these experimental tests has left open at least one loophole by which it is possible to question the validity of the results.

The work of Bell raised the possibility of using these super strong correlations as a resource for communication. It led to the discovery of quantum key distribution protocols, most famously BB84 by Bennett and Brassard and E91 by Artur Ekert. Although BB84 does not use entanglement, Ekert's protocol uses the violation of a Bell's inequality as a proof of security. Other words, violation of bells inequality produces or implies insecurity.

II. CONCEPT

Quantum systems can become entangled through various types of interactions (see section on methods below). If entangled, one object cannot be fully described without considering the other(s). They remain in a quantum superposition and share a single quantum state until a measurement is made. An example of entanglement occurs when subatomic particles decay into other particles. These decay events obey the various conservation laws, and as a result, pairs of particles can be generated so that they are in some specific quantum states. For instance, a pair of these particles may be generated having a two-state spin: one must be spin up and the other must be spin down. This type of entangled pair, where the particles always have opposite spin, is known as the spin anti-correlated case, and if the probabilities for measuring each spin are equal, the pair is said to be in the singlet state.
If each of two hypothetical experimenters, Alice and Bob, has one of the particles that form an entangled pair, and Alice measures the spin of her particle, the measurement will be entirely unpredictable, with a 50% probability of the spin being up or down. But if Bob subsequently measures the spin of his particle, the measurement will be entirely predictable—always opposite to Alice's, hence perfectly anti-correlated.

So far in this example experiment, the correlation seen with aligned measurements (i.e., up and down only) can be simulated classically. To make an analogous experiment, a coin might be sliced along the circumference into two half-coins, in such a way that each half-coin is either “heads, and each half-coin put in a separate envelope and distributed respectively to Alice and to Bob, randomly. If Alice then "measures" her half-coin, by opening her envelope, for her the measurement will be unpredictable, with a 50% probability of her half-coin being "heads" or "tails", and Bob's "measurement" of his half-coin will always be opposite, hence perfectly anti-correlated.

However, with quantum entanglement, if Alice and Bob measure the spin of their particles in directions other than just up or down, with the directions chosen to form a Bell's inequality, they can now observe a correlation that is fundamentally stronger than anything that is achievable in classical physics. Here, the classical simulation of the experiment breaks down because there are no "directions" other than heads or tails to be measured in the coins. One might imagine that using a die instead of a coin could solve the problem, but the fundamental issue about measuring spin in different directions is that these measurements cannot have definite values at the same time—they are incompatible. In classical physics this does not make sense, since any number of properties can be measured simultaneously with arbitrary accuracy. Bell's theorem implies, and it has been proven mathematically, that compatible measurements cannot show Bell-like correlations, and thus entanglement is a fundamentally non-classical phenomenon.

Experimental results have demonstrated that effects due to entanglement travel at least thousands of times faster than the speed of light. In another experiment, the measurements of the entangled particles were made in moving, relativistic reference frames in which each respective measurement occurred before the other, and the measurement results remained correlated.

III. ENTANGLEMENT, NON-LOCALITY AND HIDDEN VARIABLES

There is much confusion about the meaning of entanglement, non-locality and hidden variables and how they relate to each other. As described above, entanglement is an experimentally verified and accepted property of nature. Non-locality and hidden variables are two proposed mechanisms that enable the effects of entanglement.

If the objects are indeterminate until one of them is measured, then the question becomes, "How can one account for something that was at one point indefinite with regard to its spin (or whatever is in this case the subject of investigation) suddenly becoming definite in that regard even though no physical interaction with the second object occurred, and, if the two objects are sufficiently far separated, could not even have had the time needed for such an interaction to proceed from the first to the second object?" The answer to the latter question involves the issue of locality, i.e., whether for a change to occur in something the agent of change has to be in physical contact (at least via some intermediary such as a field force) with the thing that changes. Study of entanglement brings into sharp focus the dilemma between locality and the completeness or lack of completeness of quantum mechanics.

In the media and popular science, quantum non-locality is often portrayed as being equivalent to entanglement. While it is true that a bipartite quantum state must be entangled in order for it to produce non-local correlations, there exist entangled states that do not produce such correlations. A well-known example of this is the Werner state that is entangled for certain values of the parameters of the state, but can always be described using local hidden variables. In short, entanglement of a two-party state is necessary but not sufficient for that state to be non-local. It is important to recognize that entanglement is more commonly viewed as an algebraic concept, noted for being a precedent to non-locality as well as to quantum teleportation and to super dense coding, whereas non-locality is defined according to experimental statistics and is much more involved with the foundations and interpretations of quantum mechanics.

IV. METHODS OF CREATING ENTANGLEMENT

Entanglement is usually created by direct interactions between subatomic particles. These interactions can take numerous forms. One of the most commonly used methods is spontaneous parametric down-conversion to generate a pair of photons entangled in polarisation. Other methods include the use of a fiber coupler to confine and mix photons, the use of quantum dots to trap electrons until decay occurs, the use of the Hong-Ou-Mandel effect, etc. In the earliest tests of Bell's theorem, the entangled particles were generated using atomic cascades.

It is also possible to create entanglement between quantum systems that never directly interacted, through the use of entanglement swapping.

It is to be remembered that all major theories GTR, STR, QM, QFT, uncertainty principal deal with a set of variables and a system that is dealt with. Conservation of mass and energy holds holistically notwithstanding preservation of individual interactions.

In his celebrated paper Adolf Haimovici (1), studied the growth of a two species ecological system divided on age groups. In this paper, we establish that his processual regularities and procedural formalities can be applied for consummation of a system of measurement and explanation of quantum mechanical system.

Axiomatic predications of systemic dynamics in question are essentially “laws of accentuation and dissipation”. It includes once over change, continuing change, process of change, functional relationships, predictability, cyclical growth, cyclical fluctuations, speculation theory, cobweb analyses, stagnation thesis, perspective analysis etc. Upshot of the above statement is data produce consequences and consequences produce data.

V. EXPLANATION OF QUANTUM MECHANICAL REALITY

ASSUMPTIONS:
Explanations of “quantum mechanical systems” are divided in to three categories:

1) Category one constituting explanations tended in respect of quantum mechanical systems under practically suitable classificatory category

2) Category 2 which belong to higher age than that of category 1

3) Category three representative and constitutive of that category which has quantum mechanical systems of higher category. There however is no sacrosanct time scale.

In this connection, it is to be noted that there is no sacrosanct time scale as far as the above pattern of classific ation is concerned. Any operationally feasible scale with an eye on measurements made for the corresponding category of quantum mechanical systems would be in the fitness of things. For category 3. “Over and above” nomenclature could be used to encompass a wider range of consumption due to cellular respiration. Similarly, a “less than” scale for category 1 can be used.

NOTATION :

\( g_{20} \): Quantum of explanations of quantum mechanical reality corresponding to the consummation of category 1 of measurements done of the quantum mechanical systems

\( g_{22} \): Quantum of explanations of quantum mechanical systems under the category of 2

\( g_{23} \): Quantum of explanations under category3 corresponding to measurements in the category 3.

\( (a_{24})^{(a)}, (a_{25})^{(a)}, (a_{26})^{(a)} \) : Accentuation coefficients

\( (a_{24})^{(d)}, (a_{25})^{(d)}, (a_{26})^{(d)} \) : Dissipation coefficients

FORMULATION OF THE SYSTEM :

In the light of the assumptions stated in the foregoing, we infer the following:-

(a) The speed of growth of system of explanations tendered done under the category1 is dependent upon the quantum mechanical reality as espoused under category2. In essence the accentuation coefficient in the model is representative of the constant of proportionality between category 1 and category 2 this assumptions is made to foreclose the necessity of addition of one more variable, that would render the systemic equations unsolvable

(b) The dissipation in all the three categories is attributable to the following two phenomenon :

1) Aging phenomenon: The aging process leads to transference of the balance of number of explanations or studies expatiated under category 1 to the next category, no sooner than the age of such expatiations enucleations of the chosen quantum mechanical system crosses the boundary of demarcation

2) Depletion phenomenon: Destruction of that particular quantum mechanical system under the study dissipates the growth speed by an equivalent extent. To put it in unmistakable terms, the system under study is “dead” for whatever be the reasons attributed and ascribed for it.

Model makes allowance for the new quantum mechanical explanations of various substances or chemical compounds be it heavy or lighter and deceleration in the quantum mechanical systemal explanations attributable and ascribable to ‘drying up’ or loss of
GOVERNING EQUATIONS:

The differential equations governing the above system can be written in the following form

\[
\frac{dG_{24}}{dt} = \left( a_{24} \right)^{(4)} G_{24} - \left( a_{14} \right)^{(4)} G_{24}
\]

\[
\frac{dG_{28}}{dt} = \left( a_{28} \right)^{(4)} G_{28} - \left( a_{18} \right)^{(4)} G_{28}
\]

\[
\frac{dG_{32}}{dt} = \left( a_{32} \right)^{(4)} G_{32} - \left( a_{12} \right)^{(4)} G_{32}
\]

\[
\left( a_{24} \right)^{(4)} > 0, \quad t = 24, 25, 26
\]

\[
\left( a_{28} \right)^{(4)} > 0, \quad t = 24, 25, 26
\]

\[
\left( a_{28} \right)^{(4)} < \left( a_{24} \right)^{(4)}
\]

\[
\left( a_{32} \right)^{(4)} < \left( a_{28} \right)^{(4)}
\]

We can rewrite equation 1, 2 and 3 in the following form

\[
\frac{dG_{24}}{(a_{24})^{(4)} G_{24} - (a_{14})^{(4)} G_{24}} = dt
\]

\[
\frac{dG_{28}}{(a_{28})^{(4)} G_{28} - (a_{18})^{(4)} G_{28}} = dt
\]

Or we write a single equation as

\[
\frac{dG_{24}}{(a_{24})^{(4)} G_{24} - (a_{14})^{(4)} G_{24}} = \frac{dG_{28}}{(a_{28})^{(4)} G_{28} - (a_{18})^{(4)} G_{28}} = \frac{dG_{32}}{(a_{32})^{(4)} G_{32} - (a_{12})^{(4)} G_{32}} = dt
\]

The equality of the ratios in equation (10) remains unchanged in the event of multiplication of numerator and denominator by a constant factor.

For constant multiples \( \alpha, \beta, \gamma \) all positive we can write equation (10) as

\[
\frac{dG_1}{\alpha(G_{24})^{(4)} G_{24} - (a_{14})^{(4)} G_{24}} = \frac{dG_2}{\beta(G_{28})^{(4)} G_{28} - (a_{18})^{(4)} G_{28}} = \frac{dG_3}{\gamma(G_{32})^{(4)} G_{32} - (a_{12})^{(4)} G_{32}} = dt
\]

The general solution of the consumption of oxygen due to cellular respiration system can be written in the form

\[
\alpha G_1 + \beta G_2 + \gamma G_3 = C_{24} C_{28} C_{32} G
\]

Where \( t = 24, 25, 26 \) and \( C_{24}, C_{28}, C_{32} \) are arbitrary constant coefficients.

STABILITY ANALYSIS:

Supposing \( G_1(0) = G_2(0) = G_3(0) > 0 \), and denoting by \( \lambda_1 \) the characteristic roots of the system, it easily results that

1. If \( \left( a_{24} \right)^{(4)} \left( a_{28} \right)^{(4)} - \left( a_{14} \right)^{(4)} \left( a_{18} \right)^{(4)} > 0 \) all the components of the solution, ie all the three parts of the expatiations or expositions of the quantum mechanical reality of quantum mechanical systems tend to zero, and the solution is stable with respect to the initial data.

2. If \( \left( a_{24} \right)^{(4)} \left( a_{28} \right)^{(4)} - \left( a_{14} \right)^{(4)} \left( a_{18} \right)^{(4)} < 0 \) and

\[
\left( a_{24} \right)^{(4)} \left( a_{28} \right)^{(4)} G_{24} - \left( a_{14} \right)^{(4)} G_{24} > 0, \quad \left( a_{28} \right)^{(4)} < 0
\]

the first two components of the solution tend to infinity as \( t \to \infty \), and \( G_{32} \to 0 \).
ie. The category 1 and category 2 parts grows to infinity, whereas the third part category 3 tends to zero.

3. If \[ \frac{(c_{23})^{(4)}}{(c_{22})^{(4)}}(c_{22})^{(4)} - (c_{23})^{(4)} < 0 \] and \[ \frac{(c_{22})^{(4)}}{(c_{23})^{(4)}}(c_{22})^{(4)} = 0 \] Then all the three parts tend to zero, but the solution is not stable i.e. at a small variation of the initial values of \( y \), the corresponding solution tends to infinity.

On the other hand, away from “equilibrium”, the “fluxes” could be more emphasized. Result is increase in “entropy”. When this occurs, the system no longer tends towards equilibrium. On the contrary, it may encounter instabilities that culminate into newer orders that move away from equilibrium. Thus, dissipative structures revitalize and resurrect complex forms away from equilibrium state.

From the above stability analysis we infer the following:

1. The adjustment process is stable in the sense that the system of measurements converges to equilibrium.
2. The approach to equilibrium is a steady one, and there exists progressively diminishing oscillations around the equilibrium point.
3. Conditions 1 and 2 are independent of the size and direction of initial disturbance.
4. The actual shape of the time path of measurement-explanation of quantum mechanical systems is determined by efficiency parameter, the strength of the response of the portfolio in question, and the initial disturbance.
5. Result 3 warns us that we need to make an exhaustive study of the behavior of any case in which generalization derived from the model do not hold.
6. Growth studies as the one in the extant context are related to the systemic growth paths with full employment of resources that are available in question, in the present case quantum mechanical reality-measurement system.

**MEASUREMENTS**

**Assumptions:**

are classified into three categories analogous to the stratification that was resorted to in description or explanation of quantum realities as Einstein put it. Measurements are also transferred from one category to another corresponding to the quantum mechanical study (such transference is attributed to the aging process of ‘measurements’ from that category apparently would have become dissociation in the corresponding category, because we are in fact classified quantum mechanical systems and concomitant reals of quantum systemal realities’

(1) Category 1 is representative of measurements of quantum mechanical systems corresponding to quantum mechanical realities expatiated of the systems under category 1.

(2) Category 2 constitutes those ‘measurements’ whose age is higher than that specified under the head category 1 and is in correspondence with the similar classification of ‘quantum mechanical systems of various compounds, chemicals, or elements’.

(3) Category 3 of ‘measurements’ encompasses those with respect to category 3 of ‘quantum mechanical systems’ and concomitant vis-à-vis ‘quantum mechanical realities’.

a) The speed of growth of ‘measurements’ or ‘measurement files’ in category 1 is a linear function of the amount of measurement files under category 2 at the time of reckoning. As before the accentuation coefficient that characterizes the speed of growth in category 1 is the proportionality factor between balance in category 3 and category 2.

b) The dissipation coefficient in the growth model is attributable to two factors;

1. With the progress of time ‘measurements’ or ‘measurement files’ sector gets aged due to aging process of the quantum mechanical system under consideration and become eligible for transfer to the next category. Notwithstanding Category 3 does not have such a provision for further transference.

2. Whenever there is destruction and obliteration of those quantum mechanical systems and corresponding quantum mechanical realities, there shall be deceleration of the dissipation coefficient of the ‘measurements files’ of the quantum mechanical systems. It is to be noted that here we are talking of the ‘measurement file’ section and not of the ‘quantum mechanical reality case study'
c) Inflow into category 2 is only from category 1 in the form of transfer of balance from the category 1. This is evident from the age wise classification scheme. As a result, the speed of growth of category 2 is dependent upon the amount of inflow, which is a function of the quantum of balance of under the category 1.

d) The balance of ‘measurement’ portfolio in category 3 is because of transfer of balance from category 2. It is dependent on the amount of ‘measurements’ or ‘number of measurements’ of the quantum mechanical cases under consideration sector under category 2.

NOTATION:

\( T_{21} \) : Balance standing in the category 1 of ‘measurement numbers’

\( T_{22} \) : Balance standing in the category 2 of ‘measurement of quantum mechanical systems’

\( T_{32} \) : Balance standing in the category 3 of ‘measurements’ of corresponding quantum mechanical systems and constitutive of the amount of inflow from the category 2

\( (b_{21})^{(a)} \), \( (b_{22})^{(a)} \), \( (b_{23})^{(a)} \), \( (b_{24})^{(a)} \), \( (b_{25})^{(a)} \), \( (b_{26})^{(a)} \) : Accentuation coefficients

\( (d_{21})^{(a)} \), \( (d_{22})^{(a)} \), \( (d_{23})^{(a)} \), \( (d_{24})^{(a)} \), \( (d_{25})^{(a)} \), \( (d_{26})^{(a)} \) : Dissipation coefficients

FORMULATION OF THE SYSTEM:

Under the above assumptions, we derive the following:

a) The growth speed in category 1 is the sum of two parts:
   1. A term \( + (b_{21})^{(a)} T_{21} \) proportional to the amount of balance in the category 2
   2. A term \( - (d_{21})^{(a)} T_{21} \) representing the quantum of ‘measurement files’ dissipated from category 1. This comprises of ‘measurements’ which have grown old, qualified to be classified under category 2 due to the corresponding growth in the ‘quantum mechanical systems’ classified earlier

b) The growth speed in category 2 is the sum of two parts:
   1. A term \( + (b_{22})^{(a)} T_{22} \) constitutive of the amount of inflow from the category 2
   2. A term \( - (d_{22})^{(a)} T_{22} \) the dissipation factor arising due to aging of ‘quantum mechanical systems under considerations’ and on account of destruction of such quantum mechanical systems of various elements, compounds, stars, galaxies etc.,

c) The growth speed under category 3 is attributable to inflow from category 2 and depletion due to obliteration or obfuscation of ‘quantum mechanical systems’. be it due to entanglement, or collision with photons etc.,

GOVERNING EQUATIONS:

Following are the differential equations that govern the growth in the ‘measurements file’ portfolio

\[
\frac{d(T_{21})}{dt} = (b_{21})^{(a)} T_{21} - (d_{21})^{(a)} T_{21}
\]

\[
\frac{d(T_{22})}{dt} = (b_{22})^{(a)} T_{22} - (d_{22})^{(a)} T_{22}
\]

\[
\frac{d(T_{23})}{dt} = (b_{23})^{(a)} T_{23} - (d_{23})^{(a)} T_{23}
\]

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Following the same procedure outlined in the previous section, the general solution of the governing equations is
\[ a^2 \dot{T}_1 + \beta T_1 + \gamma T_2 = C_t e^{\lambda t}, \quad t = 24, 25, 26 \]
where \( C_{t, 1}, C_{t, 2}, C_{t, 3} \) are arbitrary constant coefficients and \( \lambda \) corresponding multipliers to the characteristic roots of the system.

**MEASUREMENT-QUANTUM MECHANICAL SYSTEMAL EXPLANATIONS OR REALITIES-DUAL SYSTEM ANALYSIS**

We will denote

1) By \( T_1(\mathcal{G}_1, t = 24, 25, 26) \), the three parts of the 'measurements files' analogously to the \( \mathcal{G}_1 \) of the quantum mechanical systems under consideration.

2) By \( (\alpha^2)^{[c]}(\mathcal{T}_{12}, t) \), the contribution of the 'measurements' portfolio vis-à-vis to the dissipation coefficient of the 'quantum mechanical systems' under consideration for study.

3) By \( (\beta^2)^{[c]}(\mathcal{T}_{12}, t) \), the contribution of the 'quantum mechanical systemic explanation or quantum mechanical reality' to the dissipation coefficient of the 'measurements' portfolio.

**MEASUREMENTS-QUANTUM MECHANICAL SYSTEMIC EXPLANATION SYSTEM GOVERNING EQUATIONS:**

The differential system of this model is now

\[
\begin{align*}
\frac{d\alpha_{24}}{dt} &= (\alpha_{24})^{[d]} \mathcal{G}_{24} - [(\alpha_{24})^{[d]} + (\alpha_{24})^{[d]}(\mathcal{T}_{24}, t)] \mathcal{G}_{24} \\
\frac{d\mathcal{G}_{24}}{dt} &= (\alpha_{24})^{[d]} \mathcal{G}_{24} - [(\alpha_{24})^{[d]} + (\alpha_{24})^{[d]}(\mathcal{T}_{24}, t)] \mathcal{G}_{24} \\
\frac{d\mathcal{G}_{24}}{dt} &= (\alpha_{24})^{[d]} \mathcal{T}_{24} - [(\alpha_{24})^{[d]} - (\alpha_{24})^{[d]}(\mathcal{T}_{24}, t)] \mathcal{T}_{24} \\
\frac{d\mathcal{T}_{24}}{dt} &= (\alpha_{24})^{[d]} \mathcal{T}_{24} - [(\alpha_{24})^{[d]} - (\alpha_{24})^{[d]}(\mathcal{T}_{24}, t)] \mathcal{T}_{24} \\
\frac{d\mathcal{T}_{24}}{dt} &= (\alpha_{24})^{[d]} \mathcal{T}_{24} - [(\alpha_{24})^{[d]} - (\alpha_{24})^{[d]}(\mathcal{T}_{24}, t)] \mathcal{T}_{24}
\end{align*}
\]

First augmentation factor attributable to MEASUREMENTS DISTURBING DISSIPATING QUANTUM MECHANICAL EXPLANATION OR QUANTUM MECHANICAL REALITY AS EINSTEIN PUT IT to the dissipation of 'QUANTUM MECHANICAL SYSTEMS EXPATIATION FOR THAT UNDER THE CONSIDERATION.'

First detritus factor contributed by QUANTUM MECHANICAL DESCRIPTION BEING DISSIPATED BY THE MEASUREMENTS MADE CORRESPONDINLY.

Where we suppose

\[
(A) \quad (\alpha_{24})^{[d]}, (\alpha_{24})^{[d]}, (\alpha_{24})^{[d]}, (\alpha_{24})^{[d]}, (\alpha_{24})^{[d]}, \mathcal{T}_{24} \quad > 0,
\text{at} \quad f = 24, 25, 26
\]

\[
(B) \quad \text{The functions} \quad (\alpha_{24})^{[d]}, (\alpha_{24})^{[d]} \quad \text{are positive continuous increasing and bounded.}
\]
Definition of \((\eta_1)^{(a)}\), \((\eta_2)^{(a)}\):

\[
\begin{align*}
(\eta_1)^{(a)}(T_{12}, t) & \leq (\eta_2)^{(a)}(T_{12}, t) \\
(\eta_2)^{(a)}(T_{23}, t) & \leq (\eta_1)^{(a)}(T_{23}, t) \leq (\eta_2)^{(a)}(T_{23}, t) \\
(\eta_2)^{(a)}(T_{24}, t) & \leq (\eta_1)^{(a)}(T_{24}, t) \leq (\eta_2)^{(a)}(T_{24}, t)
\end{align*}
\]

Definition of \((\eta_{2a})^{(a)}, (\eta_{24})^{(a)}\):

\[
\begin{align*}
\lim_{T_{12} \to \infty} (\eta_1)^{(a)}(T_{12}, t) & = (\eta_2)^{(a)}(t) \\
\lim_{T_{23} \to \infty} (\eta_2)^{(a)}(T_{23}, t) & = (\eta_2)^{(a)}(t)
\end{align*}
\]

Where \(\begin{pmatrix} (\eta_{2a})^{(a)}, (\eta_{24})^{(a)}, (\eta_1)^{(a)}, (\eta_2)^{(a)} \end{pmatrix}\) are positive constants and \(\ell = 24, 25, 26\).

They satisfy Lipschitz condition:

\[
\begin{align*}
\| (\eta_1)^{(a)}(T_{12}, t) - (\eta_1)^{(a)}(T_{12}, t) \| & \leq (\eta_{2a})^{(a)}\| T_{12} - T_{12} \| e^{-\ell (\eta_{24})^{(a)}t} \\
\| (\eta_2)^{(a)}(T_{23}, t) - (\eta_2)^{(a)}(T_{23}, t) \| & \leq (\eta_{2a})^{(a)}\| T_{23} - T_{23} \| e^{-\ell (\eta_{24})^{(a)}t}
\end{align*}
\]

With the Lipschitz condition, we place a restriction on the behavior of functions \((\eta_1)^{(a)}(T_{12}, t)\) and \((\eta_2)^{(a)}(T_{23}, t)\). It is to be noted that \((\eta_1)^{(a)}(T_{12}, t)\) is uniformly continuous. In the eventuality of the fact, that if \((\eta_{24})^{(a)} = 1\) then the function \((\eta_2)^{(a)}(T_{24}, t)\), the first augmentation coefficient attributable to ‘MEASUREMENTS’, would be absolutely continuous.

Definition of \((\eta_{24})^{(a)}, (\eta_{24})^{(b)}\):

(D) \(\begin{pmatrix} (\eta_{2a})^{(a)}, (\eta_{24})^{(a)} \end{pmatrix}\) are positive constants

\[
\frac{(\eta_{2a})^{(a)}}{(\eta_{24})^{(a)}} \cdot \frac{(\eta_{2a})^{(b)}}{(\eta_{24})^{(b)}} < 4
\]

Definition of \((\eta_{2a})^{(a)}, (\eta_{24})^{(a)}\):

(E) There exists two constants \((\eta_{2a})^{(a)}\) and \((\eta_{24})^{(a)}\) which together with \((\eta_{24})^{(b)}\), \((\eta_{2a})^{(b)}\), \((\eta_{24})^{(a)}\) and \((\eta_{24})^{(b)}\) and the constants \((\eta_{2a})^{(a)}, (\eta_{24})^{(a)}, (\eta_{24})^{(a)}, (\eta_{24})^{(a)}, (\eta_{24})^{(a)}, (\eta_{24})^{(a)}, (\eta_{24})^{(a)}\), \(\ell = 24, 25, 26\), satisfy the inequalities

\[
\begin{align*}
1 & \leq (\eta_{24})^{(a)} \left[ (\eta_{2a})^{(a)} + (\eta_{24})^{(a)} + (\eta_{24})^{(a)} (\eta_{24})^{(a)} \right] < 1 \\
1 & \leq (\eta_{24})^{(a)} \left[ (\eta_{2a})^{(a)} + (\eta_{24})^{(a)} + (\eta_{24})^{(a)} (\eta_{24})^{(a)} \right] < 1
\end{align*}
\]

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Theorem 1: if the conditions (A)-(E) above are fulfilled, there exists a solution satisfying the conditions

**Definition of** \( G_1(t), T_1(t) \):

\[
G_1(t) \leq \left( \frac{\beta_{24}}{4} \right)^{\alpha_1} g_1(s_{124})^{\alpha_2} , \quad G_1(t) = G_1^0 > 0
\]

\[
T_1(t) \leq \left( \frac{\beta_{24}}{4} \right)^{\alpha_1} g_2(s_{124})^{\alpha_2} , \quad T_1(t) = T_1^0 > 0
\]

**Proof:**

Consider operator \( A^{(4)} \) defined on the space of sextuples of continuous functions \( G_1, T_1 : \mathbb{R}_+ \rightarrow \mathbb{R}_+ \) which satisfy

\[
G_1(t) = G_1^0 , \quad T_1(t) = T_1^0 , \quad G_1^0 \leq \left( \frac{\beta_{24}}{4} \right)^{\alpha_1} g_1^{\alpha_2} , \quad T_1^0 \leq \left( \frac{\beta_{24}}{4} \right)^{\alpha_1} g_2^{\alpha_2}
\]

\[
0 \leq G_1(t) - G_1^0 \leq \left( \frac{\beta_{24}}{4} \right)^{\alpha_1} g_1^{\alpha_2}
\]

\[
0 \leq T_1(t) - T_1^0 \leq \left( \frac{\beta_{24}}{4} \right)^{\alpha_1} g_2^{\alpha_2}
\]

By

\[
G_{24}(t) = G_1^0 + \int_0^t \left[ (a_{24}^{(4)}) G_{24}(s_{124}) - \left( (a_{24}^{(4)}) + (a_{24}^{(4)}) \left( T_{24}(s_{124}), s_{124} \right) \right) G_{24}(s_{124}) \right] ds_{124}
\]

\[
G_{24}(t) = G_1^0 + \int_0^t \left[ (a_{24}^{(4)}) G_{24}(s_{124}) - \left( (a_{24}^{(4)}) + (a_{24}^{(4)}) \left( T_{24}(s_{124}), s_{124} \right) \right) G_{24}(s_{124}) \right] ds_{124}
\]

\[
T_{24}(t) = T_1^0 + \int_0^t \left[ (a_{24}^{(4)}) T_{24}(s_{124}) - \left( (a_{24}^{(4)}) + (a_{24}^{(4)}) \left( g(s_{124}), s_{124} \right) \right) T_{24}(s_{124}) \right] ds_{124}
\]

\[
T_{24}(t) = T_1^0 + \int_0^t \left[ (a_{24}^{(4)}) T_{24}(s_{124}) - \left( (a_{24}^{(4)}) + (a_{24}^{(4)}) \left( g(s_{124}), s_{124} \right) \right) T_{24}(s_{124}) \right] ds_{124}
\]

Where \( a_{24}^{(4)} \) is the integrand that is integrated over an interval \( (0,t) \)

(a) The operator \( A^{(4)} \) maps the space of functions satisfying 34,35,36 into itself .Indeed it is obvious that

\[
G_{24}(t) \leq G_1^0 + \int_0^t \left[ (a_{24}^{(4)}) G_1^0 + \left( (a_{24}^{(4)}) \left( G_1^0 \right) + (a_{24}^{(4)}) \left( G_1^0 \right) \right) \right] ds_{124} = \left( 1 + (a_{24}^{(4)}) \right) G_1^0
\]

From which it follows that
(G_{24}(x) - G_{24}(x)) e^{-\frac{(x_{24}/x_{24})^2}{2}} \leq \frac{\text{const}}{(x_{24}/x_{24})^2} \left\{ \left( (G_{24}(x))^2 + G_{24}(x) e^{-\frac{(x_{24}/x_{24})^2}{2}} \right) + \left( \hat{G}_{24}(x) \right) \right\}  \\

(G_{24})^2 is as defined in the statement of theorem 1

Analogous inequalities hold also for \( C_{24}, C_{26}, T_{24}, T_{28}, T_{26} \)

It is now sufficient to take \( (x_{24}/x_{24})^2 > 0 \) and to choose \( (x_{24}/x_{24})^2 \) and \( (\hat{Q}_{24})^2 \) large to have

\[
\frac{(x_{24}/x_{24})^2}{(x_{24}/x_{24})^2} \left( (Q_{24})^2 + (G_{24})^2 e^{-\frac{(x_{24}/x_{24})^2}{2}} \right) \leq (Q_{24})^2
\]

\[
\left( (Q_{24})^2 + T_{24}^2 e^{-\frac{(x_{24}/x_{24})^2}{2}} \right) \leq (Q_{24})^2 \]

In order that the operator \( \mathcal{A}^{(4)} \) transforms the space of sextuples of functions \( G_{24}, T_{24} \) satisfying 34,35,36 into itself

The operator \( \mathcal{A}^{(4)} \) is a contraction with respect to the metric

\[
d \left( (G_{24})^2, (T_{24})^2 \right) = \sup_{x \in [0,1]} \max \left| G_{24}^{(2)}(x) - G_{24}^{(2)}(x) \right| e^{-\frac{(x_{24}/x_{24})^2}{2}} d \left( (G_{24})^2, (T_{24})^2 \right)
\]

Indeed if we denote

**Definition of** \( \mathcal{A}^{(4)}(G_{24}, T_{24}) \):

\[
\mathcal{A}^{(4)}(G_{24}, T_{24}) = e^{-\frac{(x_{24}/x_{24})^2}{2}} d \left( (G_{24})^2, (T_{24})^2 \right)
\]

It results

\[
\left| G_{24}^{(4)}(x) - G_{24}^{(4)}(x) \right| \leq \int_{x_{24}}^{x_{24}} \left( G_{24}^{(4)}(x) + G_{24}^{(4)}(x) + \hat{G}_{24}^{(4)}(x) \right) d \left( (G_{24})^2, (T_{24})^2 \right)
\]

Where \( (x_{24}/x_{24})^2 \) represents integrand that is integrated over the interval \([0,1]\)

From the hypotheses on 25,26,27,28 and 29 it follows

\[
\left| (G_{24})^2(x) - (G_{24})^2(x) \right| e^{-\frac{(x_{24}/x_{24})^2}{2}} \leq \frac{1}{\left( (x_{24}/x_{24})^2 \right)} (G_{24}^{(4)} + (G_{24}^{(4)} + (\hat{G}_{24})^{(4)} + (\hat{G}_{24})^{(4)})) d \left( (G_{24})^2, (T_{24})^2 \right)
\]
And analogous inequalities for $G_t$ and $T_t$. Taking into account the hypothesis (34,35,36) the result follows

Remark 4: The fact that we supposed $(a_{28}^{(a)^{(a)}}(a)^{(a)}$ and $(b_{28}^{(a)^{(a)}}(a)^{(a)}$ depending also on $t$ can be considered as not conformal with the reality, however we have put this hypothesis, in order that we can postulate condition necessary to prove the uniqueness of the solution bounded by $\left(P_{28}\right)^{(a)}(a)^{(a)}$ and $\left(Q_{28}\right)^{(a)}(a)^{(a)}$ respectively of $\mathbb{R}_+$.

If instead of proving the existence of the solution on $\mathbb{R}_+$, we have to prove it only on a compact then it suffices to consider that $(a_t^{(a)})^{(a)}(a)^{(a)}$ and $(b_t^{(a)})^{(a)}(a)^{(a)}$, $t = 24,25,26$ depend only on $T_{28}$ and respectively on $(G_{27}(t)(a)^{(a)}$ and hypothesis can replaced by a usual Lipschitz condition.

Remark 2: There does not exist any $t$ where $G_t(x) = 0$ and $T_t(x) = 0$.

From 19 to 24 it results

\[ G_t(x) \geq G_t^0 e^{-\int^{x}_{x_0} [(a_t^{(a)})^{(a)}(a)^{(a)}(t) + 1] \, dt} \geq 0 \]

\[ T_t(x) \geq T_t^0 e^{-\int^{x}_{x_0} (b_t^{(a)})^{(a)}(a)^{(a)} \, dt} > 0 \quad \text{for} \quad t > 0 \]

Definition of $(M_{28})^{(a)}(a)^{(a)}(a)$ and $(D_{28})^{(a)}(a)^{(a)}(a)$:

Remark 3: if $G_{28}$ is bounded, the same property have also $G_{28}$ and $G_{28}$. Indeed if

\[ G_{28} \leq \left(\begin{array}{c}
(D_{28})^{(a)}(a)^{(a)}(a) \\
(M_{28})^{(a)}(a)^{(a)}(a)
\end{array}\right) \frac{(a_{28}^{(a)})^{(a)}(a)^{(a)}}{(b_{28}^{(a)})^{(a)}(a)^{(a)}(a)} \]

In the same way, one can obtain

\[ G_{28} \leq \left(\begin{array}{c}
(D_{28})^{(a)}(a)^{(a)}(a) \\
(M_{28})^{(a)}(a)^{(a)}(a)
\end{array}\right) \frac{(a_{28}^{(a)})^{(a)}(a)^{(a)}}{(b_{28}^{(a)})^{(a)}(a)^{(a)}(a)} \]

If $G_{28}$ or $G_{28}$ is bounded, the same property follows for $G_{28}$, $G_{28}$ and $G_{28}$, $G_{28}$ respectively.

Remark 4: If $G_{28}$ is bounded, from below, the same property holds for $G_{28}$ and $G_{28}$. The proof is analogous with the preceding one. An analogous property is true if $G_{28}$ is bounded from below.

Remark 5: If $T_{28}$ is bounded from below and $\lim_{t \to \infty} (b_{28}^{(a)^{(a)}}(a) = (G_{27}(t)(a)^{(a)}(t), t)) = (b_{28}^{(a)^{(a)}}(a)$ then $T_{28} \to \infty$.

Definition of $(M_{28})^{(a)}(a)^{(a)}$ and $a_{28}$:

Indeed let $t_0$ be so that for $t > t_0$

\[ (G_{28})^{(a)}(a) - (b_{28}^{(a)^{(a)}}(a) = (G_{27}(t)(a)^{(a)}(t), t) < a_{28}, T_{28}(t) \to (M_{28})^{(a)}(a)^{(a)}(a) \]

Then \[ \frac{dT_{28}}{dt} \geq 2 \left( (a_{28})^{(a)}(a)^{(a)}(a) - a_{28} T_{28} \right) \] which leads to

\[ T_{28} \geq \left(\frac{2a_{28}^{(a)^{(a)}}(a)^{(a)}(a)}{2}\right) \left(1 - e^{-2a_{28}^{(a)^{(a)}}(a)^{(a)}(a)}} + T_{28} e^{-2a_{28}^{(a)^{(a)}(a)}} \right) \]

If we take $t$ such that $e^{-2a_{28}^{(a)}} = \frac{1}{2}$ it results

\[ T_{28} \geq \left(\frac{2a_{28}^{(a)^{(a)}}(a)^{(a)}}{2}\right), \quad t = \log \frac{1}{2} \]

By taking now $a_{28}$ sufficiently small one sees that $T_{28}$ is unbounded. The same property holds for $T_{29}$ if $\lim_{t \to \infty} (b_{29}^{(a)^{(a)}}(a) = (G_{28}(t)(a)^{(a)}(t), t)) = (b_{28}^{(a)^{(a)}}(a)$

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We now state a more precise theorem about the behaviors at infinity of the solutions of equations 37 to 42.

**Behavior of the solutions of equation 37 to 12**

**Theorem 2:** If we denote and define

**Definition of** $(\varphi_2)^{(4)}, (\varphi_2)^{(4)}, (\varphi_2)^{(4)}, (\varphi_2)^{(4)}$:

(a) $\varphi_2)^{(4)}, (\varphi_2)^{(4)}, (\varphi_2)^{(4)}, (\varphi_2)^{(4)}$ four constants satisfying

\[-(\varphi_2)^{(4)} \leq -(\varphi_2)^{(4)} + (\varphi_2)^{(4)} - (\varphi_2)^{(4)}(\varphi_2)^{(4)} \leq -(\varphi_2)^{(4)}\]

\[-(\varphi_2)^{(4)} \leq -(\varphi_2)^{(4)} + (\varphi_2)^{(4)} - (\varphi_2)^{(4)}((\varphi_2)^{(4)}, \xi) \leq -(\varphi_2)^{(4)}\]

**Definition of** $(\psi_2)^{(4)}, (\psi_2)^{(4)}, (\psi_2)^{(4)}, (\psi_2)^{(4)}$:

(b) By $(\psi_2)^{(4)}, (\psi_2)^{(4)} < 0$ and respectively $(\psi_2)^{(4)}, (\psi_2)^{(4)} > 0$ the roots of the equations

\[(\varphi_2)^{(4)} - (\varphi_2)^{(4)}(\psi_2)^{(4)} + (\varphi_2)^{(4)}(\psi_2)^{(4)} = 0\]

and

\[(\varphi_2)^{(4)} - (\varphi_2)^{(4)}(\psi_2)^{(4)} + (\varphi_2)^{(4)}(\psi_2)^{(4)} = 0\]

**Definition of** $(\overline{\psi_2})^{(4)}, (\overline{\psi_2})^{(4)}, (\overline{\psi_2})^{(4)}, (\overline{\psi_2})^{(4)}$:

(c) By $(\overline{\psi_2})^{(4)}, (\overline{\psi_2})^{(4)} > 0$ and respectively $(\overline{\psi_2})^{(4)}, (\overline{\psi_2})^{(4)} < 0$ the roots of the equations

\[(\varphi_2)^{(4)} - (\varphi_2)^{(4)}(\psi_2)^{(4)} + (\varphi_2)^{(4)}(\psi_2)^{(4)} = 0\]

and

\[(\varphi_2)^{(4)} - (\varphi_2)^{(4)}(\psi_2)^{(4)} + (\varphi_2)^{(4)}(\psi_2)^{(4)} = 0\]

**Definition of** $(\mu_2)^{(4)}, (\mu_2)^{(4)}, (\mu_2)^{(4)}, (\mu_2)^{(4)}$:

(f) If we define $(\mu_2)^{(4)}, (\mu_2)^{(4)}, (\mu_2)^{(4)}, (\mu_2)^{(4)}$ by

\[\left\{ \begin{array}{l}
(\psi_2)^{(4)} = (\psi_2)^{(4)}, (\mu_2)^{(4)} = (\psi_2)^{(4)}, \text{if } (\psi_2)^{(4)} < (\psi_2)^{(4)}
\end{array} \right.\]

\[\left\{ \begin{array}{l}
(\mu_2)^{(4)} = (\varphi_2)^{(4)}, (\mu_2)^{(4)} = (\varphi_2)^{(4)}, \text{if } (\varphi_2)^{(4)} < (\varphi_2)^{(4)}
\end{array} \right.\]

and

\[\left\{ \begin{array}{l}
(\varphi_2)^{(4)} = \frac{\mu_2}{\mu_2}
\end{array} \right.\]

\[\left\{ \begin{array}{l}
(\psi_2)^{(4)} = \frac{\mu_2}{\mu_2}
\end{array} \right.\]

and analogously

\[\left\{ \begin{array}{l}
(\psi_2)^{(4)} = (\psi_2)^{(4)}, (\psi_2)^{(4)} = (\psi_2)^{(4)}, \text{if } (\psi_2)^{(4)} > (\psi_2)^{(4)}
\end{array} \right.\]

\[\left\{ \begin{array}{l}
(\mu_2)^{(4)} = (\mu_2)^{(4)}, (\mu_2)^{(4)} = (\mu_2)^{(4)}, \text{if } (\mu_2)^{(4)} < (\mu_2)^{(4)}
\end{array} \right.\]

\[\left\{ \begin{array}{l}
(\varphi_2)^{(4)} = \frac{\mu_2}{\mu_2}
\end{array} \right.\]

\[\left\{ \begin{array}{l}
(\psi_2)^{(4)} = \frac{\mu_2}{\mu_2}
\end{array} \right.\]

where $(\mu_2)^{(4)}, (\mu_2)^{(4)}$
Then the solution of 19, 20, 21, 22, 23 and 24 satisfies the inequalities

\[ G_{24}(t) \leq G_{23}(t) \leq G_{22}(t) \leq G_{21}(t) \leq G_{20}(t) \]

where \( G_i(t) \) is defined by equation 25

\[
\frac{1}{(\mu_i \eta_i)^2} G_{24}(t)^2 \leq G_{23}(t) \leq \frac{1}{(\mu_i \eta_i)^2} G_{22}(t)^2
\]

\[
\frac{1}{(\mu_i \eta_i)^2} G_{23}(t)^2 \leq G_{22}(t) \leq \frac{1}{(\mu_i \eta_i)^2} G_{21}(t)^2
\]

\[
\frac{1}{(\mu_i \eta_i)^2} G_{22}(t)^2 \leq G_{21}(t) \leq \frac{1}{(\mu_i \eta_i)^2} G_{20}(t)^2
\]

\[
\frac{1}{(\mu_i \eta_i)^2} G_{21}(t)^2 \leq G_{20}(t) \leq \frac{1}{(\mu_i \eta_i)^2} G_{24}(t)^2
\]

**Definition of \((S_2)^{(4)}(t), (L_2)^{(4)}(t), (R_2)^{(4)}(t), (R_2)^{(4)}(t)\):**

Where

\[(S_2)^{(4)}(t) = (a_{26}(t) - (a_{26}(t) - (a_{26}(t))\]

\[(L_2)^{(4)}(t) = (a_{26}(t) - (a_{26}(t) - (a_{26}(t))\]

**Proof**: From 19, 20, 21, 22, 23, 24 we obtain

\[
\frac{\partial^2 v^{(4)}}{\partial t^2} = (a_{26}(t) - (a_{26}(t) - (a_{26}(t))\]

**Definition of \(v^{(4)}\):**

It follows

\[
-(a_{26}(t) + (a_{26}(t) - (a_{26}(t))\]

From which one obtains

**Definition of \((T_2)^{(4)}, (T_2)^{(4)}\):**

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we find like in the previous case,

\[ a \leq \frac{C^1}{D} \leq \frac{C^2}{D} \]

it follows \( V^1(v^1) \leq V^2(v^1) \leq V^3(v^1) \)

In the same manner, we get

\[ V^1(v^1) \leq V' \leq V^3(v^1) \]

From which we deduce \( V^1(v^1) \leq V^2(v^1) \leq V^3(v^1) \)

(b) If \( 0 \leq V^1(v^1) \leq V^2(v^1) = \frac{C^2}{D} \leq V^3(v^1) \), we find like in the previous case,

\[ V^1(v^1) \leq V^2(v^1) \leq V^3(v^1) \]

(c) If \( 0 \leq V^1(v^1) \leq V^2(v^1) = \frac{C^2}{D} \leq V^3(v^1) \), we obtain

\[ V^1(v^1) \leq V^2(v^1) \leq V^3(v^1) \]

And so with the notation of the first part of condition (c), we have

**Definition of** \( V^2(v^1) :-\)

\[ V^2(v^1) = \frac{C^2}{D} \]

In a completely analogous way, we obtain

**Definition of** \( U^2(v^1) :-\)

\[ U^2(v^1) = \frac{C^2}{D} \]

Now, using this result and replacing it in 19, 20, 21, 22, 23, and 24 we get easily the result stated in the theorem.

**Particular case:**

If \( C^2 = C^2 \), then \( C^2 = C^2 \) and in this case \( V^2(v^1) = V^2(v^1) \) if in addition \( V^2(v^1) = V^2(v^1) \) then \( V^4(v^1) = V^4(v^1) \) and as a consequence \( C^2 = C^2 \) this also defines \( V^2(v^1) \) for the special case.

Analogously if \( C^2 = C^2 \), then \( C^2 = C^2 \) and then

\[ U^2(v^1) = U^2(v^1) \] if in addition \( U^2(v^1) = U^2(v^1) \) then \( T^2(v^1) = T^2(v^1) T^2(v^1) \). This is an important consequence of the relation between \( V^2(v^1) \) and \( V^2(v^1) \) and definition of \( U^2(v^1) \).
4. STATIONARY SOLUTIONS AND STABILITY

Stationary solutions and stability curve representative of the variation of MEASUREMENTS DISSIPATING OR DISTURBING THE QUANTUM MECHANICAL REALITY OR EXPLANATION OF THE QUANTUM MECHANICAL SYSTEMS UNDER CONSIDERATION SYSTEM curve lies below the tangent at \( \left( G_{27} \right) = G_0 \) for \( \left( G_{27} \right) < G_0 \) and above the tangent for \( \left( G_{27} \right) > G_0 \). Wherever such a situation occurs the point \( G_0 \) is called the “point of inflexion”. In this case, the tangent has a positive slope that simply means the rate of change of QMS Explanations is greater than zero. Above factor shows that it is possible, to draw a curve that has a point of inflexion at a point where the tangent (slope of the curve) is horizontal.

Stationary value :

In all the cases \( \left( G_{27} \right) = G_0 \), \( \left( G_{27} \right) < G_0 \), \( \left( G_{27} \right) > G_0 \), the condition that the rate of change of oxygen consumption is maximum or minimum holds. When this condition holds we have stationary value. We now infer that :

1. A necessary and sufficient condition for there to be stationary value of \( \left( G_{27} \right) \) is that the rate of change of QUANTUM MECHANICAL SYSTEMIC EXPLANATION function at \( G_0 \) is zero.

2. A sufficient condition for the stationary value at \( G_0 \), to be maximum is that the acceleration of the QUANTUM MECHANICAL SYSTEMAL EXPLANATION OR THE QUANTUM MECHANICAL REALITY OF THE SYSTEM AS EINSTEIN PUT IT is less than zero.

3. A sufficient condition for the stationary value at \( G_0 \), be minimum is that acceleration of QUANTUM MECHANICAL EXPLANATIONS OR QUANTUM MECHANICAL REALITY is greater than zero.

4. With the rate of change of \( \left( G_{27} \right) \) namely ‘QUANTUM MECHANICAL DESCRIPTION defined as the accentuation term and the dissipation term, we are sure that the rate of change of QUANTUM MECHANICAL DESCRIPTION is always positive.

5. Concept of stationary state is mere methodology although there might be closed system exhibiting symptoms of stationariness.

We can prove the following

Theorem 3: If \( \left( a_2^2 \right)^{14} \) and \( \left( b_2^2 \right)^{14} \) are independent on \( b \), and the conditions (with the notations 25, 26, 27, 28)

\[
\left( a_2^2 \right)^{14} \left( a_2^2 \right)^{14} - \left( a_2^4 \right)^{14} \left( a_2^4 \right)^{14} < 0
\]

\[
\left( a_2^2 \right)^{14} \left( a_2^2 \right)^{14} - \left( a_2^4 \right)^{14} \left( a_2^4 \right)^{14} + \left( a_2^4 \right)^{14} \left( a_2^4 \right)^{14} + \left( a_2^4 \right)^{14} \left( a_2^4 \right)^{14} + \left( a_2^4 \right)^{14} \left( a_2^4 \right)^{14} > 0
\]

\[
\left( b_2^2 \right)^{14} \left( b_2^2 \right)^{14} - \left( b_2^4 \right)^{14} \left( b_2^4 \right)^{14} > 0
\]

\[
\left( b_2^2 \right)^{14} \left( b_2^2 \right)^{14} - \left( b_2^4 \right)^{14} \left( b_2^4 \right)^{14} + \left( b_2^4 \right)^{14} \left( b_2^4 \right)^{14} + \left( b_2^4 \right)^{14} \left( b_2^4 \right)^{14} + \left( b_2^4 \right)^{14} \left( b_2^4 \right)^{14} < 0
\]

with \( \left( a_2^4 \right)^{14} \), \( \left( a_2^2 \right)^{14} \) as defined by equation 25 are satisfied, then the system
\( (c_{24}^{(4)})^{a} G_{24} - [(c_{24}^{(4)})^{a} + (c_{24}^{(4)})^{a}(T_{24}^{(4)})] G_{24} = 0 \)

\( (c_{25}^{(4)})^{a} G_{25} - [(c_{25}^{(4)})^{a} + (c_{25}^{(4)})^{a}(T_{25}^{(4)})] G_{25} = 0 \)

\( (c_{26}^{(4)})^{a} G_{26} - [(c_{26}^{(4)})^{a} + (c_{26}^{(4)})^{a}(T_{26}^{(4)})] G_{26} = 0 \)

\( (b_{24}^{(4)})^{a} T_{24} - [(b_{24}^{(4)})^{a} - (b_{24}^{(4)})^{a}(G_{27}^{(4)})] T_{24} = 0 \)

\( (b_{25}^{(4)})^{a} T_{25} - [(b_{25}^{(4)})^{a} - (b_{25}^{(4)})^{a}(G_{27}^{(4)})] T_{25} = 0 \)

\( (b_{26}^{(4)})^{a} T_{26} - [(b_{26}^{(4)})^{a} - (b_{26}^{(4)})^{a}(G_{27}^{(4)})] T_{26} = 0 \)

has a unique positive solution, which is an equilibrium solution for the system (19 to 24)

**Proof:**

(a) Indeed the first two equations have a nontrivial solution \( G_{24}, G_{25} \) if

\[ F(T_{24}) = (c_{24}^{(4)})^{a} G_{24}^{(4)} - (c_{24}^{(4)})^{a} + (c_{24}^{(4)})^{a}(T_{24}^{(4)}) G_{24}^{(4)} = 0 \]

**Definition and uniqueness of** \( T_{24} : -\)

After hypothesis \( f(0) < 0, f(\infty) > 0 \) and the functions \( (a_{14})^{a}(T_{24}) \) being increasing, it follows that there exists a unique \( T_{24} \) for which \( f(T_{24}) = 0 \). With this value, we obtain from the three first equations

\[ G_{24} = \frac{(c_{24}^{(4)})^{a} G_{24}^{(4)}}{[c_{24}^{(4)} + (c_{24}^{(4)})^{a}(T_{24}^{(4)})]} \quad , \quad G_{25} = \frac{(c_{25}^{(4)})^{a} G_{25}^{(4)}}{[c_{25}^{(4)} + (c_{25}^{(4)})^{a}(T_{25}^{(4)})]} \]

By the same argument, the equations 92,93 admit solutions \( G_{24}, G_{25} \) if

\[ \varphi(G_{27}) - (b_{24}^{(4)})^{a} (b_{24}^{(4)})^{a} - (b_{24}^{(4)})^{a} (b_{24}^{(4)})^{a} - [(b_{24}^{(4)})^{a} (b_{24}^{(4)})^{a} + (b_{24}^{(4)})^{a} (b_{24}^{(4)})^{a} (G_{27}^{(4)})] + (b_{24}^{(4)})^{a} (G_{27}^{(4)})(b_{24}^{(4)})^{a} = 0 \]

Where in \( (b_{24}^{(4)})^{a}(G_{24}, G_{25}) \) must be replaced by their values from 96. It is easy to see that \( \varphi \) is a decreasing function in \( G_{24} \) and taking into account the hypothesis \( \varphi(0) > 0, \varphi(\infty) < 0 \) it follows that there exists a unique \( G_{24} \) such that \( \varphi((G_{27})^{a}) = 0 \)

Finally, we obtain the unique solution of 89 to 94

\( G_{24} \) given by \( \varphi((G_{27})^{a} G^{a}) = 0 , \quad T_{24} \) given by \( f(T_{24}) = 0 \) and

\[ G_{24} = \frac{(c_{24}^{(4)})^{a} G_{24}^{(4)}}{[c_{24}^{(4)} + (c_{24}^{(4)})^{a}(T_{24}^{(4)})]} \quad , \quad G_{25} = \frac{(c_{25}^{(4)})^{a} G_{25}^{(4)}}{[c_{25}^{(4)} + (c_{25}^{(4)})^{a}(T_{25}^{(4)})]} \]

\[ T_{24} = \frac{(b_{24}^{(4)})^{a} T_{24}^{(4)}}{[b_{24}^{(4)} - (b_{24}^{(4)})^{a}(b_{24}^{(4)})]} \quad , \quad T_{25} = \frac{(b_{25}^{(4)})^{a} T_{25}^{(4)}}{[b_{25}^{(4)} - (b_{25}^{(4)})^{a}(b_{25}^{(4)})]} \]

Obviously, these values represent an equilibrium solution of 19,20,21,22,23,24

**ASYMPTOTIC STABILITY ANALYSIS**
**Theorem 4:** If the conditions of the previous theorem are satisfied and if the functions \((a_i(t))^{(4)}\) and \((b_i(t))^{(4)}\) Belong to \(C^{(4)}(\mathbb{R}_+^n)\) then the above equilibrium point is asymptotically stable.

**Proof:** Denote

**Definition of \([G_1, T_1] :-**

\[ G_1 = G_2 + G_3 \quad \text{and} \quad T_1 = T_1^* + T_1 \]

Then taking into account equations 89 to 94 and neglecting the terms of power 2, we obtain from 49 to 24

\[
\begin{align*}
\frac{d(G_1)}{dt} &= -(a_1(t))^{(4)}G_1 + (b_1(t))^{(4)}G_2 + (a_2(t))^{(4)}G_3 + (b_2(t))^{(4)}G_4 - (q_1(t))^{(4)}G_1 T_1 \\
\frac{d(G_2)}{dt} &= -(a_1(t))^{(4)}G_1 + (b_1(t))^{(4)}G_2 + (a_2(t))^{(4)}G_3 + (b_2(t))^{(4)}G_4 - (q_2(t))^{(4)}G_2 T_1 \\
\frac{d(G_3)}{dt} &= -(a_1(t))^{(4)}G_1 + (b_1(t))^{(4)}G_2 + (a_2(t))^{(4)}G_3 + (b_2(t))^{(4)}G_4 - (q_3(t))^{(4)}G_3 T_1 \\
\frac{d(G_4)}{dt} &= -(a_1(t))^{(4)}G_1 + (b_1(t))^{(4)}G_2 + (a_2(t))^{(4)}G_3 + (b_2(t))^{(4)}G_4 - (q_4(t))^{(4)}G_4 T_1 \\
\frac{d(T_1)}{dt} &= -(b_1(t))^{(4)}G_2 + (b_2(t))^{(4)}G_3 + \sum_{j=1}^{n} (G_j(t))^{(4)}T_1 + (q_1(t))^{(4)}G_1 T_1 \\
\end{align*}
\]

The characteristic equation of this system is

\[
\begin{align*}
&(G_1^{(4)} + (a_1(t))^{(4)}G_1 - (a_2(t))^{(4)}G_1)[(a_1(t))^{(4)} + (a_2(t))^{(4)}G_1 + (G_2(t))^{(4)}G_1] \\
&+ [(a_1(t))^{(4)} + (b_1(t))^{(4)}G_1 + (G_2(t))^{(4)}G_1] [G_2(t)]^{(4)}G_1 T_1 + (G_3(t))^{(4)}G_1 T_1 \\
&+ \ldots \\
&+ [(a_1(t))^{(4)} + (G_1(t))^{(4)}G_1] [G_4(t)]^{(4)}G_1 T_1 \ldots \\
&+ (G_1(t))^{(4)}G_1 T_1 = 0
\end{align*}
\]

And as one sees, all the coefficients are positive. It follows that all the roots have negative real part, and this proves the theorem.

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CLASSIC 2 FLAVOUR COLOR SUPERCONDUCTIVITY AND ORDINARY NUCLEAR MATTER-A NEW PARADIGM STATEMENT

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Abstract- A system of ordinary nuclear matter, the resultant of classic 2-flavor color superconductivity is investigated. It is shown that the time independence of the contributions one system to another without the transitional phase portrays another system by itself and constitutes the equilibrium solution of the original time independent system. Methodology is accentuated with the explanations, we write the governing equations with the nomenclature for the systems in the foregoing. Further papers extensively draw inferences upon such concatenation process, ipsofacto.

Index Terms- CCFSC, ORDINARY NUCLEAR MATTER, QCD, QGP

I. INTRODUCTION

Frank Wilczek expatiated on a first cut at applying the lessons learned from color-flavor locking and quark-hadron continuity to real QCD, which is complicated by splitting between strange and light quarks. Both classic 2-flavor color superconductivity (with the strange quark passive) and color-flavor locking are valid ground states in different parameter regimes at high density. An extremely intriguing possibility, matter or QCD matter refers to any of a number of theorized phases of matter whose degrees of freedom include quarks and gluons. These theoretical phases would occur at extremely high temperatures and densities, billions of times higher than can be produced in equilibrium in laboratories. Under such extreme conditions, the familiar structure of matter, where the basic constituents are nuclei (consisting of nucleons which are bound states of quarks) and electrons, is disrupted. In quark matter it is more appropriate to treat the quarks themselves as the basic degrees of freedom.

In the standard model of particle physics, the strong force is described by the theory of quantum chromo dynamics (QCD). At ordinary temperatures or densities this force just confines the quarks into composite particles (hadrons) of size around 10−15 m = 1 femtometer = 1 fm (corresponding to the QCD energy scale ΛQCD ≈ 200 MeV) and its effects are not noticeable at longer distances. However, when the temperature reaches the QCD energy scale (T of order 1012 Kelvin’s) or the density rises to the point where the average inter-quark separation is less than 1 fm (quark chemical potential µ around 400 MeV), the hadrons are melted into their constituent quarks, and the strong interaction becomes the dominant feature of the physics. Such phases are called quark matter or QCD matter.

The strength of the color force makes the properties of quark matter unlike gas or plasma, instead leading to a state of matter more reminiscent of a liquid. At high densities, quark matter is a Fermi liquid, but is predicted to exhibit color superconductivity at high densities and temperatures below 1012 K.

II. UNSOLVED PROBLEMS IN PHYSICS

QCD in the non-perturbative regime quark matter, the equations of QCD predict that a sea of quarks and gluons should be formed at high temperature and density. What are the properties of this phase of matter?

In early Universe, at high temperature according to the Big Bang theory, when the universe was only a few tens of microsecond old, the phase of matter took the form of a hot phase of quark matter called the quark-gluon plasma (QGP).

Compact stars (neutron stars). A neutron star is much cooler than 1012 K, but it is compressed by its own weight to such high densities that it is reasonable to surmise that quark matter may exist in the core. Compact stars composed mostly or entirely of quark matter are called quark stars or strange stars, yet at this time no star with properties expected of these objects has been observed. Cosmic rays comprise also high energy atomic nuclei, particularly that of iron. Laboratory experiments suggest that interaction with heavy noble gas in the upper atmosphere would lead to quark-gluon plasma formation. Heavy-ion collisions at very high energies can produce small short-lived regions of space whose energy density is comparable to that of the 20-microsecond-old universe. This has been achieved by colliding heavy nuclei at high speeds, and a first time claim of formation of quark came from the SPS accelerator at CERN in February 2000. There is good evidence that the quark-gluon plasma has also been produced at RHIC

The context for understanding the thermodynamics of quark matter is the standard model of particle physics, which contains six different flavors of quarks, as well as leptons like electrons and neutrinos. These interact via the strong interaction, electromagnetism, and also the weak interaction which allows one flavor of quark to turn into another. Electromagnetic interactions occur between particles that carry electrical charge; strong interactions occur between particles that carry color charge.

The correct thermodynamic treatment of quark matter depends on the physical context. For large quantities that exist for long periods of time (the "thermodynamic limit"), we must take into account the fact that the only conserved charges in the
standard model are quark number (equivalent to baryon number), electric charge, the eight color charges, and lepton number. Each of these can have an associated chemical potential. However, large volumes of matter must be electically and color-neutral, which determines the electric and color charge chemical potentials. This leaves a three-dimensional phase space, parameterized by quark chemical potential, lepton chemical potential, and temperature.

In compact stars quark matter would occupy cubic kilometers and exist for millions of years, so the thermodynamic limit is appropriate. However, the neutrinos escape, violating lepton number, so the phase space for quark matter in compact stars only has two dimensions, temperature (T) and quark number chemical potential \( \mu \). A strangelet is not in the thermodynamic limit of large volume, so it is like an exotic nucleus: it may carry electric charge.

A heavy-ion collision is in neither the thermodynamic limit of large volumes nor long times. Putting aside questions of whether it is sufficiently equilibrated for thermodynamics to be applicable, there is certainly not enough time for weak interactions to occur, so flavor is conserved, and there are independent chemical potentials for all six quark flavors. The initial conditions (the impact parameter of the collision, the number of up and down quarks in the colliding nuclei, and the fact that they contain no quarks of other flavors) determine the chemical potentials.

**Conjectured form of the phase diagram of QCD matter (From Wikipedia)**

The phase diagram of quark matter is not well known, either experimentally or theoretically. A commonly conjectured form of the phase diagram is shown in the figure.[3] It is applicable to matter in a compact star, where the only relevant thermodynamic potentials are quark chemical potential \( \mu \) and temperature \( T \). For guidance it also shows the typical values of \( \mu \) and \( T \) in heavy-ion collisions and in the early universe. For readers who are not familiar with the concept of a chemical potential, it is helpful to think of \( \mu \) as a measure of the imbalance between quarks and antiquarks in the system. Higher \( \mu \) means a stronger bias favoring quarks over antiquarks. At low temperatures there are no anti-quarks, and then higher \( \mu \) generally means a higher density of quarks.

Ordinary atomic matter as we know it is really a mixed phase, droplets of nuclear matter (nuclei) surrounded by vacuum, which exists at the low-temperature phase boundary between vacuum and nuclear matter, at \( \mu = 310 \text{ MeV} \) and \( T \) close to zero. If we increase the quark density (i.e. increase \( \mu \)) keeping the temperature low, we move into a phase of more and more compressed nuclear matter. Following this path corresponds to burrowing more and more deeply into a neutron star. Eventually, at an unknown critical value of \( \mu \), there is a transition to quark matter. At ultra-high densities we expect to find the color-flavor-locked (CFL) phase of color-superconducting quark matter. At intermediate densities we expect some other phases (labelled "non-CFL quark liquid" in the figure) whose nature is presently unknown. They might be other forms of color-superconducting quark matter, or something different.

Starting at the bottom left corner of the phase diagram, in the vacuum where \( \mu = T = 0 \). If we heat up the system without introducing any preference for quarks over antiquarks, this corresponds to moving vertically upwards along the \( T \) axis. At first, quarks are still confined and we create a gas of hadrons (pions, mostly). Then around \( T = 170 \text{ MeV} \) there is a crossover to the quark gluon plasma: thermal fluctuations break up the pions, and we find a gas of quarks, antiquarks, and gluons, as well as lighter particles such as photons, electrons, positrons, etc. Following this path corresponds to travelling far back in time (so to say), to the state of the universe shortly after the big bang (where there was a very tiny preference for quarks over antiquarks).

The line that rises up from the nuclear/quark matter transition and then bends back towards the \( T \) axis, with its end marked by a star, is the conjectured boundary between confined and unconfined phases. Until recently it was also believed to be a boundary between phases where chiral symmetry is broken (low temperature and density) and phases where it is unbroken (high temperature and density). It is now known that the CFL phase exhibits chiral symmetry breaking, and other quark matter phases may also break chiral symmetry, so it is not clear whether this is really a chiral transition line. The line ends at the "chiral critical point", marked by a star in this figure, which is a special temperature and density at which striking physical phenomena, analogous to critical opalescence, are expected or a complete description of phase diagram it is required that one must have complete understanding of dense, strongly interacting hadronic matter and strongly interacting quark matter from some underlying theory e.g. quantum chromodynamics (QCD). However because such a description requires the proper understanding of QCD in its non-perturbative regime, which is still far from being completely understood, any theoretical advance remains very challenging.

### III. THEORETICAL CHALLENGES: CALCULATION TECHNIQUES

The phase structure of quark matter remains mostly conjectural because it is difficult to perform calculations predicting the properties of quark matter. The reason is that QCD, the theory describing the dominant interaction between quarks, is strongly coupled at the densities and temperatures of greatest physical interest, and hence it is very hard to obtain any predictions from it. Here are brief descriptions of some of the standard approaches.

**LATTICE GAUGE THEORY**

The only first-principles calculational tool currently available is lattice QCD, i.e. brute-force computer calculations. Because of a technical obstacle known as the fermion sign problem, this method can only be used at low density and high temperature (\( \mu < T \)), and it predicts that the crossover to the quark-gluon plasma will occur around \( T = 170 \text{ MeV} \). However, it cannot be used to investigate the interesting color-superconducting phase structure at high density and low temperature.

**WEAK COUPLING THEORY**

Because QCD is asymptotically free it becomes weakly coupled at unrealistically high densities, and diagrammatic methods can
be used. Such methods show that the CFL phase occurs at very high density. At high temperatures, however, diagrammatic methods are still not under full control.

MODELS
To obtain a rough idea of what phases might occur, one can use a model that has some of the same properties as QCD, but is easier to manipulate. Many physicists use Nambu-Jona-Lasinio models, which contain no gluons, and replace the strong interaction with a four-fermion interaction. Mean-field methods are commonly used to analyse the phases. Another approach is the bag model, in which the effects of confinement are simulated by an additive energy density that penalizes unconfined quark matter.

EFFECTIVE THEORIES
Many physicists simply give up on a microscopic approach, and make informed guesses of the expected phases (perhaps based on NJL model results). For each phase, they then write down an effective theory for the low-energy excitations, in terms of a small number of parameters, and use it to make predictions that could allow those parameters to be fixed by experimental observations. In this connection we write to state the following seminal and cardinal points:

Quark Description of Hadronic Phases: A first cut at applying the lessons learned from color-flavor locking and quark-hadron continuity to real QCD, which is complicated by splitting between strange and light quarks. Both classic 2-flavor color superconductivity (with the strange quark passive) and color-flavor locking are valid ground states in different parameter regimes at high density. An extremely intriguing possibility is that the 2-flavor color superconducting phase goes over into ordinary nuclear matter with no phase transition. This might qualitatively explain the small nuclear (compared to QCD) mass scale; it requires chiral symmetry restoration -- which could explain the long-standing observation $g_A \rightarrow 1$ in nuclear matter.

Continuity of Quark and Hadron Matter: In this work the full power of color-flavor locking became apparent. It gives us an analytically tractable realization of confinement and chiral symmetry breaking in a regime of definite physical interest. We find a detailed match between the calculable properties of the high-density (quark) phase and the properties of the low-density (nuclear) phase one has learned to expect from phenomenology, numeric’s, etc.

High Density Quark Matter and the Renormalization Group in QCD with Two and Three Flavors shows how the renormalization of Fermi liquid parameters in QCD is surprisingly tractable, and identifying the favored couplings.

Color-Flavor Locking and Chiral Symmetry Breaking in High Density QCD is phase for hadronic matter at high density. Among other things, the elementary excitations are all integrally charged.

Fermion Masses, Neutrino Oscillations, and Proton Decay in the Light of SuperKamiokande: A serious attempt to decode the message of the Super Kamiokande neutrino oscillation is a discovery using all the resources of super symmetric grand unified theories.

Riemann-Einstein Structure from Volume and Gauge Symmetry is inverse to the Kaluza-Klein construction, realizing gravity as a spontaneously broken gauge theory.

A Chern-Simons Effective Field Theory for the Pfaffian Quantum Hall State is a simplified representation of the quantum Hall States exhibiting non-abelian statistics.

In his celebrated paper Adolf Haimovici (1), studied the growth of a two species ecological system divided on age groups. In this paper, we establish that his processual regularities and procedural formalities can be applied for summation of a system of transition from classic 2 flavor color superconductivity in to ordinary nuclear matter.

In this paper we study the following systems:

(a) Transformation of classic 2 flavor color super conductivity (CCFSC) to ordinary nuclear matter (ONM)

(b) (QCD) and (QGP)

Axiomatic predication includes once over change, continuing change, process of change, functional relationships, predictability, cyclical growth, cyclical fluctuations, speculation theory, cobweb analyses, stagnation thesis, perspective analysis etc. Upshot of the above statement is data produce consequences and consequences produce data.

IV. CLASSIC TWO FLAVOUR COLOUR SUPER CONDUCTIVITY SYSTEM

ASSUMPTIONS:

CCFSC are classified into three categories;

Category 1: Representative of the CCFSC vis-à-vis category 1 of ONM

Category 2: (Second Interval) comprising of CCFSC corresponding to category 2 of ONM

Category 3: Constituting CCFSC which belong to higher age than that of category 1 and category 2.

This is concomitant to category 3 of ONM. In this connection, it is to be noted that there is no sacrosanct time scale as far as the above pattern of classification is concerned. Any operationally feasible scale with an eye on the classification of ONM and CCFSC the fitness of things. For category 3. “Over and above” nomenclature could be used to encompass a wider range of consumption ONM. Similarly, a “less than” scale for category 1 can be used.

(c) The speed of growth of CCFSC under category 1 is proportional to the total amount of CCFSFSC under category 2. In essence the accentuation coefficient in the
model is representative of the constant of proportionality between under category 1 and category 2 of CCFSC. This assumptions is made to foreclose the necessity of addition of one more variable, that would render the systemic equations unsolvable

d) The dissipation in all the three categories is attributable to the following two phenomenon:

3) Aging phenomenon: The aging process leads to transference of the balance of CCFSC to the next category, no sooner than the age of the ONM crosses the boundary of demarcation

Depletion phenomenon: Drying up of the source of CCFSC vis-à-vis ONM dissipates the growth speed by an equivalent extent

NOTATION:

\[ G_{c1} \]: Quantum of CCFSC in category vis-à-vis category 1 of ONM

\[ G_{c2} \]: Quantum of CCFSC due to ONM in category 2

\[ G_{c3} \]: Quantum of CCFSC vis-à-vis category 3 of ONM

\( (a_{1c})^{(1)}, (a_{2c})^{(2)}, (a_{3c})^{(3)} \): Accentuation coefficients

\( (a_{1c}^t)^{(1)}, (a_{2c}^t)^{(2)}, (a_{3c}^t)^{(3)} \): Dissipation coefficients

FORMULATION OF THE SYSTEM:

In the light of the assumptions stated in the foregoing, we infer the following:

(d) The growth speed in category 1 is the sum of a accentuation term \( (a_{1c})^{(1)} G_{c1} \) and a dissipation term \( -(a_{1c})^{(1)} G_{c2} \), the amount of dissipation taken to be proportional to the total quantum of CCFSC vis-à-vis ONM in the corresponding category.

(e) The growth speed in category 2 is the sum of two parts \( (a_{2c})^{(2)} G_{c2} \) and \( -(a_{2c})^{(1)} G_{c3} \) the inflow from the category 1 dependent on the total amount standing in that category.

(f) The growth speed in category 3 is equivalent to \( (a_{3c})^{(3)} G_{c3} \) and \( -(a_{3c})^{(1)} G_{c1} \) dissipation ascribed only to depletion phenomenon.

Model makes allowance for the new CCFSC and concomitant ONM

GOVERNING EQUATIONS:

The differential equations governing the above system can be written in the following form

\[
\begin{align*}
\frac{dG_{c1}}{dt} &= (a_{1c})^{(1)} G_{c1} - (a_{1c})^{(2)} G_{c2} \\
\frac{dG_{c2}}{dt} &= (a_{2c})^{(2)} G_{c2} - (a_{2c})^{(1)} G_{c3} \\
\frac{dG_{c3}}{dt} &= (a_{3c})^{(3)} G_{c3} - (a_{3c})^{(1)} G_{c1} \\
(a_{1c})^{(1)} &> 0, \quad t = 13, 14, 15 \\
(a_{1c})^{(2)} &> 0, \quad t = 13, 14, 15
\end{align*}
\]
We can rewrite equation 1, 2 and 3 in the following form

\[
\frac{dG_1}{(a_{11}g_1-a_{13}g_3)^2} = - \frac{dG_2}{(a_{12}g_2-a_{13}g_3)^2} = - \frac{dG_3}{(a_{13}g_3-a_{14}g_4)^2} = dt
\]

Or we write a single equation as

\[
\frac{dG_i}{a([a_{12}g_2-a_{13}g_3]^2)g_{12}} = \frac{dG_i}{b([a_{13}g_3-a_{14}g_4]^2)g_{13}} = \frac{dG_i}{c([a_{14}g_4-a_{15}g_5]^2)g_{14}} = dt
\]

The equality of the ratios in equation (10) remains unchanged in the event of multiplication of numerator and denominator by a constant factor.

For constant multiples \( \alpha, \beta, \gamma \) all positive we can write equation (10) as

\[
\frac{dG_i}{\alpha([a_{12}g_2-a_{13}g_3]^2)g_{12}} = \frac{dG_i}{\beta([a_{13}g_3-a_{14}g_4]^2)g_{13}} = \frac{dG_i}{\gamma([a_{14}g_4-a_{15}g_5]^2)g_{14}} = dt
\]

The general solution of the CCFSC system can be written in the form

\[a_1G_1 + a_2G_2 + a_3G_3 = C_i e^{\lambda t}\]

Where \( i = 13,14,15 \) and \( C_{13}, C_{14}, C_{15} \) are arbitrary constant coefficients.

**STABILITY ANALYSIS**:

Supposing \( C_i(0) = C_i(0) > 0 \), and denoting by \( \lambda_i \) the characteristic roots of the system, it easily results that

1. If \( (a_{13}^{(1)}g_3-a_{13}^{(2)}g_3)^2 > 0 \) all the components of the solution, ie all the three parts of the consumption of oxygen due to cellular respiration tend to zero, and the solution is stable with respect to the initial data.

2. If \( (a_{13}^{(1)}g_3-a_{13}^{(2)}g_3)^2 < 0 \) and \( \lambda_{13} < 0 \), the first two components of the solution tend to infinity as \( t \to \infty \), and \( G_{13} \to 0 \), ie. The category 1 and category 2 parts grows to infinity, whereas the third part category 3 consumption of oxygen due to cellular respiration tends to zero.

3. If \( (a_{13}^{(1)}g_3-a_{13}^{(2)}g_3)^2 < 0 \) and \( \lambda_{14} + \lambda_{15} < 0 \), Then all the three parts tend to zero, but the solution is not stable i.e. at a small variation of the initial values of \( G_i \) the corresponding solution tends to infinity.

Close on the heels to equilibrium, there will be “fluxes”, “vortices”, however weak nevertheless. System shall evolve towards a stationary state in which generation of “entropy” (disorder) is as small as possible. By implication, there shall be a minimization problem mathematically, around the equilibrium state. In and around this range, linear equation would explain the characteristics of the system. On the other hand, away from “equilibrium”, the “fluxes” are more emphasized. Result is increase in “entropy”. When this occurs, the system no longer tends towards equilibrium. On the contrary, it may encounter instabilities that culminate into newer orders that move away from equilibrium. Thus, the CCFSC-ONM dissipative structures revitalize and resurrect complex forms away from equilibrium state.

From the above stability analysis we infer the following:

1. The adjustment process is stable in the sense that the system of CCFSC converges to equilibrium.
2. The approach to equilibrium is a steady one, and there exists progressively diminishing oscillations around the equilibrium point.

3. Conditions 1 and 2 are independent of the size and direction of initial disturbance.

4. The actual shape of the time path of oxygen consumption in the atmosphere by the ONM is determined by efficiency parameter, the strength of the response of the portfolio in question, and the initial disturbance.

5. Result 3 warns us that we need to make an exhaustive study of the behavior of any case in which generalization derived from the model do not hold.

6. Growth studies as the one in the extant context are related to the systemic growth paths with full employment of resources that are available in question, in the present case CCFSC-ONM-QCD-QCP systemic configuration. Such questions, whether growing system such as the one mentioned in the foregoing could produce full employment of all factors, whether or not there was a full employment natural rate growth path and perpetual oscillations around it. It is to be noted some systems pose extremely difficult stability problems. As an instance, one can quote example of pockets of open cells and drizzle in complex networks in marine stratocumulus. Other examples are clustering and synchronization of lightning flashes adjunct to thunderstorms, coupled studies of microphysics and aqueous chemistry.

**ORDINARY NUCLEAR MATTER:**

**Assumptions:**

b) ONM are classified into three categories analogous to the stratification that was resorted to in CCFSC SECTOR. When ONM category is transferred to the next sector, (such transference is attributed to the aging process of ONM, ONM from that category apparently would have become qualified for classification in the corresponding category, because we are in fact classifying CCFSC based on stratification of ONM.

(4) Category 1 is representative of ONM corresponding to CCFSC consumed by ONM under category 1.

(5) Category 2 constitutes those ONM whose age is higher than that specified under the head category 1 and is in correspondence with the similar classification of CCFSC.

(6) Category 3 of ONM encompasses those with respect to category 3 of ONM.

e) The dissipation coefficient in the growth model is attributable to two factors;

1. With the progress of time ONM gets aged and become eligible for transfer to the next category. Category 3 does not have such a provision for further transference.

2. ONM sector when become irretrievable (matter transformation or continuous creation and destruction of matter) are the other outlet that decelerates the speed of growth of ONM sector.

f) Inflow into category 2 is only from category 1 in the form of transfer of balance of ONM sector from the category 1. This is evident from the age wise classification scheme. As a result, the speed of growth of category 2 is dependent upon the amount of inflow, which is a function of the quantum of balance of ONM sector under the category 1.

1. With the progress of time ONM gets aged and become eligible for transfer to the next category. Category 3 does not have such a provision for further transference.

f) Inflow into category 2 is only from category 1 in the form of transfer of balance of ONM sector from the category 1. This is evident from the age wise classification scheme. As a result, the speed of growth of category 2 is dependent upon the amount of inflow, which is a function of the quantum of balance of ONM sector under the category 1.

g) The balance of ONM sector in category 3 is because of transfer of balance from category 2. It is dependent on the amount of CCFSC sector under category 2.

**NOTATION:**

\(T_{11}\) : Balance standing in the category 1 of ONM

\(T_{12}\) : Balance standing in the category 2 of ONM

\(T_{21}\) : Balance standing in the category 3 of ONM

\((b_{22}^{11})^{(1)}, (b_{24}^{11})^{(2)}, (b_{22}^{11})^{(3)}\) : Accentuation coefficients

\((b_{22}^{11})^{(4)}, (b_{24}^{11})^{(5)}, (b_{22}^{11})^{(6)}\) : Dissipation coefficients

**FORMULATION OF THE SYSTEM:**

Under the above assumptions, we derive the following:
The growth speed in category 1 is the sum of two parts:

3. A term \( T_{14} \) proportional to the amount of balance of ONM in the category 2

4. A term \(-T_{13}\) representing the quantum of balance dissipated from category 1. This comprises of ONM, which have grown old, qualified to be classified under category 2 and loss of ONM whatever may be reasons attributable and ascribable for.

e) The growth speed in category 2 is the sum of two parts:

3. A term constitutive of the amount of inflow from the category 1

4. A term the dissipation factor arising due to aging of ONM.

f) The growth speed under category 3 is attributable to inflow from category 2 and oxygen consumption stalled irrevocably and irretrievably due to energy transformation or continuous creation and destruction of ONM

GOVERNING EQUATIONS:

Following are the differential equations that govern the growth in the ONM portfolio

\[
\frac{dT_{14}}{dt} = (b_{14})^{(12)}T_{14} - (b_{13})^{(12)}T_{13} \\
\frac{dT_{13}}{dt} = (b_{12})^{(12)}T_{12} - (b_{13})^{(12)}T_{13} \\
\frac{dT_{12}}{dt} = (b_{12})^{(12)}T_{12} - (b_{13})^{(12)}T_{13} \\
(b_i)^{(1)} > 0, \quad t = 13.1415 \\
(b_i)^{(1)} > 0, \quad t = 13.1415 \\
(b_{14})^{(12)} < (b_{12})^{(12)} \\
(b_{13})^{(12)} < (b_{12})^{(12)}
\]

Following the same procedure outlined in the previous section, the general solution of the governing equations is

\[
\alpha T_{14} + \beta T_{13} + \gamma T_{12} = C_1 t^{1/4}, \quad t = 13.1415
\]

where \(C_{10}, C_{14}, C_{15}\) are arbitrary constant coefficients and \(\alpha, \beta, \gamma\) are corresponding multipliers to the characteristic roots of the ONM system

CLASSIC TWO FLAVOUR COLOUR SUPERCONDUCTIVITY AND ORDINARY NUCLEAR MATTER –DUAL SYSTEM ANALYSIS

We will denote

4) By \(T_1 t = 13.1415\), the three parts of the ONM system analogously to the \(C_{10}\) of the CCFSC systems.

5) By \((b_i)^{(1)}(T_{14} t)\), the contribution of the CCFSC to the dissipation coefficient of the ONM

6) By \((-b_i)^{(1)}(C_{14} t)\), the contribution of the CCFSC to the dissipation coefficient of the ONM

CLASSIC TWO FLAVOUR COLOUR SUPERCONDUCTIVITY-ORDINARY NUCLEAR MATTER SYSTEM GOVERNING EQUATIONS:

The differential system of this model is now

\[
\frac{dG_{14}}{dt} = (a_{14})^{(12)} G_{14} - [(a_{14})^{(12)}(T_{14} t)] G_{14}
\]
\[
\frac{d\Delta_{14}}{dt} = (a_{14})^{(14)} (\zeta_{22}) - [(a_{14})^{(14)} + (a_{14})^{(14)} (T_{14}, \xi)] G_{14}
\]
\[
\frac{d\Delta_{23}}{dt} = (a_{23})^{(23)} (\zeta_{23}) - [(a_{23})^{(23)} + (a_{23})^{(23)} (T_{23}, \xi)] G_{23}
\]
\[
\frac{d\Delta_{43}}{dt} = (b_{43})^{(21)} T_{12} - [(b_{43})^{(21)} - (b_{43})^{(21)} (G, \xi)] T_{12}
\]
\[
\frac{d\Delta_{34}}{dt} = (b_{34})^{(21)} T_{12} - [(b_{34})^{(21)} - (b_{34})^{(21)} (G, \xi)] T_{14}
\]
\[
\frac{d\Delta_{31}}{dt} = (b_{31})^{(21)} T_{14} - [(b_{31})^{(21)} - (b_{31})^{(21)} (G, \xi)] T_{12}
\]
\[
(a_{25})^{(11)} (T_{14}, \xi) = \text{First augmentation factor} \text{ attributable to ONM dissipation of CCFSC}
\]
\[
-(b_{25})^{(11)} (G, \xi) = \text{First detrition factor} \text{ contributed by CCFSC to the dissipation of ONM}
\]

Where we suppose
\[
(F) \quad (a_{ij})^{(14)}, (a_{ij})^{(23)}, (b_{ij})^{(21)} > 0, i,j = 1, 2, 3, 4, 5
\]

(G) The functions \((a_{ij})^{(14)}, (b_{ij})^{(21)}\) are positive continuous increasing and bounded.

Definition of \((a_{ij})^{(14)}, (b_{ij})^{(21)}\):
\[
(a_{ij})^{(14)} (T_{14}, \xi) \leq (a_{ij})^{(14)} \leq (A_{13})^{(14)}
\]
\[
(b_{ij})^{(21)} (G, \xi) \leq (b_{ij})^{(21)} \leq (B_{13})^{(21)}
\]

(H) \[
\lim_{T_{14} \to 0} (a_{ij})^{(14)} (T_{14}, \xi) = (a_{ij})^{(14)}
\]
\[
\lim_{E \to 0} (b_{ij})^{(21)} (G, \xi) = (b_{ij})^{(21)}
\]

Definition of \((A_{15})^{(14)}, (B_{15})^{(21)}\):

Where \(\{E = 1, 4, 15\}\) are positive constants

They satisfy Lipschitz condition:
\[
\| (a_{ij})^{(14)} (T_{14}, \xi) - (a_{ij})^{(14)} (T_{14}, \xi) \| \leq (K_{13})^{(14)} |T_{14} - T_{14}| e^{-((A_{15})^{(21)} \xi)}
\]
\[
\| (b_{ij})^{(21)} (G, \xi) - (b_{ij})^{(21)} (G, \xi) \| < (K_{13})^{(21)} |G - G| e^{-((B_{15})^{(21)} \xi)}
\]

With the Lipschitz condition, we place a restriction on the behavior of functions \((a_{ij})^{(14)} (T_{14}, \xi), (a_{ij})^{(23)} (T_{23}, \xi), \) and \((b_{ij})^{(21)} (T_{23}, \xi), (T_{14}, \xi)\). And \((T_{14}, \xi)\) are points belonging to the interval \(\{K_{13}^{(14)}, A_{15}, B_{15}, 1\}\). It is to be noted that \((a_{ij})^{(14)} (T_{14}, \xi)\) is uniformly continuous. In the eventuality of the fact, that if \((A_{15})^{(14)} = 1\) then the function \((a_{ij})^{(14)} (T_{14}, \xi)\), the first augmentation coefficient attributable to ONM would be absolutely continuous.

Definition of \((B_{13})^{(21)}, (K_{13})^{(21)}\):

(I) \((B_{13})^{(21)}, (K_{13})^{(21)}\) are positive constants
\[
\left( \frac{\|a_{13}\|}{\|a_{12}\|} \right)_{\mathbb{R}^3} < 1
\]

**Definition of \((a_{13})^{(1)}, (Q_{13})^{(1)}\):**

There exists two constants \((B_{13})^{(1)}, (Q_{13})^{(1)}\) which together with \((B_{12})^{(1)}, (Q_{12})^{(1)}, (B_{11})^{(1)}, (Q_{11})^{(1)}, (b_{1})^{(1)}, (b_{2})^{(1)}, (y_{1})^{(1)}, (y_{2})^{(1)}, i = 13, 14, 15, 35\)

\[
\frac{1}{(B_{13})^{(1)}} \left[ (a_{13})^{(1)} + (a_{23})^{(1)} + (b_{13})^{(1)} (Q_{13})^{(1)} \right] \leq 1
\]

\[
\frac{1}{(B_{13})^{(1)}} \left[ (b_{13})^{(1)} + (b_{23})^{(1)} + (Q_{13})^{(1)} (Q_{13})^{(1)} \right] \leq 1
\]

**Theorem 1:** If the conditions (A)-(E) above are fulfilled, there exists a solution satisfying the conditions

\[
G_{1}(\omega) \leq (a_{1})^{(1)} (a_{1})^{(1)}, \quad G_{1}(\omega) = G_{1}^{*} > 0
\]

\[
T_{1}(\omega) \leq (Q_{1})^{(1)} (Q_{1})^{(1)}, \quad T_{1}(\omega) = T_{1}^{*} > 0
\]

**Proof:**
Consider operator \(G^{(1)}\) defined on the space of sextuples of continuous functions \(G_{1}, T_{1}: \mathbb{R}_{4} \rightarrow \mathbb{R}_{4}\) which satisfy

\[
G_{1}(\omega) = G_{1}^{*}, \quad T_{1}(\omega) = T_{1}^{*}, \quad G_{1} \leq (a_{1})^{(1)}, \quad T_{1} \leq (Q_{1})^{(1)}
\]

\[
0 \leq G_{1}(\omega) - G_{1}^{*} \leq (a_{1})^{(1)} (a_{1})^{(1)}
\]

\[
0 \leq T_{1}(\omega) - T_{1}^{*} \leq (Q_{1})^{(1)} (Q_{1})^{(1)}
\]

By

\[
G_{12}(\omega) = G_{12}^{*} + \int_{0}^{s} \left[ (a_{12})^{(1)} (a_{12})^{(1)} (s_{12})^{(1)} - ((a_{12})^{(1)} (a_{12})^{(1)} (T_{12})^{(1)} (s_{12})^{(1)}) G_{12} (s_{12})^{(1)} \right] ds_{12}
\]

\[
G_{12}(\omega) = G_{12}^{*} + \int_{0}^{s} \left[ (a_{12})^{(1)} (a_{12})^{(1)} (s_{12})^{(1)} - ((a_{12})^{(1)} (a_{12})^{(1)} (T_{12})^{(1)} (s_{12})^{(1)}) G_{12} (s_{12})^{(1)} \right] ds_{12}
\]

\[
G_{12}(\omega) = G_{12}^{*} + \int_{0}^{s} \left[ (a_{12})^{(1)} (a_{12})^{(1)} (s_{12})^{(1)} - ((a_{12})^{(1)} (a_{12})^{(1)} (T_{12})^{(1)} (s_{12})^{(1)}) G_{12} (s_{12})^{(1)} \right] ds_{12}
\]

\[
T_{12}(\omega) = T_{12}^{*} + \int_{0}^{s} \left[ (b_{12})^{(1)} (b_{12})^{(1)} (s_{12})^{(1)} - ((b_{12})^{(1)} (b_{12})^{(1)} (G_{12})^{(1)} (s_{12})^{(1)}) T_{12} (s_{12})^{(1)} \right] ds_{12}
\]

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(b) The operator \( \mathcal{A}^{(2)} \) maps the space of functions satisfying 34,35,36 into itself. Indeed it is obvious that

\[
G_{12}(x) \leq G_{12}(x) + \int_0^T \left( G_{24}(x) + \left( G_{13}(x) + G_{24}(x) \right) e^{-\left( G_{13}(x) + G_{24}(x) \right) t} \right) \, ds_1(x) =
(1 + (\sigma_{13}(x) + 1) G_{24}(x) + \left( G_{13}(x) + G_{24}(x) \right) e^{-\left( G_{13}(x) + G_{24}(x) \right) t} )
\]

From which it follows that

\[
\left( G_{13}(x) - G_{13}(x) \right) e^{-G_{13}(x) t} \leq \frac{G_{13}(x)}{G_{13}(x)} \left[ (G_{13}(x) + G_{24}(x)) e^{-\left( G_{13}(x) + G_{24}(x) \right) t} \right] e^{-G_{13}(x) t}
\]

\( (G_{13})^{(2)} \) is as defined in the statement of theorem 1

Analogous inequalities hold also for \( G_{14}, G_{15}, T_{13}, T_{14}, T_{15} \)

It is now sufficient to take \( \beta_{13} \) and choose \( (\beta_{13})^{(2)} \) large to have

\[
\frac{G_{13}(x)}{G_{13}(x)} \left[ (G_{13}(x) + G_{24}(x)) e^{-\left( G_{13}(x) + G_{24}(x) \right) t} \right] e^{-G_{13}(x) t}
\]

In order that the operator \( \mathcal{A}^{(2)} \) transforms the space of sextuples of functions \( G_{11}, T_{11} \) satisfying 34,35,36 into itself

The operator \( \mathcal{A}^{(2)} \) is a contraction with respect to the metric

\[
d \left( (G_{11}, T_{11}), (G_{12}, T_{12}) \right) = \\
\sup_{x \in I_{11}} \max_{T_{11}} \left| G_{11}(x) - G_{12}(x) e^{-(G_{11}(x) + G_{12}(x)) T_{11}} \right| + \sup_{x \in I_{11}} \max_{T_{11}} \left| T_{11}(x) - T_{12}(x) e^{-(G_{11}(x) + G_{12}(x)) T_{11}} \right|
\]

Indeed if we denote

**Definition of \( \mathcal{A}^{(2)}(G, T) \)**:

\[
\mathcal{A}^{(2)}(G, T) = \mathcal{A}^{(2)}(G, T)
\]

It results

\[
\left| G_{13}(x) - G_{13}(x) \right| \leq \int_0^T \left( G_{13}(x) + G_{13}(x) \right) e^{-(G_{13}(x) + G_{13}(x)) t} \, ds_1(x) + \\
\int_0^T \left( G_{13}(x) + G_{13}(x) \right) e^{-(G_{13}(x) + G_{13}(x)) t} \, ds_1(x)
\]

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Where $f_{[0,t]}$ represents integrand that is integrated over the interval $[0, t]$

From the hypotheses on $25, 26, 27, 28$ and $29$ it follows

$$|G^{(1)} - G^{(2)}| = |\mathcal{A}_{x}\mathcal{A}_{y}| \leq \frac{1}{|R_{0}|}|(a_{x}^{(1)})^{(1)} + (a_{x}^{(2)})^{(1)} + (a_{y}^{(1)})^{(1)} + (a_{y}^{(2)})^{(1)} - (\mathcal{A}_{x})^{(2)} (\mathcal{A}_{y})^{(2)} d((G^{(1)}, T^{(1)}), G^{(2)}, T^{(2)})|$$

And analogous inequalities for $G_{1}$ and $T_{1}$. Taking into account the hypothesis $(34, 35, 36)$ the result follows

**Remark 1:** The fact that we supposed $(u_{x}^{(1)})^{(1)}$ and $(u_{y}^{(2)})^{(2)}$ depending also on $t$ can be considered as not conformal with the reality, however we have put this hypothesis in order that we can postulate condition necessary to prove the uniqueness of the solution bounded by $(\mathcal{A}_{x})^{(1)} o (\mathcal{A}_{y})^{(2)}$ and $(\mathcal{A}_{x})^{(1)} o (\mathcal{A}_{y})^{(2)}$ respectively on $R_{+}$.

If instead of proving the existence of the solution on $\mathbb{R}_{+}$, we have to prove it only on a compact then it suffices to consider that $(a_{x}^{(1)})^{(1)}$ and $(a_{y}^{(2)})^{(2)}$ depend only on $T_{64}$ and respectively on $G$ (and not on $t$) and hypothesis can replaced by a usual Lipschitz condition.

**Remark 2:** There does not exist any $t$ where $G_{2}(t) = 0$ and $T_{2}(t) = 0$

From $19$ to $24$ it results

$$G_{2}(t) \geq G_{0} e^{-\int_{0}^{t} ((a_{x}^{(1)})^{1} - (a_{x}^{(2)})^{1} (a_{y}^{(1)})^{2} (a_{y}^{(2)})^{2}) dx} \geq 0$$

$$T_{2}(t) \geq T_{0} e^{-\int_{0}^{t} (a_{y}^{(2)})^{2} dx} > 0 \quad \text{for } t > 0$$

**Definition of**

$(\mathcal{B}_{1})^{(1)} = ((\mathcal{B}_{1})^{(1)})^{1}_{x}, ((\mathcal{B}_{1})^{(1)})^{2}_{y}$ and $((\mathcal{B}_{1})^{(1)})^{3}_{z}$.

**Remark 3:** if $G_{25}$ is bounded, the same property have also $G_{24}$ and $G_{25}$, indeed if

$$G_{25} \leq (\mathcal{B}_{1})^{(1)}$$

it follows

$$\frac{dG_{24}}{dt} \leq (\mathcal{B}_{1})^{(1)} - (a_{24})^{(2)} G_{24}$$

and by integrating

$$G_{24} \leq G_{24} e^{(\mathcal{B}_{1})^{(1)}_{x}} + 2(a_{24})^{(2)} ((\mathcal{B}_{1})^{(1)}_{x})^{2} / (a_{24})^{(2)}$$

In the same way, one can obtain

$$G_{25} \leq (\mathcal{B}_{1})^{(1)}_{x} = G_{25} e^{(\mathcal{B}_{1})^{(1)}_{x}} + 2(a_{25})^{(2)} ((\mathcal{B}_{1})^{(1)}_{x})^{2} / (a_{25})^{(2)}$$

If $G_{24}$ or $G_{25}$ is bounded, the same property follows for $G_{25} \times G_{26}$ and $G_{26}$, $G_{24}$ respectively.

**Remark 4:** If $G_{25}$ is bounded, from below, the same property holds for $G_{24}$ and $G_{26}$. The proof is analogous with the preceding one. An analogous property is true if $G_{24}$ is bounded from below.

**Remark 5:** If $T_{24}$ is bounded from below and $\lim_{t \to \infty} ((b_{1})^{(1)} (G(t), t)) = (b_{1})^{(1)}$ then $T_{24} \to \infty$.

**Definition of** $(\varphi_{1})^{(1)}$ and $\varphi_{1}$.
Indeed let $t_1$ be so that for $t > t_1$
\[
(a_4(t) - (a_4')^2 + (a_4'')(t_1) < \sigma_2 T_{14}(t) > (m_2(t))
\]
Then \( \frac{d\bar{b}_{14}}{dt} > (a_4(t)) \) which leads to
\[
T_{14} > \frac{(b_{14}(t_1) - (m_2(t)))}{\sigma_2} + \frac{T_{14}e^{-\sigma_2 t}}{t}
\]
If we take $t$ such that $e^{-\sigma_2 t} = \frac{1}{2}$ it results
\[
T_{14} > \frac{(b_{14}(t_1) - (m_2(t)))}{\sigma_2} + \log \frac{1}{2}e^{-\sigma_2 t}
\]
By taking now $\varepsilon_4$ sufficiently small one sees that $T_{14}$ is unbounded. The same property holds for
\[
T_{14} \text{ if } \lim_{t \to \infty} (b_{14}(t_1) - (m_2(t))) = (b_{14})^2
\]
We now state a more precise theorem about the behaviors at infinity of the solutions of equations 37 to 42.

**Behavior of the solutions of equation 37 to 42**

**Theorem 2:** If we denote and define

**Definition of** \((a_2(t))^{(1)}, (a_2(t))^{(2)}, (a_2(t))^{(3)}, (a_2(t))^{(4)}\):

\[
- (a_2(t))^{(1)} - c_1 (a_2(t))^{(1)} + c_2 (a_2(t))^{(1)} = - (a_2(t))^{(1)}
\]

**Definition of** \((v_2(t))^{(1)}, (v_2(t))^{(2)}, (v_2(t))^{(3)}, (v_2(t))^{(4)}\):

\[
- (v_2(t))^{(1)} - c_1 (v_2(t))^{(1)} + c_2 (v_2(t))^{(1)} = - (v_2(t))^{(1)}
\]

**Definition of** \((u_2(t))^{(1)}, (u_2(t))^{(2)}, (u_2(t))^{(3)}, (u_2(t))^{(4)}\):

\[
- (u_2(t))^{(1)} - c_1 (u_2(t))^{(1)} + c_2 (u_2(t))^{(1)} = - (u_2(t))^{(1)}
\]

**Definition of** \((\gamma_2(t))^{(1)}, (\gamma_2(t))^{(2)}, (\gamma_2(t))^{(3)}, (\gamma_2(t))^{(4)}\):

\[
- (\gamma_2(t))^{(1)} - c_1 (\gamma_2(t))^{(1)} + c_2 (\gamma_2(t))^{(1)} = - (\gamma_2(t))^{(1)}
\]

**Definition of** \((m_2(t))^{(1)}, (m_2(t))^{(2)}, (m_2(t))^{(3)}, (m_2(t))^{(4)}\):

\[
- (m_2(t))^{(1)} - c_1 (m_2(t))^{(1)} + c_2 (m_2(t))^{(1)} = - (m_2(t))^{(1)}
\]

and analogously.
and 

\[
(u_1)^{(1)} = u_1(0), \quad (u_1)^{(2)} = u_1(1), \quad \text{if} \quad (u_1)^{(1)} < (u_1)^{(2)}
\]

\[
(u_2)^{(1)} = u_2(0), \quad (u_2)^{(2)} = u_2(1), \quad \text{if} \quad (u_2)^{(1)} < (u_2)^{(2)}
\]

where \((u_1)^{(1)}, (u_1)^{(2)}\) are defined by 59 and 61 respectively.

Then the solution of 19, 20, 21, 22, 23 and 24 satisfies the inequalities

\[
G_{21} \varepsilon \left[ (S_{11})^{(2)} - (P_{11})^{(2)} \right] \leq G_{21} \varepsilon \left[ (S_{12})^{(2)} \right] \leq G_{21} \varepsilon \left[ (S_{12})^{(2)} \right]
\]

where \((P_{11})^{(2)}\) is defined by equation 25

\[
\frac{1}{(u_2)^{(1)}} \frac{G_{21} \varepsilon \left[ (S_{11})^{(2)} - (P_{11})^{(2)} \right] \varepsilon \left[ (S_{12})^{(2)} \right]}{G_{21} \varepsilon \left[ (S_{12})^{(2)} \right]} \leq \frac{1}{(u_2)^{(1)}} G_{21} \varepsilon \left[ (S_{12})^{(2)} \right] \leq \frac{1}{(u_2)^{(1)}} \frac{G_{21} \varepsilon \left[ (S_{12})^{(2)} \right] \varepsilon \left[ (S_{12})^{(2)} \right]}{G_{21} \varepsilon \left[ (S_{12})^{(2)} \right]}
\]

\[
\frac{1}{(u_2)^{(1)}} \frac{G_{21} \varepsilon \left[ (S_{12})^{(2)} - (P_{12})^{(2)} \right] \varepsilon \left[ (S_{12})^{(2)} \right]}{G_{21} \varepsilon \left[ (S_{12})^{(2)} \right]} \leq \frac{1}{(u_2)^{(1)}} G_{21} \varepsilon \left[ (S_{12})^{(2)} \right] \leq \frac{1}{(u_2)^{(1)}} \frac{G_{21} \varepsilon \left[ (S_{12})^{(2)} \right] \varepsilon \left[ (S_{12})^{(2)} \right]}{G_{21} \varepsilon \left[ (S_{12})^{(2)} \right]}
\]

Definition of \((S_{11})^{(1)} , (S_{12})^{(1)} , (R_{11})^{(1)} , (R_{12})^{(1)}\)

Where

\[
(S_{11})^{(1)} = (a_{11})^{(1)} - (a_{12})^{(1)}
\]

\[
(S_{12})^{(1)} = (a_{11})^{(1)} - (a_{12})^{(1)}
\]

\[
(R_{11})^{(1)} = (b_{11})^{(1)} - (b_{12})^{(1)}
\]

\[
(R_{12})^{(1)} = (b_{11})^{(1)} - (b_{12})^{(1)}
\]

Proof: From 19, 20, 21, 22, 23, 24 we obtain

\[
\frac{\partial v^{(2)}}{\partial t} = \left( (a_{11})^{(2)} - (a_{12})^{(2)} \right) + \left( (a_{11})^{(2)} \right) + \left( (a_{12})^{(2)} \right) + \left( (a_{12})^{(2)} \right) + \left( (a_{12})^{(2)} \right)
\]

Definition of \(v^{(2)}\): 

\[
v^{(2)} = \frac{\partial v^{(2)}}{\partial t}
\]
From which one obtains

**Definition of** \( v_{i1}^{(1)} \), \( v_{i2}^{(1)} \) :-

\[
\begin{align*}
(\text{d}) \quad & 0 \leq \frac{v_{i2}^{(1)}}{v_{i1}^{(1)}} = \frac{g_{2i}}{g_{1i}} \leq \frac{v_{i2}^{(1)}}{v_{i1}^{(1)}} = \frac{f_{2i}}{f_{1i}} \\
\end{align*}
\]

It follows \( v_{i1}^{(1)} \leq v_{i2}^{(1)} \leq (v_{i1}^{(1)})^{2} \)

In the same manner, we get

\[
\begin{align*}
\text{(f)} \quad & 0 \leq \frac{v_{i2}^{(1)}}{v_{i1}^{(1)}} = \frac{g_{2i}}{g_{1i}} \leq \frac{v_{i2}^{(1)}}{v_{i1}^{(1)}} = \frac{f_{2i}}{f_{1i}} \\
\end{align*}
\]

From which we deduce \( v_{i1}^{(1)} \leq v_{i2}^{(1)} \leq (v_{i1}^{(1)})^{2} \)

\[
\begin{align*}
(\text{e}) \quad & 0 \leq \frac{v_{i2}^{(1)}}{v_{i1}^{(1)}} = \frac{g_{2i}}{g_{1i}} \leq \frac{v_{i2}^{(1)}}{v_{i1}^{(1)}} = \frac{f_{2i}}{f_{1i}} \\
\end{align*}
\]

we find like in the previous case,

\[
\begin{align*}
\text{(f)} \quad & 0 \leq \frac{v_{i2}^{(1)}}{v_{i1}^{(1)}} = \frac{g_{2i}}{g_{1i}} \leq \frac{v_{i2}^{(1)}}{v_{i1}^{(1)}} = \frac{f_{2i}}{f_{1i}} \\
\end{align*}
\]

we obtain

\[
\begin{align*}
\text{(e)} \quad & 0 \leq \frac{v_{i2}^{(1)}}{v_{i1}^{(1)}} = \frac{g_{2i}}{g_{1i}} \leq \frac{v_{i2}^{(1)}}{v_{i1}^{(1)}} = \frac{f_{2i}}{f_{1i}} \\
\end{align*}
\]

And so with the notation of the first part of condition (c), we have

**Definition of** \( v_{i2}^{(1)} \) :-

\[
\begin{align*}
(\text{m}_{i2}^{(1)})^{2} \leq v_{i2}^{(1)} \leq (\text{m}_{i1}^{(1)})^{2} \quad \Rightarrow \quad \frac{v_{i2}^{(1)}}{v_{i1}^{(1)}} = \frac{g_{2i}}{g_{1i}} \\
\end{align*}
\]

In a completely analogous way, we obtain

**Definition of** \( u_{i2}^{(1)} \) :-

\[
\begin{align*}
(\text{n}_{i2}^{(1)})^{2} \leq u_{i2}^{(1)} \leq (\text{n}_{i1}^{(1)})^{2} \quad \Rightarrow \quad \frac{u_{i2}^{(1)}}{u_{i1}^{(1)}} = \frac{g_{2i}}{g_{1i}} \\
\end{align*}
\]

Now, using this result and replacing it in 19, 20, 21, 22, 23, and 24 we get easily the result stated in the theorem.

**Particular case** :
If \((a_{12})^{(i)} = (a_{24})^{(i)}\), then \((a_{12})^{(i)} = (a_{24})^{(i)}\) and in this case \((v_{12})^{(i)} = (v_{24})^{(i)}\) if in addition \((v_{25})^{(i)} = (v_{14})^{(i)}\) then \(v_{12}^{(i)}(z) = (v_{24})^{(i)}\) and as a consequence \(c_{25}(z) = (v_{25})^{(i)}(z)\) this also defines \((u_{25})^{(i)}\) for the special case.

Analogously if \((u_{12})^{(i)} = (u_{24})^{(i)}\) then \((u_{12})^{(i)} = (u_{24})^{(i)}\) and then \((u_{12})^{(i)} = (u_{24})^{(i)}\) if in addition \((u_{12})^{(i)} = (u_{24})^{(i)}\) then \(T_{12}^{(i)} = (u_{24})^{(i)}(z)\) This is an important consequence of the relation between \((v_{12})^{(i)}\) and \((v_{12})^{(i)}\) and definition of \((u_{25})^{(i)}\).

5. STATIONARY SOLUTIONS AND STABILITY

Stationary solutions and stability curve representative of the variation of CCFSC consumption due to ONM vis-à-vis ONM curve lies below the tangent at \(G = G_0\) for \(G < G_0\) and above the tangent for \(G > G_0\). Wherever such a situation occurs the point \(G_0\) is called the “point of inflexion”. In this case, the tangent has a positive slope that simply means the rate of change of CCFSC is greater than zero. Above factor shows that it is possible, to draw a curve that has a point of inflexion at a point where the tangent (slope of the curve) is horizontal.

Stationary value:

In all the cases \(G = G_0\), \(G < G_0\), \(G > G_0\) the condition that the rate of change of CCFSC is maximum or minimum holds. When this condition holds we have stationary value. We now infer that:

6. A necessary and sufficient condition for there to be stationary value of \(G\) is that the rate of change of CCFSC function at \(G_0\) is zero.

7. A sufficient condition for the stationary value at \(G_0\), to be maximum is that the acceleration of the CCFSC is less than zero.

8. A sufficient condition for the stationary value at \(G_2\), be minimum is that acceleration of CCFSC is greater than zero.

9. With the rate of change of \(G\) namely CCFSC defined as the accentuation term and the dissipation term, we are sure that the rate of change of CCFSC is always positive.

10. Concept of stationary state is mere methodology although there might be closed system exhibiting symptoms of stationariness.

We can prove the following

**Theorem 3:** If \((a_{ij})^{(i)}\) and \((b_{ij})^{(i)}\) are independent on \(z\), and the conditions (with the notations 25,26,27,28)

\[
\begin{align*} 
(a_{12}^{(i)} - a_{24}^{(i)}) & < 0 \\
(a_{12}^{(i)} - a_{24}^{(i)}) & > 0 \\
(b_{12}^{(i)} - b_{24}^{(i)}) & < 0 \\
(b_{12}^{(i)} - b_{24}^{(i)}) & > 0
\end{align*}
\]

with \((u_{12})^{(i)}\) and \((u_{24})^{(i)}\) as defined by equation 25 are satisfied, then the system

\[
\begin{align*} 
(a_{12}^{(i)} - a_{24}^{(i)})G_{24} - \{(a_{12}^{(i)} + a_{25}^{(i)}(T_{12})G_{25} & = 0 \\
(a_{12}^{(i)} - a_{24}^{(i)})G_{25} - \{(a_{12}^{(i)} + a_{25}^{(i)}(T_{12})G_{25} & = 0 \\
(a_{12}^{(i)} - a_{24}^{(i)})G_{24} - \{(a_{12}^{(i)} + a_{25}^{(i)}(T_{12})G_{25} & = 0
\end{align*}
\]
Theorem 4: If the conditions of the previous theorem are satisfied and if the functions \( \{a_i^e\}^T \) and \( \{b_i^e\}^T \) Belong to \( C^{(2)}(\mathbb{R}_+^n) \) then the above equilibrium point is asymptotically stable.

Proof: Denote

Definition of \( \mathfrak{G}, \mathfrak{T} \): -

Asymptotic stability analysis

\( (b_{24})^{(1)} T_{24} - [(b_{24})^{(1)} - (b_{24})^{(1)} (G)] T_{24} = 0 \)

\( (b_{24})^{(1)} T_{24} - [(b_{24})^{(1)} - (b_{24})^{(1)} (G)] T_{24} = 0 \)

\( (b_{24})^{(1)} T_{24} - [(b_{24})^{(1)} - (b_{24})^{(1)} (G)] T_{24} = 0 \)

has a unique positive solution, which is an equilibrium solution for the system (19 to 24)

**Proof:**

(a) Indeed the first two equations have a nontrivial solution \( G_{22}, G_{24} \) if

\[
F (T) = (c_{12})^{(1)} (c_{14})^{(1)} - (c_{12})^{(1)} (c_{14})^{(1)} + (c_{12})^{(1)} (c_{14})^{(1)} (T_{14}) + (c_{12})^{(1)} (c_{14})^{(1)} (T_{14}) + (c_{12})^{(1)} (c_{14})^{(1)} (T_{14}) = 0
\]

**Definition and uniqueness of \( T_{24} \):**

After hypothesis \( f(0) < 0, f(\infty) > 0 \) and the functions \( \{a_i^e\}^T (T_{24}) \) being increasing, it follows that there exists a unique \( T_{24}^* \) for which \( F (T_{24}) = 0 \). With this value, we obtain from the three first equations

\[
G_{22} = \frac{a_{22} T_{24}^*}{ [(a_{22})^T (a_{22})^{(1)} (T_{24}^*)] } \quad , \quad G_{24} = \frac{a_{24} T_{24}^*}{ [(a_{24})^T (a_{24})^{(1)} (T_{24}^*)] }
\]

(c) By the same argument, the equations 92,93 admit solutions \( G_{22}, G_{24} \) if

\[
\Phi (G) = (b_{12})^{(1)} (b_{14})^{(1)} - (b_{12})^{(1)} (b_{14})^{(1)} - (b_{24})^{(1)} (b_{24})^{(1)} -
\]

\[
[(b_{12})^{(1)} (b_{14})^{(1)} (G) + (b_{24})^{(1)} (b_{24})^{(1)} (G)] + (b_{12})^{(1)} (b_{14})^{(1)} (G) = 0
\]

Where in \( \mathfrak{G} (G_{22}, G_{22}, G_{24}) \), \( G_{22}, G_{24} \) must be replaced by their values from 96. It is easy to see that \( \Phi \) is a decreasing function in \( G_{24} \) taking into account the hypothesis \( \Phi (0) > 0, \Phi (\infty) < 0 \) it follows that there exists a unique \( G_{24}^* \) such that \( \Phi (G^*) = 0 \)

Finally we obtain the unique solution of 89 to 94

\[
G_{22} \text{ given by } \Phi (G^*) = 0 , T_{24}^* \text{ given by } f(T_{24}) = 0 \quad \text{and}
\]

\[
G_{22} = \frac{a_{22} T_{24}^*}{ [(a_{22})^T (a_{22})^{(1)} (T_{24}^*)] } \quad , \quad G_{24} = \frac{a_{24} T_{24}^*}{ [(a_{24})^T (a_{24})^{(1)} (T_{24}^*)] }
\]

\[
T_{24} = \frac{b_{24} T_{24}^*}{ [(b_{24})^T (b_{24})^{(1)} (T_{24}^*)] } \quad , \quad T_{24} = \frac{b_{24} T_{24}^*}{ [(b_{24})^T (b_{24})^{(1)} (T_{24}^*)] }
\]

Obviously, these values represent an equilibrium solution of 19,20,21,22,23,24

**Asymptotic Stability Analysis**

**Theorem 4:** If the conditions of the previous theorem are satisfied and if the functions \( \{a_i^e\}^T \) and \( \{b_i^e\}^T \) Belong to \( C^{(2)}(\mathbb{R}_+^n) \) then the above equilibrium point is asymptotically stable.
\[ G_i = G_i^0 + G_i^1 \quad T_i = T_i^0 + T_i^1 \]

\[ \frac{\partial (G_i^0)_{(1)}}{\partial G_j} (T_i^0) = (q_{16})_{(1)} \quad \frac{\partial (G_i^1)_{(1)}}{\partial G_j} (G^0) = G_j^0 \]

Then taking into account equations 89 to 94 and neglecting the terms of power 2, we obtain from 19 to 24:

\[ \frac{\partial G_i}{\partial t} = -((G_{15})_{(1)}^2 + (G_{14})_{(1)}^2)G_{14} + (G_{24})_{(1)}^2 G_{24} - (G_{15})_{(2)}^2 G_{15} T_{15} \]

\[ \frac{\partial G_i}{\partial t} = -((G_{14})_{(1)}^2 + (G_{13})_{(1)}^2)G_{13} + (G_{24})_{(1)}^2 G_{24} - (G_{13})_{(2)}^2 G_{13} T_{13} \]

\[ \frac{\partial G_i}{\partial t} = -((G_{13})_{(1)}^2 + (G_{12})_{(1)}^2)G_{12} + (G_{24})_{(1)}^2 G_{24} - (G_{12})_{(2)}^2 G_{12} T_{12} \]

\[ \frac{\partial G_i}{\partial t} = -((G_{12})_{(1)} - (G_{11})_{(1)})T_{11} + (b_{23})_{(1)}^2 T_{23} + \Sigma_{j=1}^{10} (G_{10})_{(1)} T_{10} G_j \]

\[ \frac{\partial G_i}{\partial t} = -((G_{11})_{(1)} - (G_{10})_{(1)})T_{10} + (b_{22})_{(1)}^2 T_{22} + \Sigma_{j=1}^{10} (G_{10})_{(1)} T_{10} G_j \]

\[ \frac{\partial G_i}{\partial t} = -((G_{10})_{(1)} - (G_{10})_{(1)})T_{10} + (b_{21})_{(1)}^2 T_{21} + \Sigma_{j=1}^{10} (G_{10})_{(1)} T_{10} G_j \]

The characteristic equation of this system is

\[ \begin{align*}
(\lambda)^{10} &+ (b_{23})_{(1)}^2 \lambda^{9} + (b_{22})_{(1)}^2 \lambda^{8} + (b_{21})_{(1)}^2 \lambda^{7} + (G_{10})_{(1)}^2 \lambda^{6} + (G_{10})_{(1)}^2 \lambda^{5} \\
&+ (G_{10})_{(1)}^2 \lambda^{4} + (G_{10})_{(1)}^2 \lambda^{3} + (G_{10})_{(1)}^2 \lambda^{2} + (G_{10})_{(1)}^2 \lambda + (G_{10})_{(1)}^2 \\
&= 0
\end{align*} \]

And as one sees, all the coefficients are positive. It follows that all the roots have negative real part, and this proves the theorem.
More often than not, models begin with the assumption of ‘steady state’ and then proceed to trace out the path, which will be followed when the steady state is subjected to some kind of exogenous disturbance. Breathing pattern of terrestrial organisms is another parametric representation to be taken into consideration. It cannot be taken for granted that the sequence generated in this manner will tend to equilibrium i.e. a traverse from one steady state to another.

In our model, we have, using the tools and techniques by Haimovici, Levin, Volterra, Lotka have brought out implications of steady state, stability, asymptotic stability, behavioral aspects of the solution without any such assumptions, such as those mentioned in the foregoing.

**IN THE FOLLOWING, WE GIVE EQUATIONS FOR THE QCD-QGP-CCFSC-ONM SYSTEM. Solutions and sine-qua-non theoretical aspects are dealt in the next paper (part II)**

**GOVERNING EQUATIONS**

**CCFSC**

\[
\frac{dG_{12}}{dt} = (\alpha_{12})^{(12)} G_{14} - (\alpha_{12})^{(1)} G_{13}
\]

\[
\frac{dG_{41}}{dt} = (\alpha_{41})^{(1)} G_{14} - (\alpha_{41})^{(12)} G_{44}
\]

\[
\frac{dG_{13}}{dt} = (\alpha_{13})^{(12)} G_{14} - (\alpha_{13})^{(1)} G_{13}
\]

**ONM**

\[
\frac{dT_{14}}{dt} = (\beta_{14})^{(12)} T_{14} - (\beta_{14})^{(1)} T_{15}
\]

\[
\frac{dT_{15}}{dt} = (\beta_{15})^{(12)} T_{15} - (\beta_{15})^{(1)} T_{14}
\]

\[
\frac{dT_{16}}{dt} = (\beta_{16})^{(12)} T_{16} - (\beta_{16})^{(1)} T_{17}
\]

**QCD**

\[
\frac{dG_{13}}{dt} = (\alpha_{13})^{(12)} G_{14} - (\alpha_{13})^{(1)} G_{19}
\]

\[
\frac{dG_{17}}{dt} = (\alpha_{17})^{(12)} G_{19} - (\alpha_{17})^{(1)} G_{19}
\]

\[
\frac{dG_{19}}{dt} = (\alpha_{19})^{(12)} G_{17} - (\alpha_{19})^{(1)} G_{19}
\]

**QGP**

\[
\frac{dT_{17}}{dt} = (\beta_{17})^{(12)} T_{17} - (\beta_{17})^{(1)} T_{19}
\]

\[
\frac{dT_{19}}{dt} = (\beta_{19})^{(12)} T_{19} - (\beta_{19})^{(1)} T_{17}
\]
\[
\frac{d}{dt} = \begin{bmatrix}
(b_{12})^{(1)}T_{12} - (b_{13})^{(1)}T_{13} \\
(b_{23})^{(2)}T_{23} - (b_{24})^{(2)}T_{24} \\
(b_{34})^{(3)}T_{34} - (b_{35})^{(3)}T_{35}
\end{bmatrix}
\]

GOVERNING EQUATIONS OF DUAL CONCATENATED SYSTEMS

**CCFSC-ONM**

**CCFSC**

\[
\frac{d}{dt} = \begin{bmatrix}
(a_{12})^{(1)}G_{12} - \left[ (a_{13})^{(1)}G_{13} + (a_{14})^{(1)}T_{14}, z \right] G_{12} \\
(a_{23})^{(2)}G_{23} - \left[ (a_{24})^{(2)}G_{24} + (a_{25})^{(2)}T_{25}, z \right] G_{23} \\
(a_{34})^{(3)}G_{34} - \left[ (a_{35})^{(3)}G_{35} + (a_{36})^{(3)}T_{36}, z \right] G_{34}
\end{bmatrix}
\]

Where are first augmentation coefficients for category 1, 2 and 3 due to ONM

**ONM**

\[
\frac{d}{dt} = \begin{bmatrix}
(b_{12})^{(1)}T_{12} - \left[ (b_{13})^{(1)}T_{13} - (b_{14})^{(1)}G_{14}, z \right] T_{12} \\
(b_{23})^{(2)}T_{23} - \left[ (b_{24})^{(2)}T_{24} - (b_{25})^{(2)}G_{25}, z \right] T_{23} \\
(b_{34})^{(3)}T_{34} - \left[ (b_{35})^{(3)}T_{35} - (b_{36})^{(3)}G_{36}, z \right] T_{34}
\end{bmatrix}
\]

Where \(- (b_{12})^{(1)}(G, z), - (b_{23})^{(2)}(G, z), - (b_{34})^{(3)}(G, z)\) are first detrition coefficients for category 1, 2 and 3 due to CCFSC

QGP dissipates laws of QCD

**QCD**

\[
\frac{d}{dt} = \begin{bmatrix}
(a_{12})^{(1)}G_{12} - \left[ (a_{13})^{(1)}G_{13} + (a_{14})^{(1)}T_{14}, z \right] G_{12} \\
(a_{23})^{(2)}G_{23} - \left[ (a_{24})^{(2)}G_{24} + (a_{25})^{(2)}T_{25}, z \right] G_{23} \\
(a_{34})^{(3)}G_{34} - \left[ (a_{35})^{(3)}G_{35} + (a_{36})^{(3)}T_{36}, z \right] G_{34}
\end{bmatrix}
\]

Where are first augmentation coefficients for category 1, 2 and 3 due to QGP

**QGP**

\[
\frac{d}{dt} = \begin{bmatrix}
(b_{12})^{(1)}T_{12} - \left[ (b_{13})^{(1)}T_{13} - (b_{14})^{(1)}G_{14}, z \right] T_{12} \\
(b_{23})^{(2)}T_{23} - \left[ (b_{24})^{(2)}T_{24} - (b_{25})^{(2)}G_{25}, z \right] T_{23} \\
(b_{34})^{(3)}T_{34} - \left[ (b_{35})^{(3)}T_{35} - (b_{36})^{(3)}G_{36}, z \right] T_{34}
\end{bmatrix}
\]

Where \(- (b_{12})^{(1)}(G, z), - (b_{23})^{(2)}(G, z), - (b_{34})^{(3)}(G, z)\) are first detrition coefficients for category 1, 2 and 3 QGP dissipating QCD

GOVERNING EQUATIONS OF CONCATENATED SYSTEM OF TWO CONCATENATED DUAL SYSTEMS

**QCD**

\[
\frac{d}{dt} = \begin{bmatrix}
(a_{12})^{(1)}G_{12} - \left[ (a_{13})^{(1)}G_{13} + (a_{14})^{(1)}T_{14}, z \right] G_{12} \\
(a_{23})^{(2)}G_{23} - \left[ (a_{24})^{(2)}G_{24} + (a_{25})^{(2)}T_{25}, z \right] G_{23} \\
(a_{34})^{(3)}G_{34} - \left[ (a_{35})^{(3)}G_{35} + (a_{36})^{(3)}T_{36}, z \right] G_{34}
\end{bmatrix}
\]

Where are first augmentation coefficients for category 1, 2 and 3 due to QGP

\[
\frac{d}{dt} = \begin{bmatrix}
-(b_{12})^{(1)}(T_{12}, z) \\
-(b_{23})^{(2)}(T_{23}, z) \\
-(b_{34})^{(3)}(T_{34}, z)
\end{bmatrix}
\]

are second detrition coefficients for category 1, 2 and 3 due to ONM

**ONM**

\[
\frac{d}{dt} = \begin{bmatrix}
(b_{12})^{(1)}T_{12} - \left[ (b_{13})^{(1)}T_{13} - (b_{14})^{(1)}G_{14}, z \right] T_{12} \\
(b_{23})^{(2)}T_{23} - \left[ (b_{24})^{(2)}T_{24} - (b_{25})^{(2)}G_{25}, z \right] T_{23} \\
(b_{34})^{(3)}T_{34} - \left[ (b_{35})^{(3)}T_{35} - (b_{36})^{(3)}G_{36}, z \right] T_{34}
\end{bmatrix}
\]

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Where are first detrition coefficients for category 1, 2 and 3 due to CCFSC

QCD

CCFSC:

Where are first augmentation coefficients for category 1, 2 and 3 due to QGP

Where are second detrition coefficients for category 1, 2 and 3 due to QGP

Where are first detrition coefficients for category 1, 2 and 3 due to CCFSC

Where are second augmentation coefficients for category 1, 2 and 3 due to ONM

Where are first augmentation coefficients for category 1, 2 and 3 due to ONM

Where are first detrition coefficients for category 1, 2 and 3 due to QCD
Where are first augmentation coefficients for category 1, 2 and 3 due to QGP

And are second augmentation coefficient for category 1, 2 and 3 due to ONM

Where are first detrition coefficients for category 1, 2 and 3 due to CCFSC

are second detrition coefficient for category 1, 2 and 3 due to QCD

are first augmentation coefficients for category 1, 2 and 3 due to CCFSC

are second augmentation coefficient for category 1, 2 and 3 due to QGP

are first detrition coefficients for category 1, 2 and 3 due to QCD

are second detrition coefficients for category 1, 2 and 3 due to CCFSC

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REFERENCES


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Job Satisfaction among Library Professionals in Haryana State

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2P.D.M. College of Engineering, Bahadurgarh (Haryana)-India

Abstract- The objective of this study is to examine those factors which are related in a high manner to job satisfaction among library workers. Data were collected from a sample of 100 library professionals from private engineering and management colleges in Haryana state. The data analyses indicated that job satisfaction among library professionals is not related to their sex, the type of library in which they worked, or their vocational needs, but it is related to the characteristics of their job environments. The supervisory climate and the essential characteristics of the job itself are the two most important determinants of job satisfaction. Interpretation of the data suggests that a supervisory climate which permits a librarian to exercise initiative and professional judgment in the performance of the job is conducive to job satisfaction. This study contributes to the LIS literature and practice in the following two ways: first, this study provides new knowledge concerning the job satisfaction factors of library professionals. Second, the new knowledge may help library and information managers to develop effective managerial approaches.

Index Terms- Job Satisfaction, Digital Environment, Occupational Stress, Library Professionals

I. INTRODUCTION

Job satisfaction has been of interest to organizational researchers, because of its relationships with job performance and/or organizational commitment. More importantly, employed individuals spend most of the time doing their job works. As a result, the feelings of individual about their jobs are likely to affect those impacting on their general lives. Job Satisfaction: Job is an occupational act which carried out by an individual in return for a reward. Satisfaction refers to the way one feels about events, rewards, people, relation and amount of mental gladness on the job. Job satisfaction is also an emotional response to a job situation which cannot be seen, it is only be inferred and simply how the people feel about their job and different aspects of it. The job satisfaction and job attitudes are the alternate terms and typically used interchangeably. Both refer to affective orientations on the part of individuals toward work roles which they are presently occupying. Positive attitudes toward the job are conceptually equivalent to job satisfaction and negative attitudes towards the job are equivalent to job dissatisfaction. Job satisfaction is governed, to a large extent, by perception and expectations of the working people. Any discrepancy between aspirations and perceptions account for dissatisfaction. Several authors have stressed the significance and importance of job as a source of satisfaction. Apart from wealth, work also provides many other things to a person such as sense of doing something worthwhile, having some aims in life and brings some status in the society.

Definitions of Job Satisfaction: Edwin Locke's (1976) classic definition of job satisfaction has been widely cited in the literature. Locke defines job satisfaction as “a pleasurable or positive emotional state resulting from an appraisal of one’s job or job experiences” (p. 1300). Similarly, Hackman & Oldham (1975) provide an implicit definition of job satisfaction as one’s affective reactions to his/her job in their Job Characteristics Model.

II. LITERATURE REVIEW

The literature review is not comprehensive, but is rather limited to the areas concerning the job satisfaction of library employees, and the job satisfaction of other types of employees in various organizational settings. I will examine specific important factors affecting job satisfaction in the literature, from which I will complete my research hypotheses.

Fleck and Bawden (1995) made a study designed to provide information on the perception of the library and information professional. Results show that LIS was highly regarded by its users but seen as fulfilling very much a service oriented and reactive function rather than a dynamic or proactive function. LIS professionals are regarded as being efficient, intelligent and helpful, possessing specialized knowledge, and undertaking a range of tasks beyond the routine and traditional. But, Kaya, (1995) found that the job satisfaction in developing countries is lower than that of developed countries. Unless librarians secure peer status through adherence to core academic standards, the emerging era of electronic information will see domination in the librarians influence over librarians affairs. Burd (2003) found that librarians in organizations that support participatory management, open communication, opportunities for achievement and relationships built on honesty and trust are more satisfied and committed and less likely to leave. Sornam and Sudha (2003) said that library profession is a people oriented profession which cannot escape from the clutches of conflicts and “frustrations and age, mental status and years of experience have an impact on occupational role stress”. Srivastava & Srivastava, (2004) said that satisfaction about nature of job can be increased through job environment, training on IT and good monetary gains. “Librarians of the colleges and other educational institutions should be provided training about the advanced information technology”. Libraries are often challenged to offer the kinds of work environments that these new professionals prefer” (Patillo Morgan and Morgan, 2009). Bii and Wanyama
Hypothesis: There is no association between Marital Status and Job Satisfaction factors. 

**Chi square -Test for the association between Library Professional (Rural/Urban) and Job Satisfaction factors among library professionals**

Hypothesis: H\(_0\) There is no association between Library Professional (Rural/Urban) factors and Job Satisfaction.

H\(_1\) There is association between Library Professional (Rural/Urban) factors and Job Satisfaction.

### III. RESEARCH METHODOLOGY

This study used a descriptive survey design. The purpose of descriptive surveys, according to Ezeani (1998), is to collect detailed and factual information that describes an existing phenomenon. The target population of the study was library professionals of private engineering and management colleges in Haryana. A total enumeration sampling technique was used to select 100 library professionals. The breakdown is given in Data Interpretation.

### IV. DATA INTERPRETATION

In respondents 57% are male and 43% are female, 39% are married and 61% are unmarried. 63% respondents have supervisory designation and 37% have non-supervisory designation. 91% library professionals are involved in IT but 9% are not involved. In respondents 71% library professionals belong to Urban and 29% belong to Rural.

#### Chi square -Test for the association between Gender and Job Satisfaction factors among library professionals

**Hypothesis:** H\(_0\) There is no association between Gender and Job Satisfaction factors.

H\(_1\) There is association between Gender and Job Satisfaction factors.

#### Table 1

**Gender * Job Satisfaction Cross tabulation**

<table>
<thead>
<tr>
<th>Gender</th>
<th>Job Satisfaction</th>
<th>Count</th>
<th>Expected Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>1.00</td>
<td>2</td>
<td>1.7</td>
</tr>
<tr>
<td></td>
<td>2.00</td>
<td>8</td>
<td>9.1</td>
</tr>
<tr>
<td></td>
<td>3.00</td>
<td>11</td>
<td>10.3</td>
</tr>
<tr>
<td></td>
<td>4.00</td>
<td>24</td>
<td>22.2</td>
</tr>
<tr>
<td></td>
<td>5.00</td>
<td>12</td>
<td>13.7</td>
</tr>
<tr>
<td>Female</td>
<td>1.00</td>
<td>1</td>
<td>1.3</td>
</tr>
<tr>
<td></td>
<td>2.00</td>
<td>8</td>
<td>6.9</td>
</tr>
<tr>
<td></td>
<td>3.00</td>
<td>7</td>
<td>7.7</td>
</tr>
<tr>
<td></td>
<td>4.00</td>
<td>15</td>
<td>16.8</td>
</tr>
<tr>
<td></td>
<td>5.00</td>
<td>12</td>
<td>10.3</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>36</td>
<td>43</td>
</tr>
<tr>
<td></td>
<td>Expected Count</td>
<td>3.0</td>
<td>18</td>
</tr>
<tr>
<td></td>
<td></td>
<td>16.0</td>
<td>39</td>
</tr>
<tr>
<td></td>
<td></td>
<td>18.0</td>
<td>24</td>
</tr>
<tr>
<td></td>
<td></td>
<td>39.0</td>
<td>24.0</td>
</tr>
<tr>
<td></td>
<td></td>
<td>24.0</td>
<td>100</td>
</tr>
</tbody>
</table>

#### Table 2

**Chi-Square Tests**

<table>
<thead>
<tr>
<th>Value</th>
<th>Df</th>
<th>Asymp. Sig. (2-sided)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pearson Chi-Square</td>
<td>1.366a</td>
<td>4</td>
</tr>
</tbody>
</table>

#### Table 3

**Library Professional (Urban/Rural) * Job Satisfaction Cross tabulation**

<table>
<thead>
<tr>
<th>Library Professional (Urban/Rural)</th>
<th>Job Satisfaction</th>
<th>Count</th>
<th>Expected Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>Urban</td>
<td>1.00</td>
<td>2</td>
<td>2.1</td>
</tr>
<tr>
<td>Urban</td>
<td>2.00</td>
<td>10</td>
<td>11.4</td>
</tr>
<tr>
<td>Urban</td>
<td>3.00</td>
<td>14</td>
<td>12.8</td>
</tr>
<tr>
<td>Urban</td>
<td>4.00</td>
<td>28</td>
<td>27.7</td>
</tr>
<tr>
<td>Urban</td>
<td>5.00</td>
<td>17</td>
<td>17.0</td>
</tr>
<tr>
<td>Rural</td>
<td>1.00</td>
<td>9</td>
<td>4.6</td>
</tr>
<tr>
<td>Rural</td>
<td>2.00</td>
<td>6</td>
<td>5.2</td>
</tr>
<tr>
<td>Rural</td>
<td>3.00</td>
<td>4</td>
<td>11.3</td>
</tr>
<tr>
<td>Rural</td>
<td>4.00</td>
<td>11</td>
<td>7.0</td>
</tr>
<tr>
<td>Rural</td>
<td>5.00</td>
<td>7</td>
<td>29.0</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>18</td>
<td>71.0</td>
</tr>
</tbody>
</table>

#### Table 4

**Chi-Square Tests**

<table>
<thead>
<tr>
<th>Value</th>
<th>Df</th>
<th>Asymp. Sig. (2-sided)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pearson Chi-Square</td>
<td>1.003a</td>
<td>4</td>
</tr>
<tr>
<td>Likelihood Ratio</td>
<td>.997</td>
<td>4</td>
</tr>
<tr>
<td>Linear-by-Linear Association</td>
<td>.136</td>
<td>1</td>
</tr>
</tbody>
</table>

#### Table 5

**Marital Status * Job Satisfaction Cross tabulation**

<table>
<thead>
<tr>
<th>Marital Status</th>
<th>Job Satisfaction</th>
<th>Count</th>
<th>Expected Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>Married</td>
<td>1.00</td>
<td>1</td>
<td>1.2</td>
</tr>
<tr>
<td>Married</td>
<td>2.00</td>
<td>6</td>
<td>6.2</td>
</tr>
<tr>
<td>Married</td>
<td>3.00</td>
<td>8</td>
<td>7.0</td>
</tr>
<tr>
<td>Married</td>
<td>4.00</td>
<td>15</td>
<td>15.2</td>
</tr>
<tr>
<td>Married</td>
<td>5.00</td>
<td>9</td>
<td>9.4</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>39</td>
<td>39.0</td>
</tr>
</tbody>
</table>

Interpretation: Tabulated value is 9.488. Since calculated value is 1.003 and it is less than tabulated value. The H\(_0\) is accepted.

Chi square -Test for the association between Marital Status and Job Satisfaction factors among library professionals

**Hypothesis:** H\(_0\) There is no association between Marital Status and Job Satisfaction factors.

H\(_1\) There is association between Marital Status and Job Satisfaction factors.
Hypothesis: H₀: There is no association between Supervisory Status and Job Satisfaction factors.
H₁: There is association between Supervisory Status and Job Satisfaction factors.

Table 6

<table>
<thead>
<tr>
<th>Supervisory Status</th>
<th>Job Satisfaction</th>
<th>Count</th>
<th>Expected Count</th>
<th>Value</th>
<th>df</th>
<th>Asymp. Sig. (2-sided)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supervisory</td>
<td>No</td>
<td>9.2</td>
<td>9.1</td>
<td>.004</td>
<td>1</td>
<td>.948</td>
</tr>
<tr>
<td></td>
<td>Yes</td>
<td>11.0</td>
<td>11.0</td>
<td>.004</td>
<td>1</td>
<td>.948</td>
</tr>
<tr>
<td>Non Supervisory</td>
<td>No</td>
<td>10.9</td>
<td>10.9</td>
<td>.004</td>
<td>1</td>
<td>.948</td>
</tr>
<tr>
<td></td>
<td>Yes</td>
<td>11.5</td>
<td>11.5</td>
<td>.004</td>
<td>1</td>
<td>.948</td>
</tr>
<tr>
<td>Total</td>
<td>No</td>
<td>20.1</td>
<td>20.1</td>
<td>.004</td>
<td>1</td>
<td>.948</td>
</tr>
<tr>
<td></td>
<td>Yes</td>
<td>22.5</td>
<td>22.5</td>
<td>.004</td>
<td>1</td>
<td>.948</td>
</tr>
<tr>
<td>N of Valid Cases</td>
<td></td>
<td>100</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Interpretation: Tabulated value is 9.488. Since calculated value is .004 and it is less than tabulated value, The H₀ is accepted.

Table 7

<table>
<thead>
<tr>
<th>Supervisory Status</th>
<th>Involvement in IT</th>
<th>Count</th>
<th>Expected Count</th>
<th>Value</th>
<th>df</th>
<th>Asymp. Sig. (2-sided)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supervisory</td>
<td>Involved</td>
<td>7.8</td>
<td>7.8</td>
<td>.558</td>
<td>1</td>
<td>.324</td>
</tr>
<tr>
<td></td>
<td>Not Involved</td>
<td>9.2</td>
<td>9.2</td>
<td>.307</td>
<td>1</td>
<td>.576</td>
</tr>
<tr>
<td>Non Supervisory</td>
<td>Involved</td>
<td>9.4</td>
<td>9.4</td>
<td>.558</td>
<td>1</td>
<td>.324</td>
</tr>
<tr>
<td></td>
<td>Not Involved</td>
<td>11.0</td>
<td>11.0</td>
<td>.307</td>
<td>1</td>
<td>.576</td>
</tr>
<tr>
<td>Total</td>
<td>Involved</td>
<td>17.2</td>
<td>17.2</td>
<td>.558</td>
<td>1</td>
<td>.324</td>
</tr>
<tr>
<td></td>
<td>Not Involved</td>
<td>20.2</td>
<td>20.2</td>
<td>.307</td>
<td>1</td>
<td>.576</td>
</tr>
<tr>
<td>N of Valid Cases</td>
<td></td>
<td>100</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Interpretation: Tabulated value is 9.488. Since calculated value is .558 and it is less than tabulated value, The H₀ is accepted.

V. FINDINGS AND SUGGESTIONS

The results of the comparisons are summarized as follows:

Chi square - Test for the association between Involvement in IT and Job Satisfaction factors among library professionals

Hypothesis: H₀: There is no association between Involvement in IT and Job Satisfaction factors.
H₁: There is association between Involvement in IT and Job Satisfaction factors.

Interpretation: Tabulated value is 9.488. Since calculated value is 9.457 and it is less than tabulated value, The H₀ is accepted.
current scenario, the library professionals do not identify their position in the organization they serve and in the society they live. To solve the identity crisis, their present designations as Librarian, Catalogue Assistant, Reference Librarian, Archivist etc. may be changed to Scientist, Jr. Scientist, Sr. Scientist, and Information Scientist etc.

The findings of the present study are reasonably limited in its scope with regard to many aspects. The results can be made more elaborate if a number of future scientific enquiries are conducted in this area. Hence the following research areas are identified and suggested for further research on the job satisfaction of library professionals. The study can be extended to identify the pattern of relationship among different dimensions of job satisfaction of library professionals. A factor comparison of job satisfaction of library professionals in Haryana with respect to select variables can be made. A study can be conducted to explore the relationship between Job Satisfaction, Quality of Work Life and Occupational Stress of semi-professionals in the libraries and to compare the results with that of professional librarians. Job Satisfaction, Quality of Work Life and Occupational Stress of other professionals like teachers and scientists can be explored and compared with that of librarians.

REFERENCES


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Religion and Industrialization

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Abstract- Divine view is to industrialization a part of the process of economic development. It has been pointed out frequently enough that the concept of industrialization and commerce can well be found in the divine sources. Because all that subscribe to the divine rules of governance become Ibadah (form of worship), hence industrialization within the religious ambit is also an Ibadah. Divine messages, therefore, stresses both the moral quality and skills in the production of goods. People are getting benefits from industry from different ways, sometimes their ritual prayers have been done comfortably through the well supports from industrial goods and services. As per common observation devotee don’t find any relationship of industrialization with divine messages. In this paper an effort has been taken to present the divine messages with regard to industrialization.

Index Terms- Industry, religion, Services, Resources, obligations.

I. INTRODUCTION AND GENERAL CONCEPTION ABOUT INDUSTRIALIZATION

Industry and industrialization are general and appealing issues in modern science millennium. All concerned are trying to enhance this area through their efforts due to its devastating requirements for person, society and nation as a whole. People are getting benefits from industry from different ways, sometimes their ritual prayers have been done comfortably through the well supports from industrial goods and services. As per common observation devotee don’t find any relationship of industrialization with divine messages.

One commonly heard definition of industrialization is the transformation of an economic society built largely on mechanized industry rather than agriculture, craftsmanship or commerce. However, this definition has the tendency to push agriculture development and the growth and significance of the non-manufacturing sectors into the background in favor of manufacturing-based industrial development.

The critical linkages between the manufacturing and non-manufacturing sectors, the urban-based and rural-based industries, the resource-based and non-resource-based industries and the complementary roles of commercial activities can only be ignored at the peril of being entrapped in an overly constrained definition of industrialization. The effective utilization of all God-endowed available natural and other resources produced by industries other than the manufacturing branch must merit as a case for industrialization.

In general, industrialization leads to a continuous increase in the size of the industrial sector. Industry is a fundamental activity in the economic life of a nation. It is a means towards the creation of a strong society in the midst of modern challenges and assisting it in safeguarding the welfare of the citizens of the Islamic state, whether Muslims or non-Muslims. The continuous and rapid change in the present realities, the new demands of our modern societies as well the political and economic events in the area of globalization have enhanced the need for local made products. This is essential in order to ensure that a country can attain independence in the true sense of the word and has the political and economic power to determine its own future.

II. METHODOLOGY AND OBJECTIVES OF THE STUDY

The study is mainly based on secondary data. The major sources of data were the Holy Quran, Sunnah and Islamic management literature, Journals and different related research study. Some academicians and experts in religious discipline have also been consulted. The main objective of the study in to evaluate divine thinking regarding industrialization. The specific objectives are as follow:

(a) To analyze some issues relating to industrialization in Islamic perspective.
(b) To analyze the thinking of economic development by industrialization from divine verses.

III. THE HOLY SCRIPTURE AND INDUSTRIALIZATION

The Qur’an constitutes the word of God (Allah) upon which general and specific rules of affairs, between man and his Creator, man and his fellowmen, man and his environment and man with himself; are ordained. The same principles that govern man’s relationship with his Creator will manifest in man’s other relationship. And because industrialization is part of man’s economic affairs and the latter being a subset of all man’s affairs stated earlier, hence, industrialization will necessarily be governed by the same general and specific rules of affairs in Islam. And because all that subscribe to the Islamic rules of governance become Ibadah (form of worship), hence industrialization within the Islamic ambit is also Ibadah.

Simultaneously, in order for industrialization to be accepted as Ibadah (worship), it must subscribe to divine principles, the more important being that the industries must engage only in divinely permissible activities, and secondly, industries must strive towards the goodness of not man’s physical self, but also his spiritual and moral development.

Given this spectrum of understanding, one of the Quranic thrusts is to declare that man’s efforts in acquiring and utilizing the God-endowed resources (including through industrialization) should be perceived only as a means to greater goodness and purity. Subsequently, industrialization is not an end by itself. Neither is the state of being a highly industrialized country the apex of total development. Rather, industrialization should be a...
God-blessed process, culminating with a society, which is an epitome of economic, spiritual and moral excellences.4 Allah says in the Qur’an:

“He (Allah) made you strong with His help and bestowed great benefits upon you, so that you might give thanks.” 5

“He (Allah) will make a good provision for you till an appointed day and will bestow His grace upon those that have merit”. 6

“Eat of the good and lawful things which Allah has bestowed on you and give thanks for His favors if you truly serve Him”.” 7

Craftsmanship and industrial aptitude had been the ways of the Prophets upon whom we attempt to emulate. Prophet Daud (AS) was endowed with the art of making coats of mail while Prophet Nuh (AS) was a builder of a huge and sturdy ark.

“We (Allah) taught him (Daud) the craft of making coats of mail, so that you might have protection in your wars. Will you then give thanks?” 8

“On Daud, We (Allah) bestowed Our favors. (We said): ‘Mountains and you birds, echo his songs of praise’. We made hard iron pliant to him (saying): ‘Make coats of mail and measure their links with care. Do what is right: I see all your actions’. 9

“We (Allah) revealed (Our Will) to him (Nuh) saying: Build an ark under Our watchful eye, according to Our guidance and Our inspiration!”10

Engaging in monumental projects was not alien to the tasks undertaken by the Prophets. For this, the events related to Prophets Sulaiman (AS) and Dzulkarnain (AS) are illustrative.

“To Sulaiman (We subdued) the wind, traveling a month’s journey morning and a month’s journey evening. We caused a fountain of molten copper to flow at his behest and jinn who made the iron blocks red with heat, he said: ‘Bring me molten copper to pour on them’.”

“He (Dzulkarnain) said: ‘The power which My Lord has given me is better than any tribute. Lend me a force of laborers and I will raise a barrier (a high dam) between you (a certain community) and them (Ya’juj and Majuj). Come, make me blocks of iron’. At length, when he dammed up the valley between the two mountains, he said: ‘Blow (with your bellows)’. And when he made the iron blocks red with heat, he said: ‘Bring me molten copper to pour on them’”. 12

The Qur’an and other authentic religious scriptures may not contain explicit statements on the more intricate deliberations of industrialization. Allah knows best for this. Nonetheless, the broad framework for action and the appropriate spirit in facing such challenges are sufficiently provided in the Qur’an.

One can appreciate the Quranic emphases on the proper use of the intellect, the need for wise ponderance over the bounties of Allah and its uses, the enjoinder upon mankind to travel, learn and apply newly-acquired knowledge and experience meticulously, the necessity of ensuring that one’s nafs (desires) do not transgress the limits of goodness and virtues, the need to suppress uncontrolled emotions in favor of objectivity, etc. This is because, while Islam identifies a broad and definite framework if the conduct of man’s affairs, the detailed strategies and approaches to problem-solving and decision-making are very much left to man’s wish and faith-related use of the intellect which Allah has endowed. As Allah says in the Qur’an:

“In the creation of the heavens and the earth, and it the alternation of night and day, there are signs for men of sense; those who remember Allah when standing, sitting, and lying down, and reflect on the creation of the heavens and the earth (saying): ‘Lord. You have not created these in vain. Glory be to You! Save us from the torment of the Fire, Lord’”13

Many other virtues, values and principles for the conduct of the spiritually and morally pristine society is physically and materially developed can be found in the Qur’an. These of courses are relevant in discussing the attributes of the spiritually, morally and materially developed industrialists and other agents of the economy. But for the appropriateness of the subject at hand, we should perhaps proceed to be enlightened on the Quranic verses, which have other direct relevance to industrialization.

To begin with, the Qur’an, in the more places than one, makes mention of natural resources which constitute as inputs of various degrees: raw, intermediate or for immediate consumption.

“We (Allah) made hard iron pliant to him (Daud)”. 14

“And We caused a fountain of molten copper to flow at his (Sulaiman’s) behest”. 15

“We have sent down iron, with its mighty strength and diverse uses for mankind, so that Allah may know those who support Him, though unseen, and support His Apostle”. 16

“He (Allah) sends down water from the sky which fills the riverbeds to overflowing, so that their torrents bear a swelling foam, akin to that which rises from smelted ore when make ornaments and tools”. 17

The Qur’an also contains verses implying possible types of industries quite common to many civilizations. One mode of categorization to facilitate our understanding of these verses may be to classify them under one of the following headings:18

a. Essentials industries.

b. Semi-essentials industries; and.

c. Comfort industries.

IV. ESSENTIALS INDUSTRIES

i) Food-related industry

The following verses are most relevant about food-related industry.

“With it (rainwater), We caused vineyards and palm-groves to spring up, yielding abundant fruit for your sustenance. Also a tree which grows on Mount Sinai and gives oil and relish for the eaters. In the cattle too, you eat their meat and gain other benefits from them besides”: 19

“Eat of their (cattle’s) flesh yourselves, and feed the poor and the unfortunate”: 20

“And from wind-driven clouds. We sent down abundant water from the clouds, bringing forth grain and varied plants, and gardens thick with foliage”: 21

“Let man reflect on the food he eats: how We pour down the rain in torrents and cleave the earth asunder; how We bring forth the corn, the grapes and the fresh vegetation; the olive and the palm, the thickets, the fruuits-trees and the green pasture, for you and your cattle to delight in”. 22
Have you ever considered the fire which you kindle? Is it you who have brought into being the tree that serves as its fuel – of are We the cause of its coming into being? It is We Who have made it a means to remind (you of Us) and a comfort for all who are lost, and hungry in the wilderness (of their lives).  

For it is He (Allah) Who has brought into being gardens – (both) the cultivated ones and those growing wild – and the date-palm, and fields bearing multiform produce, and the olive tree, and the pomegranate: (all) resembling one another and yet so different. Eat of their fruit when it comes to fruition, and hive (unto the poor) their due on harvest day. And do not waste (God’s bounties) verily, He dies not love the wasteful”.  

And it is He Who has made the sea subservient (to His Laws), so that you might eat fresh meat from it, and take from it gems which you may wear”.  

If we went through all the religious scriptures there are numerous verses are available on food industry. As these are fundamental needs of human being Almighty God has given due emphasis on food related industry.  

i) Clothing (textile) industry  

“And (God) has endowed you with (the skill to make) dwellings of the skins of animals – easy for you to handle when you travel and when you camp – and (to make) furnishings and goods for temporary uses of their (rough) wool and their soil, furry and their hair”.  

iii) Shelter (housing) industry  

“And God has given you (the ability to build) your houses as places of rest”.  

“You have built mansions on its plains and hewed out houses in the mountains”.  

VI. COMFORTS INDUSTRIES  

Islamic permits the enjoyment of the comforts of life, as long as the indulgences do not transgress into the realms of extravagance, waste and neglect of one’s obligations to Allah. Rather, such indulgences into life’s comforts and luxuries should, in order to be meaningful, enhance one’s thankfulness to the Creator and his deepened recognition of Allah’s bounties graced upon him. As such, the Qur'an expresses references to luxuries, among others, such as beautiful mansions: Allah hath promised to Believers, men and women, gardens under which rivers flow, to dwell therein, and beautiful mansions in gardens of everlasting bliss. But the greatest bliss is the good pleasure of Allah: that is the supreme felicity.  

garments of silk, brocades, soft couches: Nor strain thine eyes in longing for the things We have given for enjoyment to parties of them, the splendour of the life of this world, through which We test them: but the provision of thy Lord is better and more enduring.  

splendor of the worldly life bracelets of gold. Pearls and silk: Allah will admit those who believe and work righteous deeds, to Gardens beneath which rivers flow: they shall be adorned therein with bracelets of gold and pearls; and their garments there will be of silk.  

rich brocade: They will recline on Carpets, whose inner linings will be of rich brocade: the Fruit of the Gardens will be near (and easy of reach).  

silver bracelets and heavy brocade: Upon them will be green Garments of fine silk and heavy brocade, and they will be adorned with Bracelets of silver; and their Lord will give to them to drink of a Wine Pure and Holy, pearls and coral: Out of them come Pearls and Coral:  

VII. SECTION SUMMARY  

Not all the relevant verses of the Qur'an have been identified vis-à-vis the relevant industries. Nonetheless, what have been mentioned should at least establish the following:  

1. The Qur'an promotes, rather than impedes industrial activities;
2. God’s bounties are to be utilized to the fullest but not in forms that contradict goodness and justice;
3. Mankind has to be sufficiently conscientious before they can reap the benefits inherent in many of God’s bounties;
4. The Qur’an may not contain many explicit statements on industrialization per se, but it does clearly define a picture within which the priority needs of mankind are identified;
5. Establishment of industries or undertaking industrialization is not an end by itself, but rather a means to achieve a more holistic form of success, culminating with a blessed abode in the hereafter; and,
6. Lastly, inferences other than those made in this paper can be made on the various verses of the Qur’an. For example, when iron and copper are mentioned in the cases of Prophets Daud (AS) and Sulaiman (AS) respectively, it can visualize the Quranic viewpoint on the significance of the iron and other metal industries. Similarly, the Quranic references to ships and smelted ore indicate the significance of shipbuilding, the shipping and the mining industries.

VIII. THE SAYINGS OF PROPHETS AND INDUSTRIALIZATION

The Sunnah constitutes the traditions of Prophet Muhammad (SAW), be it his saying, his action and his silence that can be interpreted as his agreement, consent and acknowledgement. The Sunnah details out the Qur’an with the Prophet Muhammad (SAW) as the manifestation of what the Qur’an stands for. Hence, it is impossible to comprehend everything in the Qur’an without reference to the Sunnah.

It is not possible to pursue a task of identifying every relevant hadith of the subject of industrialization in this limited paper. However, to state in broad terms, much of the Sunnah, if not all, have either direct or indirect relevance to this issue. In more specific words, the Sunnah contains various principles of plan and action (including of the economic nature), plus the proper attitude and spirit that must be imbued into one who desires both material and spiritual bliss.

To appreciate this rope of the Sunnah, one can perhaps attempt to derive some relevant lessons from the following hadith:

The Prophet once passed by a dead goat and upon seeing it said: “Why did you not take off its skin? You could put it to use after tanning it.” “The Companions replied: “It was dead.” Thereupon, the Prophet said: “Only its eating is prohibited.”

The above hadith expresses several lessons:

i) One should be clear as to the Islamic law such that an incomplete interpretation will not impede one’s progress.
ii) Knowledge and (technological) expertise are implied herewith as relevant to the maximum utilization of Allah’s bounties.

The Prophet also once said: “He who cultivates a land which does not belong to anyone else has a prior right over it.”

This hadith among others calls for initiative from Muslims such that there remains no under utilization or wastage of resources.

On the virtues of self-dependency and refraining from perpetual of long-term dependence on the charity of others, we can take heed of the following two hadith:

“No one has ever eaten better food than what he eats as a result of the labor of his hand. And verily, Allah’s Prophet Daud (AS), used to eat by the work of his hand”.

“Anyone of you who gathers a bundle of fuel-wood (and carries it to the bazaar) on his back, is better than one who begs from anyone and he grants or refuses (to grant) him”.

Other ahadith of the Prophet determines the basic values that must be adopted for a blessed progressive society. Values such as acting justly, trustworthiness. These act to remind Muslims that it takes more than just skills, knowledge, material richness and mundane factors to ensure perpetual economic strength and stability. Indeed, some things cannot be bought or acquired at any material value. People’s confidence in us, our own dignity as an honorable society and similar intangible attributes can only be acquired when there exist the desire and commitment in acquiring it. This is what, among others, will be a significant contribution of the Sunnah to our industrialization efforts.

IX. CONCLUSION

The importance of introduction and use of new technology is undeniable. We have to be adequately equipped with the latest technology in all kinds of industries so as to be competitive economically at the international level of continuous growth and development and able to, at least, defend ourselves from external threats.

The urge to acquire the new knowledge and skill is embodied in the Divine maxim:

“Wisdom in the right of believer wherever it is found, they have more right over it”.

In an Islamic legal maxim, it is stated that:

“A thing is a duty if another duty can not be performed without it.”

The above maxims provide the justification for the Muslim to consider industrialization as a moral and religious obligation in the light of the present circumstances. The Muslims are now a backward nation. We need to have a sufficient number of experts in different fields in order to build the nation. This very obvious in the field of medicine, engineering, information technology and security.

Industrialization in the contemporary world grows from the inherent desire in human nature for prosperity and prestige, it is not an outcome of religious support or any other ethical encouragement. To develop general sense and to encourage people for industrialization the above discussion are highly influential. The effective utilization of God-endowed natural and other resources can be possible through industrial process. It is a means towards the creation of a strong society in the midst of modern challenges and assisting it in safeguarding welfare of the citizen of any state. To uphold the economic status, standard of living and alleviate poverty at present industrialization is a religious obligation.

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A Robust Watermarking Technique Based on Discrete Cosine Transformation

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Abstract- Classical watermarking schemes mainly are of frequency domain where information can be hidden in various frequency components. The hidden information usually corrupted due to various image processing operations and attacks. This paper finds polarity of DC components in each image block is robust to the DCT/IDCT operations. Thus a new watermarking scheme based DC-component is developed. In this proposed scheme, information bits are encoded and hidden in the DC-components of each image block. The experimental results indicate that (1) hidden information can be recovered from compression/decompression attacks and (2) the information-hiding process is low computation complexity.

Index Terms- Frequency domain, DC component, hidden information, watermarking technique

I. INTRODUCTION

The advent of the Internet and the wide availability of computers, scanners, and printers make digital data acquisition, exchange, and transmission simple task. However, making digital data accessible to others through networks also creates opportunities for malicious parties to make scalable copies of copyrighted content without permission of the content owner. The protection of digital information had become one of significant and critical issues in digital content technology. In the past, information-hiding technologies were proposed [1-4] to insert some secret information into the protected digital contents. The secret information inserted in content is regards as watermark to indicate the ownership of protected contents. Generally, such a watermark can be either visible or invisible to offer various applications, for examples, the determination of content ownership and the encryption of critical data in ordinary image contents.

The watermark ownership identification is the focus of this investigation. Typical features of an ideal ownership-identifying watermarking should include (1) Imperceptibility (2) Robustness and (1) Un ambiguity. In other words, the embedded watermark should not affect the visibility quality of the target image. The embedding of watermark image should have a high imperceptibility. Besides, the embedded watermark image should have a high immunity against possible disturbances from outsiders, such as compression attacks. Previously, LSB (Least Significant Bit) of image pixels are widely used to save the hidden information because of its low impact on the image quality after embedding process. However, LSB is subject to be changed in lossy compression, such as JPEG. The changes degraded the recovery of watermarks. Thus, an applicable watermarking should be robust enough to promote the survival of watermark in cases of attacks. In the extraction of the embedded watermarking, the integrity of recovered watermark is greatly concerned. In the transportation and process of protected images, the embedded watermark could be damaged by communication noises, distortion of media processing. Thus, the integrity of recovered watermarks is also an important issue while evaluating the performance of watermarking. The similarity between the original and the recovered is expected to be should reach an acceptable level. Additionally, low computation complexity is also expected to be a good feature of applicable watermarking technique. This feature will facilitate the feasibility of watermark.

The rest of this paper is organized as follows. In section 2, related works in last year’s are presented to illustrate the state-of-art in watermarking. Then, in Section 3, a robust and low computation cost watermarking is proposed to improve the quality of the traditional watermark. A series of implementations is conducted in Section 4, to evaluate the performance of the proposed scheme. Finally, this work is concluded in Section 5.

II. WATERMARKING TECHNIQUES

According to the ability of watermark to resist attack, watermarking techniques are categorised into many types. Ekici et al. [2] classified watermark techniques into three categories.

(1) Fragile Watermark:
Fragile watermark offers more critical protection on the target image because the embedded watermark is very fragile, even in case of slight modification on protected images. Fridrich et al [1] proposed a fragile watermark to detect the modification, cutting and replacement. Thus, fragile watermark has the features of easy-implementing, easy-detecting and easy-degrading.

(2) Semi- Fragile Watermark:
Semi-fragile watermark possesses higher technique and ability to identify if the pixel modifications are caused by malicious attacks or not. Some normal media processing, such as JPEG, PNG etc, may change a portion of pixel values due to their natures. Such image modification is not regarded as malicious attacks. Thus, semi-fragile watermarking should be capable of identifying the reasons for pixel modification and distinguishing the real suspect attacks from them. Lin et al. [2], proposed a
semi-fragile watermarking based on the analysis of JPEG compression characteristics. In the scheme, the embedded watermark is very robust to JPEG compression and extremely fragile to the other image modification. Consequently, semi-fragile watermark is beneficial to specific applications.

(3) Robust Watermark:
Typically, watermarks are widely used in the multimedia data copyright protection. Therefore the watermark security tightly depends on its robustness. Cox et al. [3], showed that a robust watermark of images, even through complicated image processing still is of integrity. Wang et al. [4] proposed a genetic algorithm to estimate the geometric manipulation in geometrical attacks. Reference points are deployed in the original image. Then, a genetic-based matching algorithm is developed to identify the reference points and to analyse the resulting geometric manipulation. The image after DCT operations, its DC component has a fine stability not affected by the transformation process. Relatively to AC components, DC components demonstrate a potential for advanced watermarking development. In this paper the study will focus on the DC-based watermarking.

III. A DCT-BASED WATERMARKING

After DCT transformation, the information of image pixels is converted to a frequency domain in which the strengths of frequency components in spectrum are depicted. In tradition approaches, the data bits of watermarks are spread in various frequency components. However, the transformation could cause the loss of partial data bit. Besides, the introduction of watermark bits could also degrade the quality of the original image. To solve this problem, the investigation of using DC-components of image blocks to conserve the watermark bits is conducted. In the investigation, the effects of block size, compression rates and available watermark capacity are explored. These results will be a baseline for reference in their real deployment of DC-based watermarking.

The operations of the proposed approach are as follows. There are four main operations in the watermark embedding phase. First, the original image is converted to a frequency-domain spectrum via a DCT transformation. Second to enhance the watermark robustness, the watermark is re-coded with a redundancy of a 16-bit hamming code. Third, an embedding process is designed to distribute the recoded watermark in to the DC-components of each image block. Finally, the embedded image is converted back to pixel image.

![Fig 1: Embedding Procedure](image)

There are some issues to discuss this embedding procedure: (1) the watermark bit representation in DC-components, (2) the determination of block size (3) availability of watermark capacity. First, regarding to the watermark bit representation in DC-components is formulated as the following two steps;

Step 1: Determine the bias value, for DC-component.
Step 2: Update each DC-component according to Eq. (1)

\[ dc_t C(x, y) = \begin{cases} dc_c C(x, y) + \alpha & \text{if } HW(x) = 1 \\ dc_c C(x, y) - \alpha & \text{if } HW(x) = 0 \end{cases} \]

Where \( dc_C \), \( C' \), and \( \alpha \) are the transformed spectrum, embedded spectrum of original image and offset values, respectively.

In other words, the watermark bit is represented by a set of positive and negative bias applied on DC-components. There are some advantages to use DC-components to hide information. (1) The changes of DC-component are not easily visible for human. (2) The hidden watermark is fully spread on image pixel. That is beneficial to recover the watermark from the attacks of cutting and replacement.

Second, since the proposed approach is based on DC-components of image blocks, the division of blocks truly affects the computation complexity and the available amount of hidden information. Generally, the number of available DC-components is equal to the number of total blocks in an image. Thus, there will be \( n \) bits of hidden information if there are \( n \) image blocks. Although, the usable watermark space increases as the block number increasing, the resulted smaller and more blocks take more time cost to embed and retrieve hidden watermarks. Thus, the determination of block size is a trade-off between usable capacity and time consumption.

Third, another factor affecting the watermark capacity is the adopted hamming code length. Hamming code is helpful to recover data from single bit error. Usually, the hamming code length, \( L \), is equal to ceiling (log \( k \) +1) and \( k \) is the bit number of the protected data. For example, if the bit number of the data to be protected is 8, then the additional hamming code should have 4 bits.

To clearly illustrate the effects caused by block sizes on image quality and time cost, the PSNR (peak signal to noise ratio) defined in Eq. (2) is used to evaluate the distortion of the original image due to watermark embedding.

\[ PSNR = 10 \log \left( \frac{255^2}{MSE} \right) \]

Where \( MSE = \frac{1}{MN} \sum_{i=1}^{M} \sum_{j=1}^{N} (C_{ij} - \hat{C}_{ij})^2 \)

A 512x512 image is used in the analysis. In this analysis, this image is divided in five cases, including 2x2, 4x4, 8x8, 16x16, and 32x32. The available watermark capacities obtained from these divisions are 64KBytes, 16KBytes, 4Kbytes, 1Kbytes and 256Bytes. First, to illustrate the effect of the bias value, there are two bias values, 4 and 20, in comparison. There are some properties observed. (1) The capacity is inversely proportional to the block size. (2) The larger block size has the better image quality. (3) The large bias value may result in degrading the image quality. Second, since the smaller block size produces more transformation computations, the time consumption is also
explored. In Table 1, time consumptions in various block sizes are presented.

### TABLE I: Watermark capacity, PSNRs and time consumptions in case of various block sizes

<table>
<thead>
<tr>
<th>Block size</th>
<th>Capacity</th>
<th>PSNR (α=4)</th>
<th>PSNR (α=20)</th>
<th>Time Cost(unit)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2X2</td>
<td>64Kbytes</td>
<td>56.22/82</td>
<td>42.2/698</td>
<td>[53] 35</td>
</tr>
<tr>
<td>4X4</td>
<td>16Kbytes</td>
<td>56.23/53</td>
<td>42.2/778</td>
<td>[58] 11</td>
</tr>
<tr>
<td>8X8</td>
<td>4Kbytes</td>
<td>56.81/81</td>
<td>4301/027</td>
<td>[63] 5</td>
</tr>
<tr>
<td>16X16</td>
<td>1Kbyte</td>
<td>48.1/382</td>
<td></td>
<td>[68] 5</td>
</tr>
<tr>
<td>32X32</td>
<td>256Kbytes</td>
<td>61/43</td>
<td></td>
<td>[72] 3</td>
</tr>
</tbody>
</table>

The extraction of the embedded watermark is illustrated in Fig. 2. The original watermark and the embedded watermark both are transformed via DCT to obtain their frequency components. The corresponding DC-components are used to derive the watermark bit in a way of block by block as follows,

$$HW(i,j) = \begin{cases} 1 & \text{if } \text{dct}_c(k,j) > \text{dct}_c(l,k) \\ 0 & \text{otherwise} \end{cases}$$

(3)

Certainly, the obtained watermark is mixed with some hamming code. Thus, through a process of hamming error correction, single bit error will be fully fixed. Then, an original watermark is recovered.

![Fig. 2: The extraction process of watermarks](image)

**IV. PERFORMANCE EVALUATION OF PROPOSED APPROACH**

To verify the performance of the proposed approach, four 512x512 gray images from USC-SIPI image database [4] are employed in three test scenarios, including random noise, image cutting and JPEG compression. The watermark to be embedded is a 44x44 black –and – white image as shown in Fig. 3.

![Fig 3: Test Watermark](image)

This watermark is re-coded with 5 bits hamming code to enhance its robustness and then will be embedded in the four test images. Through three image manipulations, including random noise, cutting and compression, the image with watermarks are damaged. From the damaged images, the watermark is extracted in the reverse way of the embedding process as shown in Fig. 2. In the experiment, the similarity of the recovered watermark and the original watermark is investigated. The similarity is defined in Eq. (4) to show the percentage of the pixel identical to the original watermark. Thus the similarity depicts how the recovered watermark is close to the original watermark.

$$\text{similarity} = 1 - \frac{1}{N^2} \sum_{i=1}^{N} \sum_{j=1}^{N} |W^* - W|$$

(4)

Where $W^*$ and $W$ are the recovered watermark and the original watermark, respectively. In the first experiment, various percentages of random noise are introduced to the embedded image to emulate the degradation of the network channel. The results as shown in Table 2 demonstrate that the similarity still maintain at least 80% when the network channel SNR is 13dB.

### TABLE III: Watermark capacity, PSNRs and time consumptions in case of various block sizes

<table>
<thead>
<tr>
<th>Image</th>
<th>Lena</th>
<th>F16</th>
<th>Baboon</th>
<th>Lake</th>
</tr>
</thead>
<tbody>
<tr>
<td>PSNR</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>[74]</td>
<td>55d</td>
<td>[75] 100%</td>
<td>[76] 100%</td>
<td>[77] 100%</td>
</tr>
<tr>
<td>[79]</td>
<td>45d</td>
<td>[80] 100%</td>
<td>[81] 100%</td>
<td>[82] 100%</td>
</tr>
<tr>
<td>[84]</td>
<td>35d</td>
<td>[85] 98%</td>
<td>[86] 98%</td>
<td>[87] 100%</td>
</tr>
<tr>
<td>[89]</td>
<td>25d</td>
<td>[90] 81%</td>
<td>[91] 81%</td>
<td>[92] 90%</td>
</tr>
<tr>
<td>[94]</td>
<td>20d</td>
<td>[95] 61%</td>
<td>[96] 62%</td>
<td>[97] 77%</td>
</tr>
</tbody>
</table>

The second experiment is to verify the watermark similarity when a portion of embedded image is lost due to an image-cutting attack. The cut image area is a rectangle and its position is randomly determined. Table 3 shows the numerical results. In average, the recovered watermark has the similarity more than 70%, even when the image loss due to cutting is up to 10%.

### TABLE IIIII: Watermark capacity, PSNRs and time consumptions in case of various block sizes

<table>
<thead>
<tr>
<th>Image Loss</th>
<th>Lena</th>
<th>F16</th>
<th>Baboon</th>
<th>Lake</th>
</tr>
</thead>
<tbody>
<tr>
<td>PSNR</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>[74]</td>
<td>55d</td>
<td>[75] 100%</td>
<td>[76] 100%</td>
<td>[77] 100%</td>
</tr>
<tr>
<td>[79]</td>
<td>45d</td>
<td>[80] 100%</td>
<td>[81] 100%</td>
<td>[82] 100%</td>
</tr>
<tr>
<td>[84]</td>
<td>35d</td>
<td>[85] 98%</td>
<td>[86] 98%</td>
<td>[87] 100%</td>
</tr>
<tr>
<td>[89]</td>
<td>25d</td>
<td>[90] 81%</td>
<td>[91] 81%</td>
<td>[92] 90%</td>
</tr>
<tr>
<td>[94]</td>
<td>20d</td>
<td>[95] 61%</td>
<td>[96] 62%</td>
<td>[97] 77%</td>
</tr>
</tbody>
</table>

www.ijsrp.org
Also this proposed approach offers a robust watermark for codec attacks such as JPEG. In Fig.4, the watermark is retrieved after decompression and compression of the embedded image. The parameter, Q, used in the quantization stands for compression rate. A larger Q value means a less compression rate. The results depicts that the recovered watermark is tightly close to the original if Q is more than 30. Even when the higher compression is applied, the similarity could be acceptable in a level of 70%.

![Fig. 4: Each Q task out similarity of watermark (α=20)](image)

V. CONCLUSION

A DCT-based watermark to improve the robustness is proposed. The experimental results depict that the proposed approach has the advantages of resisting noise, image cutting, and the JPEG compression. Compared with the previous work, the proposed approach presents a higher similarity, even in the high compression ratio of 27.7, better than the previous.

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AUTHORS

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Preparation and Spectral Investigations of Neodymium Oxide doped Polymethylmethacrylate based Laser Material

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**Materials Science Lab., Department of Physics, Chaudhary Devi Lal University, Sirsa-125 055, India.

Abstract- The modifications in structural and optical properties by incorporating rare earth oxide in polymethylmethacrylate (PMMA) matrix may open up the possibility of the development of smart tunable laser materials. In the present work, neodymium oxide is embedded in synthesized PMMA matrix by chemical doping process. The spectral investigations of neodymium oxide doped PMMA matrix has been carried out using FTIR, UV-visible and photoluminescence spectrophotometers. Infrared study has shown that the absorption band region 1800-1000 cm\(^{-1}\) becomes sharper as concentration rare earth oxide increases in PMMA matrix. UV-visible spectra show that the absorption peaks occurred in the UV range 211-228 nm. The photoluminescence study has shown that reasonably sharp fluorescence emission peak is observed in region 380-390 nm whose position changes as concentration of rare earth oxide varies in PMMA matrix.

Index Terms- Chemical doping, tunable laser materials, neodymium oxide, PMMA, Spectral investigations.

I. INTRODUCTION

Laser materials are that type of substances in which the majority of atoms or molecules are in the excited energy states. Many solid, liquid, gaseous substances have been studied, including synthetic ruby crystal, helium-neon gas mixture and organic laser dyes, capable of continuous operation, but at a low power. Among all laser materials, the tunable laser materials show great impression because they can continuously change their emission wavelength, or color, in a given spectral range. As such, these quantum devices have found numerous applications in many diverse fields. In particular, tunable lasers have played a crucial and sustained role in advancements of materials science. Among basic fields that employ tunable lasers are use of rare earth oxides and organic dye as the gain medium and their wide spectrum, which makes it highly tunable or to produce very short duration pulses. Tunable laser materials have numerous applications in optics, electronics, photodynamic therapy, nonlinear optics, dye chemistry, material processing, atmospheric and underwater sensing, local area communications network, sensors [1-4], spectroscopy, birthmark removal, isotope separation and industry [5] etc. A lack of toxicity and flammability, lower costs and, essentially, compactness would make them useful for medical applications or research work [6-8]. Laser materials made by polymerization of rare earth oxides in the polymer host matrix are advanced class of materials with great deal of future promise for potential applications as high performance materials. Several research groups are engaged in the development and interpretation of these types of advanced materials. Fan Rongwei et al. [9] have reported the solid state dye lasers based on LDS 698 doped in modified polymethylmethacrylate. Schultheiss Slike et al. [10] have reported rhodamines in silica-zirconia materials, Scott J. Brian et al. [11] have reported mesoporous and mesostructured materials for optical applications. Purificacion et al. [12] have been reported photonic and nanobiophotonic properties of luminescent lanthanide-doped hybrid organic-inorganic materials. In the present study, we want to make efforts to synthesize the thin film shaped tunable laser material. For this, we use polymethylmethacrylate (PMMA) as a host matrix for the dispersion of rare earth oxide molecules in it. Choice of PMMA as host material for rare earth oxide doping due to their good transparency, resistivity, mechanical strength and optical homogeneity which can play an important role to build up the tunable laser material or advanced optical materials. The thin film shaped neodymium oxide doped PMMA based material has been prepared by casting method. The concentration of neodymium oxide in polymethylmethacrylate matrix varies as 0.6x10\(^{-3}\), 1x10\(^{-3}\), 1.2x10\(^{-3}\), 1.3x10\(^{-3}\) and 1.4x10\(^{-3}\) mol/L. The structural and optical characterization of prepared samples are made by spectroscopic techniques such as FTIR, UV-visible and photoluminescence (PL) spectroscopy. We have recorded the IR absorption spectra and fluorescence emission spectra at different concentrations of rare earth doped in PMMA matrix and analyzed them with regard to their applications as tunable luminescent laser materials for device fabrication.

II. EXPERIMENTAL DETAILS

A. Chemicals used
Perspex (PMMA) (Ruchi Enterprises Mumbai, India), Acetone (Spectrochem Pvt. Ltd., Mumbai, India), neodymium oxide (Sigma Aldrich).

B. Methodology and chemical doping
The neodymium oxide doped polymethylmethacrylate based material have been prepared by dissolving perspex 17.0g in acetone and stirring has been done for four days with the help of a magnetic stirrer. Chemical doping of neodymium oxide has...
been carried out by making solution of rare earth oxide in acetone. The samples have been synthesized by adding dopant solution with different concentration into solution of perspex during polymerization process. The neodymium oxide concentration in synthesized PMMA matrix varies as 0.6×10^{-3}, 1×10^{-3}, 1.2×10^{-3}, 1.3×10^{-3} and 1.4×10^{-3} mol/L. The resultant reaction mixture doped with neodymium oxide was cast into petridishes and put them in an oven at 42°C for about 15 days so that the evaporation of acetone from the samples took place for the sake of homogeneous incorporation of neodymium oxide (dopant). The temperature was increased slowly up to 80°C for 24 h for final ageing to achieve good physical and mechanical strength of prepared material.

III. RESULTS AND DISCUSSION

A. FTIR study

Spectroscopic characterization is an essential tool which is useful to understand the optical properties and behavior of interacting groups after the doping of synthesized materials. Prepared PMMA based material has been characterized by IR spectroscopy using FTIR spectrophotometer (Nicolet 360). IR spectra of undoped and neodymium oxide doped PMMA, exhibit several peaks as shown in Figure 1 (a), (b) and (c). To explain the effect of dopant, we have taken FTIR spectra of polymethylmethacrylate at different rare earth oxide concentrations such as 1.2×10^{-3}, 1.4×10^{-3} mol/L. The absorption band in the region 3015-3010 cm^{−1} is mainly due to C-H stretching of PMMA. The main band in the region 1800-1000 cm^{−1} is associated with the combination of vibrations of CH_{2}-CO_{2}-C-CH_{3} network of polymethylmethacrylate. Region appears in 1697-1650 cm^{−1} is due to the stretching of C=O group. The absorption band appears at 1500-1430 cm^{−1} is due to C-H deformation of –CH_{2} group. The absorption band in the region 2843-2810 cm^{−1} is due to C-H stretching of C-O-CH_{2} group. The absorption band appears at 1459-1440 cm^{−1} is due to C-H deformation of –CH_{2} group. The absorption band appears at 841-800 cm^{−1} due to stretching of C-C group. The absorption band appears 1395-1386 cm^{−1} is due to C-H deformation of C(CH_{3})_{2} group. It has been clear from the IR spectra of undoped and neodymium oxide doped samples that the absorption band region 1800-1000 cm^{−1} becomes sharper as the concentration of dopant increases in PMMA matrix and it may be due to the homogeneous dispersion of neodymium oxide molecules in the PMMA matrix. It has been observed that the prolonged heat treatment at moderate temperature of the samples increases mechanical strength, abrasion resistance, transparency etc. which may be due to improvement in bonding in PMMA network.

B. UV-visible study

The UV-visible study of neodymium oxide doped polymethylmethacrylate based material has been done by recording optical absorption using Spectrophotometer (Perkin Elmer Lambda). The absorption spectra of pure PMMA and neodymium oxide doped PMMA are shown in Figure 2. It has been observed that the absorption peaks appears at wavelengths 223, 222, 228, 211 and 218nm as the concentration of dopant varies as 0.6×10^{-3}, 1×10^{-3}, 1.2×10^{-3}, 1.3×10^{-3} and 1.4×10^{-3} mol/L in PMMA matrix respectively. The shifting shifting occurred in the spectra may be due to the polarity of solvent used in the synthesis or may be due to the dispersion of rare earth oxide particles in the PMMA matrix.

C. Photoluminescence study

Photoluminescence spectra of undoped and neodymium oxide doped samples are shown in Figure 3a and 3b. PL study of neodymium oxide doped PMMA in which the concentration of dopant varies as 1×10^{-3}, 1.2×10^{-3} and 1.4×10^{-3} mol/L shows emission peaks at wavelength 389, 380 and 390 which lie in UV region. It has been observed from fluorescence spectra that the emission peak has maximum intensity at concentration 1.4×10^{-3} mol/L corresponding to wavelength 390nm. A slight shifting has been observed in the spectra as concentration of dopant changes in the host matrix.

IV. CONCLUSION

In summary, neodymium oxide doped PMMA based thin film shape tunable laser material has been prepared and characterized by FTIR, UV-visible and photoluminescence (PL) spectroscopic techniques. The absorption band region 1800-1000 cm^{−1} of IR spectra becomes sharper as concentration of rare earth oxide increases in the PMMA matrix which may be due to homogeneous dispersion of neodymium oxide atoms/molecules in the PMMA matrix. The UV-visible study of rare earth oxide doped PMMA thin plastic films shows that the absorption peaks are observed at wavelengths 223, 222, 228, 211 and 218nm as concentration varies from 0.6×10^{-3} to 1.4×10^{-3} mol/L. The fluorescence spectra show that the prominent emission peak is observed at ~ 590 nm at concentration 1.4×10^{-3} mol/L of rare earth oxide. The photoluminescence study shows a slight shifting in emission peak as concentration of rare earth changes in the PMMA matrix. All these factors make the possibility of the development of rare earth doped PMMA tunable laser materials.

V. FIGURES AND TABLES
Figure 1a: IR spectra of Undoped PMMA

Figure 1b: IR spectra of neodymium oxide doped PMMA with concentration 1.2×10^{-3} mol/L

Figure 1c: IR spectra of neodymium oxide doped PMMA with concentration 1.4×10^{-3} mol/L
Figure 2: Absorption spectra of undoped and neodymium oxide doped PMMA

Figure 3a: Fluorescence emission spectra of undoped PMMA
Figure 3b: Fluorescence emission spectra of neodymium oxide doped PMMA

Table 1: Photophysical properties of neodymium oxide doped PMMA based material

<table>
<thead>
<tr>
<th>Concentration of dye (mol/L)</th>
<th>( \lambda_{\text{obs max}} ) (nm)</th>
<th>( \lambda_{\text{em max}} ) (nm)</th>
<th>Stokes shift (nm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>( 1 \times 10^{-3} )</td>
<td>222</td>
<td>389</td>
<td>167</td>
</tr>
<tr>
<td>( 1.2 \times 10^{-3} )</td>
<td>228</td>
<td>380</td>
<td>152</td>
</tr>
<tr>
<td>( 1.4 \times 10^{-3} )</td>
<td>218</td>
<td>390</td>
<td>172</td>
</tr>
</tbody>
</table>

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A REVIEW: THE STRUCTURAL INTERVENTION AND OD’S FUTURE

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Abstract- In this paper we have tried to review the structural intervention and the future of organizational development. Structural intervention sometimes called techno structural intervention. This class intervention includes changes in how the overall work of the organization is divided into units, who reports to whom, methods of control, the spatial arrangements of equipment and people, workflow arrangements, and changes in communications and the authority. In particular we want to review the structural interventions that are frequently labeled OD or linked to OD. We will also look at the concept of OD future.

Index Terms- employees, intervention, organization, organizational development (OD)

I. INTRODUCTION

Organizational development is a long-term effort, led and supported by top management, to improve an organization’s visioning, empowerment, learning, and problem-solving processes, through an ongoing, collaborative management of organization’s culture – with special emphasis on the culture of intact work teams and other team configurations – utilizing the consultant – facilitator role and the theory and technology of applied behavioral science, including action research. Organizational development (OD) is an application of behavioral science to organizational change. It encompasses a wide array of theories, processes, and activities, all of which are oriented toward the goal of improving individual organizations. OD stresses carefully planned approaches to changing or improving organizational structures and processes, in an attempt to minimize negative side effects and maximize organizational effectiveness.

ORGANIZATIONAL DEVELOPMENT BASICS

Although the field of OD is broad, it can be differentiated from other systems of organizational change by its emphasis on process rather than problems. Indeed, traditional group change systems have focused on identifying problems in an organization and then trying to alter the behavior that creates the problem. OD initiatives, in contrast, focus on identifying the behavioral interactions and patterns that cause and sustain problems. OD programs usually share several basic characteristics. For instance, they are considered long-term efforts of at least one to three years in most cases. In addition, OD stresses collaborative management, whereby managers and workers at different levels of the hierarchy cooperate to solve problems. OD also recognizes that every organization is unique and that the same solutions can't necessarily be applied at different companies—this assumption is reflected in an OD focus on research and feedback. Another common trait of OD programs is an emphasis on the value of teamwork and small groups. An integral feature of most OD programs is the change agent, which is the group or individual that facilitates the OD process. Change agents are usually outside consultants with experience managing OD programs, although companies sometimes utilize inside managers. The advantage of bringing in outside OD consultants is that they often provide a different perspective and have a less biased view of the organization's problems and needs. The drawback of outside change agents is that they typically lack an in-depth understanding of key issues particular to the company or institution.

II. INTERVENTIONS

OD interventions are plans or programs comprised of specific activities designed to effect change in some facet of an organization. Numerous interventions have been developed over the years to address different problems or create various results. However, they all are geared toward the goal of improving the entire organization through change. OD interventions can be categorized in a number of ways, including function, the type of group for which they are intended, or the industry to which they apply. In fact, W.L. French identified 13 major "families" of interventions based on the type of activities that they included—activity groups included teambuilding, survey feedback, structural change, and career-planning. One convenient method of classifying OD interventions is by group size and interrelationship.

III. STRUCTURAL INTERVENTIONS

It is called as techno structural interventions. This class of interventions includes changes in how the overall work of an organization is divided into units, who reports to whom, methods of control, the arrangement of equipment and people, work flow arrangements and changes in communications and authority.

1. Socio Technical System: is largely associated with experiments attempted to create better fit among the technology,
structure and social interactions of a particular production unit. Premises of Sociotechnical System:-
(1) Effective work system must jointly optimize the relationship between their social and technical parts. 
(2) Such system must effectively manage the boundary separating and relating them to the environment. 
This system tend to feature the formation of autonomous work group, the grouping of core tasks so that a team has major unit of total work to be accomplished, the training of group members in multiple skills, delegation to the work group of many aspects of how the work gets done, and the availability of great deal of information and feedback to work groups for self-regulation of productivity and quality.

2. Self-managed teams: A self-managed team has total responsibility for its defined remit. That remit might be a specific project. A self-managed team thrives on interacting skill sets, on shared motivation and shared leadership. The team is autonomous and its members are responsible to no one but each other. The team’s accountability is based on team’s result and not on the performance of its members. Individual performance is an internal team issue. A self-managed team is not just a group of people working together but also a genuine collaboration. It is measured by its results, not the performance of its individual member.

Self-managed teams:
- Are more independent than other types of team.
- Help to flatten organizational structure.
- Eliminate intermediate levels of responsibility and removes the requirement for middle management.
- Favour natural leaders.

3. Work redesign: OD approach to work redesign based on a theoretical model of what job characteristics lead to the psychological states that produce what they call "higher internal work motivation."

Organization analyses jobs using the five core job characteristics - i.e. skill variety, task identity, task significance, autonomy and feedback from the job.

<table>
<thead>
<tr>
<th>Skill variety experienced</th>
<th>Related to the work</th>
</tr>
</thead>
<tbody>
<tr>
<td>Task</td>
<td>Task identity</td>
</tr>
<tr>
<td></td>
<td>Meaningfulness of the work</td>
</tr>
<tr>
<td></td>
<td>Job autonomy - Experienced responsibility for the outcome of the work</td>
</tr>
<tr>
<td></td>
<td>Feedback - Psychological state of knowledge of the result of the work activities</td>
</tr>
</tbody>
</table>

The outcome of these job characteristics is:
- High work motivation
- High satisfaction
- High work effectiveness

4. Quality of work life (QWL): An attempt to restructure multiple dimensions of the organization and to institute a mechanism, which introduces and sustains changes over time. QWL Features
- Voluntary involvement on the part of employees
- Union agreement with process and participation.
- Assurance of no loss of job
- Training for team problem solving
- Use of quality circles
- Participation in forecasting, work planning
- Regular plant and team meetings.
- Encouragement for skill development.
- Job rotations.

These features include union involvement - a focus on work teams, problem solving session by the work teams in which the agenda may include productivity, quality and safety problems, autonomy in planning work the availability of skill training and increased responsiveness to employees by supervision.

IV. THE FUTURE OF ORGANIZATIONAL DEVELOPMENT

There are contradictory opinions about the status and future prospects of organizational development. There are 6 proposed areas that could revitalize the field of organizational development in the future: virtual teams, conflict resolution, work group effectiveness, social network analysis, trust, and intractable conflict. Focusing on these areas will help to bridge the gap between research theory (i.e., academics) and practice (i.e., consultants). Getting these two groups to communicate with each other will benefit both groups and promote organizational development efforts. In a survey conducted twenty individuals involved in the study and practice of organizational development were questioned about their perspectives and predictions on the future of the field. The most in-demand services, according to those polled, are:
- Executive coaching and development
- Team building and team effectiveness
- Facilitating strategic organizational change
- Systemic integration
- Diversity and multiculturalism.

They list the daily challenges in the field as the need for speed, resistance to change, interpersonal skills and awareness, and differentiating organizational development, which refers to the variety of definitions of organizational development among practitioners and how this impacts consultants, clients, and the clients' needs. The opinions on the future direction of the field vary among its practitioners. Nevertheless, the continuing interest in and value of optimizing an organization's needs and goals with the needs, wants, and personal satisfaction of its employees indicate that organizational development will continue to be relevant to and vital for organizational reform in the future, either in its present form or through evolution into other theories and practices.
V. CONCLUSION

Most of the structural interventions we have reviewed seek a joint optimization of the social and technological systems of organizations. Applications are properly called OD to the extent that the latter is true; they use the participant action research model, and other characteristics are congruent with how OD has been described till now. OD label would not be applied whenever structural interventions are carried out without attention to the social system or to humanistic values. Though OD seems to have a promising future, there are certain factors that have the potential to make the future of OD uncertain. These includes nature of organizational leadership and value of top management, knowledge of management about OD, interdisciplinary nature of OD, dissemination of OD techniques, integration of techniques in the field of OD with those in other fields an the recording and maintenance of the future working of OD.

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Comparison of Exponential Companding Transform and Adaptive-ACE Algorithm for PAPR Reduction in OFDM Signal

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Abstract- One of the main disadvantages of Orthogonal Frequency Division Multiplexing (OFDM) is its high peak-to-average power ratio (PAPR). As the simplest approach to reducing the PAPR, Clipping based Active Constellation Extension (CB-ACE) exhibits good practicability, and the repeated clipping-and-filtering (RCF) algorithm proposed by Jean Armstrong provides a good performance in PAPR reduction and out-of-band power’s filtering. However, its way of filtering in frequency-domain requires RCF operations to control the peak regrowth, which degrades the bit error rate (BER) performance and greatly increases the computational complexity. Therefore, this paper put forward comparison of two existing techniques namely Exponential Companding Transform and Adaptive-ACE Algorithm. The simulation results show that, exponential Companding Transform gives better result for PAPR Reduction and provides low complexity in Algorithm.

Index Terms- ACE, Exponential Companding Transform, OFDM, PAPR, RCF

I. INTRODUCTION

As a promising technique, OFDM has been widely used in many new and emerging broadband communication systems, such as digital audio broadcasting (DAB), high-definition television (HDTV), wireless local area network (IEEE 802.11a and HIPERLAN/2). However, as the OFDM signals are the sum of signals with random amplitude and phase, they are likely to have large PAPR that requires a linear high-power amplifier (HPA) with an extremely high dynamic range, which is expensive and inefficient. Furthermore, any amplifier nonlinearity causes inter modulation products resulting in unwanted out-of-band power.

A number of approaches have been proposed to deal with the PAPR problem, including clipping, clipping-and-filtering (CF), coding, companding transform, active constellation extension (ACE), selected mapping (SLM), partial transmit sequence (PTS), and so on [1]. Compared with other methods, clipping is the simplest and of good practicality. In particular, Jean Armstrong has proposed a RCF Algorithm which is also called Clipping Based Active Constellation Extension, which dramatically reduces the PAPR and limits the out-of band power to a low level , but excessively increases the computational complexity as well. Based on Jean Armstrong’s method, this paper describes an improved approach which can provide good performance and lower complexity.

II. DEFINITION OF OFDM SIGNALS AND PAPR

In OFDM, a block of N symbols, \{X_k, k=0, 1, \ldots, N-1\}, is formed with each symbol modulating one of a set of subcarriers, \{f_n,n=0, 1, \ldots, N-1\} with equal frequency separation 1/T, where T is the original symbol period. An inverse discrete Fourier transform (IDFT) can efficiently generate the multicharacter symbols. The IDFT of vector $X_k=\{X_0, X_1, \ldots, X_{N-1}\}$ results in T/N spaced discrete time signal $x_n=\{x_0, x_1, \ldots, x_{N-1}\}$. Thus, the transmitted signal is

$$x_n = \frac{1}{\sqrt{N}} \sum_{k=0}^{N-1} X_k \exp\left(\frac{2\pi i kn}{N}\right) \quad 0 \leq k \leq N-1$$

(1)

The PAPR of the transmitted signal can be written as

$$PAPR = \max_{0 \leq n \leq N-1} \left[ \frac{|x_n|^2}{E[|x_n|^2]} \right]$$

(2)

The complementary cumulative distribution function (CCDF) is one of the most frequently used performance measures for PAPR reduction techniques, which denotes the probability that the PAPR of a data block exceeds a given threshold z. The CCDF of the PAPR of a data block of N symbols with Nyquist rate sampling is derived as

$$P(PAPR>z)=1-P(PAPR \leq z)=1-(1-e^{-z})^{\frac{N}{T}}$$

(3)

III. THE ADAPTIVE-ACE ALGORITHM

The main objective of the Adaptive Active Constellation Extension (Adaptive ACE) algorithm for reducing the Peak-to-Average Power Ratio (PAPR) is to control both the clipping level and the convergence factor at each step and thereby minimize the peak power signal whichever is greater than the initial target clipping level [3].

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The Adaptive Active Constellation Extension (Adaptive ACE) algorithm can be initialized by selecting the parameters namely the target clipping level, denoted by $A$ and the number of iterations, denoted by $i$. In the first step, the iteration is taken as two i.e., $i = 2$ and the initial target clipping level is to be taken as $A$ [3].

The predetermined clipping level, denoted by $A$, is related to the target clipping ratio, $\gamma$ and given by the equation (5) [3].

$$\gamma = \frac{\mu^2}{\epsilon_{\text{cr}} A}$$ (4)

Where, $\gamma$ is the target clipping ratio and $A$ is predetermined clipping level.

The clipping of the peak signal results to distortion of the original OFDM signal, namely In-Band Distortion and Out-of-Band Distortion. [3] The in-band distortion results in the system performance degradation and cannot be reduced, while, the out-of-band distortion can be minimized by filtering the clipped signals. The signal obtained after filtering the clipped signal is given by [3].

$$x^{(i+2)} = x^{(i)} + \delta x^{(i)}$$ (5)

The Convergence Factor (CF), denoted by $\mu$ can be estimated by using the equation

$$\mu = \frac{B(I_{Q}, A(i))}{G(I_{Q}, A(i))}$$ (6)

Where $R$ is the real part, $e^{(i)}$ is the peak signal above the predetermined level, $c^{(i)}$ is the anti-peak signal at the $i$th iteration, $(\cdot)^{\dagger}$ is complex inner part. the anti-peak signal at the $i$th iteration given by

$$C^{(i)} = T^{(i)} C^{(i)}$$ (7)

where, $T^{(i)}$ is transfer matrix at the $i$th iteration which is given by

$$T^{(i)} = Q^{(i)} Q^{(i-1)}$$ (8)

where, $Q^{*}$ is conjugate of constellation order and $Q$ is the constellation order. The original Orthogonal Frequency Division Multiplexing (OFDM) signal, denoted by $x_n$, is to be clipped in order to reduce the peak signals. The clipping signal is given by the equation

$$c_n^{(i)} = \begin{cases} \left| x_n^{(i)} \right| - A & \text{if } \left| x_n^{(i)} \right| > A \\ 0, & \text{otherwise} \end{cases}$$ (9)

where $c_n^{(i)}$ is the clipping sample of $i$th iteration, $x_n^{(i)}$ is the oversampled OFDM signal, $A$ is predetermined clipping level and for the next iteration is given by

$$A^{(i+2)} = A^{(i)} + \mu \nabla A^{(i)}$$ (10)

where $A^{(i+2)}$ is the next iteration level, $A^{(i)}$ is the present iteration level, $\mu$ is the convergence factor and $\nabla A$ is the gradient with respect to $A$ which is given by

$$V_A = \frac{\sum_{n=0}^{N_p} \left| x_n \right|^2}{N_p}$$ (11)

where $N_p$ is the number of peak samples larger than $A$.

The Peak-to-Average Power Ratio (PAPR) is to be calculated to the signal obtained by the equation (10), which reduces the PAPR than the PAPR calculated for the original OFDM signal or PAPR obtained of the OFDM signal obtained by using the Clipping-Based Active Constellation Extension (CB-ACE) algorithm.

IV. THE EXPONENTIAL COMPANDING TRANSFORM ALGORITHM

The Exponential Companding Transform is also named as the Nonlinear Companding Transform. The idea of companding comes, from the use of companding in Speech Processing. Since, the Orthogonal Frequency Division Multiplexing (OFDM) signal is similar to that of the speech signal, in the sense that large signals occur very infrequently, the same companding technique can be used to improve the OFDM transmission performance. The key idea of the Exponential Companding Transform is to effectively reduce the Peak-to-Average Power Ratio (PAPR) of the transmitted or the companded Orthogonal Frequency Division Multiplexing (OFDM) signals by transforming the statistics of the amplitudes of these signals into uniform distribution. The uniform distribution of the signals can be obtained by compressing the peak signals and expanding the small signals. The process of companding enlarges the amplitudes of the small signals, while the peaks remain unchanged. Therefore, the average power is increased and thus the Peak-to-Average Power Ratio (PAPR) can be reduced.

The Exponential Companding Transform can also eliminate the Out-of-Band Interference (OBI), which is a type of distortion caused by clipping the original OFDM signals. The other advantage of the companding transform is that, it can maintain a constant average power level. The proposed scheme can reduce the PAPR for different modulation formats and sub-carrier sizes without increasing the system complexity and signal bandwidth. The Exponential Companding Transform also causes less spectrum side-lobes.

The original Orthogonal Frequency Division Multiplexing (OFDM) signal is converted into the companded signal by using the Exponential Companding Transform. The companded signal obtained by using the Exponential or Nonlinear Companding Transform is given by the equation

$$R(\xi) = \text{sign}(\xi) \sqrt{2 \left[ 1 - \exp \left( -\frac{\xi^2}{2\sigma^2} \right) \right]}$$ (12)

Where, $h(\xi) –$ Companded Signal obtained by Exponential Companding Transform, $\text{sign}(\xi) -$ sign Function, $\sigma -$ Average Power of Output Signals, $\xi -$ original OFDM signal. The average power of the output signals, denoted by $\sigma$, is required in order to maintain the average amplitude of both the input and output signals at the same level. The average power of the output signals is given by the equation (10).
signal obtained by using the AdaptiveActive Constellation Extension (Adaptive-ACE) algorithm is equal to 10 dB, 8.5 dB and 8.0 dB for the target clipping ratios of 0 dB, 2 dB and 4 dB respectively with a Complimentary Cumulative Distribution Function (CCDF) of $10^{-2}$ or 0.01.

The Peak-to-Average Power Ratios is increasing as the target clipping ratios is decreasing i.e., minimum PAPR cannot be achieved, when the target clipping level is set below an initially unknown optimum value, which results to low clipping ratio problem.

The other problems faced by the AdaptiveActive Constellation Extension (Adaptive-ACE) algorithm are Out-of-Band Interference (OBI) and peak regrowth. Here, the Out-of-Band Interference (OBI) is a form of noise or an unwanted signal, which is caused when the original Orthogonal Frequency Division Multiplexing (OFDM) signal is clipped for reducing the peak signals which are outside to the predetermined area and the peak regrowth is obtained after filtering the clipped signal. The peak regrowth results to, increase in the computational time and computational complexity.

From Figure 3, the original Orthogonal Frequency Division Multiplexing (OFDM) signal is companded i.e., the peak signals of the OFDM signal are compressed and the small signals of the OFDM signal are expanded by using the Exponential Companding Transform for different powers of the amplitude of the companded signals i.e., for $d = 1$, $d = 2$ and $d = 3$.

\[
\alpha = \frac{\sqrt{\sum_{n=1}^{N} |s[n]|^2}}{\sqrt{\sum_{n=1}^{N} |s[n]|^2}}
\]

(13)

Where, $\alpha$ – Average Power of Output Signals
$d$ – Power of the amplitude of the Companded Signal

V. SIMULATION RESULTS

Peak-to-Average Power Ratio (PAPR) of the original Orthogonal Frequency Division Multiplexing (OFDM) signal i.e., the PAPR is to be calculated by using the equations (1), (2) and (3).

From the Figure 1, the Peak-to-Average Power Ratio (PAPR) of the original Orthogonal Frequency Division Multiplexing (OFDM) signal is equal to 11.8 dB with a Complimentary Cumulative Distribution Function (CCDF) of $10^{-2}$ or 0.01. The Peak-to-Average Power Ratio (PAPR) of the original Orthogonal Frequency Division Multiplexing (OFDM) signal is very high, which is evident from the Screen Shot 2.1. The high PAPR results to the increase in the complexity of the Analog-to-Digital Converters (ADCs) and Digital-to-Analog Converters (DACs), also reduces the efficiency of the power amplifiers.

The Peak-to-Average Power Ratio (PAPR) by the Adaptive Active Constellation Extension (Adaptive-ACE) algorithm is to be calculated for the Orthogonal Frequency Division Multiplexing (OFDM) signal which is obtained after filtering the clipped signal i.e., the PAPR is to be calculated for the equation (5) by using the equations (1), (2) and (3).

The Complimentary Cumulative Distribution Function (CCDF) by the AdaptiveActive Constellation Extension (Adaptive-ACE) algorithm is to be calculated for the Orthogonal Frequency Division Multiplexing (OFDM) signal which is obtained after filtering the clipped OFDM signal.

From the Figure 2, the Peak-to-Average Power Ratio (PAPR) of the Orthogonal Frequency Division Multiplexing (OFDM)
The Peak-to-Average Power Ratio by using the Exponential Companding Transform is to be calculated for the Orthogonal Frequency Division Multiplexing (OFDM) signal which is obtained after compressing the peak signals and expanding the small signals i.e., PAPR is to be calculated for the equation (9) by using the equations (1), (2) and (3).

From the Screen Shot 3.4, the Peak-to-Average Power Ratio (PAPR) of the Orthogonal Frequency Division Multiplexing (OFDM) signals obtained by using the Exponential Companding Transform is reduced to 4.5 dB with a Complimentary Cumulative Distribution Function (CCDF) of $10^{-2}$ or 0.01.

Table 5.1 – Comparison of PAPR (in dB) and CCDF for different techniques

<table>
<thead>
<tr>
<th>Different Techniques</th>
<th>PAPR (in dB)</th>
<th>CCDF</th>
</tr>
</thead>
<tbody>
<tr>
<td>Original OFDM Signal</td>
<td>11.8</td>
<td>$10^{-7}$ or 0.01</td>
</tr>
<tr>
<td>Adaptive Constellation Extension (ACE)</td>
<td>6.8</td>
<td>10-2 or 0.01</td>
</tr>
<tr>
<td>Exponential Companding Transform</td>
<td>4.5</td>
<td>$10^{-2}$ or 0.01</td>
</tr>
</tbody>
</table>

From the table 5.1, the Peak-to-Average Power Ratio of the Orthogonal Frequency Division Multiplexing systems is reduced or minimized by using the existing methods namely Clipping-Based Active Constellation Extension (CB-ACE)and the Exponential Companding TransformAlgorithm at a Complimentary Cumulative Distribution Function of $10^{-2}$ or 0.01.

VI. CONCLUSION

The Adaptive Constellation Extension (CB-ACE) Algorithm reduces the high Peak-to-Average Power Ratio (PAPR) by clipping and filtering the original OFDM signal. The CB-ACE Algorithm results to peak regrowth, Out-of-Band Interference (OBI), low clipping ratio problem, increase in the Bit Error Rate (BER) and decrease in the Signal-to-Noise Ratio (SNR).

The Exponential Companding Transform improves the Bit Error Rate (BER) and minimizes the Out-of-Band Interference (OBI) in the process of reducing the Peak-to-Average Power Ratio (PAPR) effectively by compressing the peak signals and expanding the small signals. The improved BER transmits the data via a transmission channel with fewer errors, while the minimized OBI reduces the effects caused by clipping.

Hence, by reducing the Peak-to-Average Power Ratio (PAPR), the complexity of the Analog-to-Digital Converter (ADC) and Digital-to-Analog Converter (DAC) can be reduced. The reduced Peak-to-Average Power Ratio (PAPR) also increases the efficiency of the Power Amplifiers.

REFERENCES

ORAL HYGIENE AWARENESS AMONG TWO NON PROFESSIONAL COLLEGE STUDENTS IN CHENNAI, INDIA- A PILOT STUDY

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Abstract- Oral Health is very personnel health an important health practice for the personal health behaviour that in case of college students those who studying their under graduation. This study aims to find out awareness about the Dental Hygiene among the College Students of Chennai city, India.

Methods
A questionnaire was distributed to the students of in and around the different colleges in chennai city covering men’s college, women’s college & co-education colleges (N = 219) during the academic year 2008 -2009. The response rate was 70%. The questions consisted information on the general background, of dental hygiene knowledge.

Results
Dental hygiene knowledge seemed to be limited and very few background factors were associated with it. More than half of the students had visited a dentist during the previous 12 months, but only one third of students were brushing twice a day or more often.

Conclusions
It may be concluded that the non professional College students seemed to have appropriate knowledge on some oral health topics, but limited knowledge on the others. Their tooth brushing practices are still far behind the international recommendation (twice a day) and also the knowledge, why it should be done so frequently also very limited

Index Terms- Chennai, oral hygiene awareness, oral health attitude

I. INTRODUCTION

"O"r al Health for Healthy life" the theme for World Health Day by WHO for 1998 (1).No one can be truly healthy unless he or she is free from the burden of oral and craniofacial diseases and conditions (2). Oral health diseases are detrimental to the quality of life during childhood through old age and can have an impact on self-esteem, eating ability, nutrition, and health. They are associated with considerable pain, anxiety, and impaired social functioning (3.4). Among the dental disease, dental caries and periodontal problem is of more prevalence and it is an important component of global disease burden. Dental disease preventions depend upon the involvement of community, professional and individual.

Oral health of an individual depends upon awareness and attitude .Attitudes naturally reflect their own experiences, cultural perceptions, familial beliefs, and other life situations and has a strong influence on oral health behaviour (5). Several recent studies concern the oral health attitudes and behaviours of young adults and the relation between their attitudes and behaviours and their dental or oral status, (6,7) Oliveira et al. report that children with inadequate oral health knowledge are twice as likely to have caries than children with adequate knowledge. Studies have shown that there is an association between increased knowledge and better oral health (8,9).The objective of this study was to evaluate the oral health knowledge and oral health behaviour among the nonprofessional college students in Chennai with help of questionnaire adopted from Peterson et al. (18) and Stenberg et al.(19)

II. MATERIALS AND METHOD
A questionnaire containing 25 questions was distributed among the 219 undergraduate non-professional students of two colleges in Chennai city during the academic year 2009 -2010. The response rate was 70% (n =219). The questions consisted information on the general background, dental hygiene habits and oral health knowledge. The age group of the study population were 18-21 yrs.

Background: age (18–21 years); marital status (single); nationality (Indian); years in College (one year, two or more years); financial status (satisfactory, not satisfactory); dental disease (yes, no/don't know).

Oral health knowledge: awareness of dental caries, effect of soft drinks on caries, occurrence of periodontal diseases, role of fluoride in toothpaste.

Oral health behaviour: it was assessed with the history of last dental visit (Within One year /More than one year ago / ≥ two years ago / Never) purpose of dental visit (examination/prevention, treatment), tooth brushing frequency (once a day, twice a day , more than twice a day), mode of brushing. Kind of tooth brush used (medium /soft /hard/very hard bristles), the amount of toothpaste applied on toothbrush, use of fluoridated toothpaste and mouth rinse. Subjects were asked to
answer the questions based on the options given to each question. Response formats included forced choice format in which subjects choose one or more responses from a provided list of options. Explanations of the questions were provided to required subjects. One investigator was always readily available till the completion of questionnaire for clarification. Descriptive statistics were obtained and means, standard deviation, and frequency distribution were calculated. Data analysis was done with Statistical Package for Social Science (SPSS 19.0, Inc., and Chicago, IL).

III. RESULTS

Brushing habits of the study population were at least once a day (85.3%), 14.6% twice a day and 0.9% thrice a day. Approximately 45% of samples were using medium sized bristles, 27% hard bristles and 24% soft bristles tooth brush. Tooth paste were being used by 51% of samples, 38% uses tooth powder and 10% brick powder. 49% of tooth paste used were fluoridated. Amount of tooth paste used for brushing were more than half of the tooth brush (42%), half of the tooth brush (33%), less than half of the brush (16.4%), just a speck (1.3%). Most of the study population had not even once visited the dentist (58.4%). Rest of the study population visited dentist for prevention (24.6%), examination (8.6%), filling /extraction (11%) and special treatments such as endodontic, prosthodontics, orthodontics (3.1%). 48% of parents of the study population insisted on dental treatment.

TABEL 1: Oral health attitude

<table>
<thead>
<tr>
<th>Questionnaire</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Last time when did you visited a dentist?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Within One year</td>
<td>31</td>
<td>14.1</td>
</tr>
<tr>
<td>More than one year ago</td>
<td>41</td>
<td>18</td>
</tr>
<tr>
<td>≥ two years ago</td>
<td>19</td>
<td>8.6</td>
</tr>
<tr>
<td>Never</td>
<td>128</td>
<td>58.4</td>
</tr>
<tr>
<td>What was the purpose of your visit?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Examination</td>
<td>19</td>
<td>8.6</td>
</tr>
<tr>
<td>Prevention</td>
<td>54</td>
<td>24.6</td>
</tr>
<tr>
<td>Need for a filling/extraction</td>
<td>11</td>
<td>5</td>
</tr>
<tr>
<td>Special treatment i.e. Endodontics, Prosthodontics, orthodontics</td>
<td>7</td>
<td>3.1</td>
</tr>
</tbody>
</table>

Regarding the oral health knowledge, approximately 40% of students knew that caries is a dental disease and 54% were aware of soft drinks causing caries. Most of the study population (90%) were aware of brushing twice daily with proper tooth brush is very essential for good oral hygiene. 21% percentage of students was aware that fluorides in tooth paste prevent caries.

TABEL 2: Oral health awareness

<table>
<thead>
<tr>
<th>Caries is a type of</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dental career</td>
<td>10</td>
<td>4.5</td>
</tr>
<tr>
<td>Dental disease</td>
<td>88</td>
<td>40.1</td>
</tr>
<tr>
<td>Tooth paste</td>
<td>33</td>
<td>15.06</td>
</tr>
<tr>
<td>Name of a Dentist</td>
<td>67</td>
<td>30.5</td>
</tr>
<tr>
<td>Not answered</td>
<td>21</td>
<td>9.5</td>
</tr>
</tbody>
</table>

Fluoride is added to toothpaste because of

<table>
<thead>
<tr>
<th>Fluoride is added to toothpaste because of</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pleasant taste</td>
<td>33</td>
<td>15.06</td>
</tr>
<tr>
<td>Soft feeling</td>
<td>94</td>
<td>42.9</td>
</tr>
<tr>
<td>Prevents caries</td>
<td>46</td>
<td>21</td>
</tr>
<tr>
<td>Lesser price</td>
<td>9</td>
<td>1.3</td>
</tr>
<tr>
<td>Don’t know</td>
<td>37</td>
<td>16.8</td>
</tr>
</tbody>
</table>

Do you have bleeding gums?

<table>
<thead>
<tr>
<th>Do you have bleeding gums?</th>
<th>Daily</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Daily</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>
### About 91% of samples knew the importance of gargling mouth after each intake of food. Only 17% of study population uses toothpicks. 21% of samples experiences bad breath. Mouth fresheners were used by 32% population. Importance of visiting dentist once in every six months was known by 74% of population.

### TABEL-3: Oral hygiene habits

<table>
<thead>
<tr>
<th>How many times do you brush your teeth daily?</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
</table>
| Once a day                                  | 187       | 85.3
| Twice a day                                 | 35        | 14.6
| Three times a day                           | 2         | 0.9
| More than three times a day                 | 0         | 0

<table>
<thead>
<tr>
<th>With which of these do you use to brush your teeth?</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
</table>
| Tooth paste                                         | 112       | 51.1
| Tooth powder                                       | 84        | 38.35
| Ash/Brick Powder                                   | 21        | 9.5
| Salt                                                | 2         | 0.9

<table>
<thead>
<tr>
<th>What kind of brush do you use?</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
</table>
| Soft Bristles                   | 52        | 23.7
| Medium Bristles                 | 98        | 44.7
| Hard Bristles                   | 61        | 27.8
| Very hard Bristles              | 8         | 3.6

<table>
<thead>
<tr>
<th>How much toothpaste do you apply to a toothbrush?</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
</table>
| Less than half the brush                          | 13        | 16.4
| Half                                              | 73        | 33.3
| More than half                                   | 92        | 42
| Just a speck                                      | 3         | 1.3
| Not answered                                      | 15        | 6.8

<table>
<thead>
<tr>
<th>Do you regularly use a mouth freshener?</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
</table>
| Yes                                               | 46        | 21
The knowledge of caries being a dental disease is only for 40% of population it shows a very low level of awareness. Very low level of accurate knowledge about fluorides preventing caries and also the soft drinks cause it coincides with the results given by Dai-Il Paik et al 2007 on Korean population.

V. POTENTIAL LIMITATION

This study consists of self-reporting data which depends upon varying levels of language ability and familiarity in completion of questionnaire which would have influenced the selection of response. Misinterpretation and misunderstanding of questionnaire items would have occurred. The questionnaire was pretested with positive results and an investigator was readily available to clarification till the completion of questionnaire.

VI. CONCLUSION

The above study shows that there is lack in appropriate oral health education even among literates. This pilot study gives information regarding the present scenario prevailing in Chennai. Further investigations are required in large quantity for understand more accurately and employ in the public health education for the welfare of the people. The need of the hour is to educate and spread the education about dental care through dentist, media and outreach public health programme to make the individual and the society healthy.

REFERENCES


<table>
<thead>
<tr>
<th></th>
<th>Yes</th>
<th>No</th>
<th>Don't know</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>69</td>
<td>127</td>
<td>23</td>
</tr>
<tr>
<td></td>
<td>31.5</td>
<td>57.9</td>
<td>10.5</td>
</tr>
</tbody>
</table>


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Biotransformation of a single amino-acid L-tyrosine into a bioactive molecule L-DOPA

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Abstract- *Penicillium jensenii* (identified by Dept. of Mycology, Agharkar Research Institute, Pune) isolated from soil (rhizosphere zone) was found to be a potent tyrosinase producer. Tyrosinase is capable of bringing about biotransformation of a single amino acid tyrosine to L-DOPA (3, 4-dihydroxyphenylalanine) which is used as therapeutic agent in the treatment for Parkinson’s disease. Maximum yield of tyrosinase was 13 U/ml at 30°C in tyrosine broth (3mg/ml of tyrosine), pH 7 with an inoculum size of 5% w/v after 24 hrs of incubation under shake-culture conditions (120 rpm).

Index Terms- Biotransformation, L-DOPA (3, 4-dihydroxyphenylalanine), *Penicillium jensenii*, Tyrosinase

I. INTRODUCTION

Biotransformation is the chemical modification (or alteration) of chemical compounds like amino acids[1], toxins [2], xenobiotics [3,4] and drugs [5-7], brought about by an organism to produce bioactive molecules. Enzymes are the catalysts for the biotransformation reactions [8]. Tyrosinases have been isolated from prokaryotes such as *Pseudomonas putida*, *Bacillus* sp. [9, 10]; fungi such as *Aspergillus oryzae* [11, 19], *Neurospora crassa* [12], *Agaricus bisporus* [13], *Pycnoporus* sp. [14] and *Acremonium rutilum* [21]; plants such as *Amorphophallus campanulatus* [15] and *Portulaca grandiflora* [16]; mammals [17]. Tyrosinase (monophenol, dihydroxyphenylalanine: oxygen oxidoreductase) EC 1.14.18.1; is a type III copper protein and is an important enzyme participating in the process of melanin biosynthesis [18]. One of the main applications of tyrosinase is biotransformation of a single amino acid L-tyrosine to a biologically active molecule L-DOPA (3,4-dihydroxy-L-phenylalanine) by hydroxylation reaction as shown in Figure 1.

The present study was undertaken to isolate and explore novel tyrosinase producing microorganisms present in the soil and obtain considerable amount of L-DOPA. There have been no reports of tyrosinase from *Penicillium jensenii* producing L-DOPA as far as we are aware. This paper deals with identification of the isolate producing tyrosinase and confirmation of the production of L-DOPA as well as optimization of the environmental parameters for maximum production of tyrosinase and L-DOPA.

II. MATERIALS AND METHODS

**Materials**

**Milk agar**-
- Peptone - 1 %
- NaCl - 0.5 %
- Yeast Extract - 0.3%
- Agar - 2%
- Milk separately autoclaved at 10 lbs pressure: 10 %
- pH - 6.5-7.2

**Tyrosine agar** –
- Peptone - 0.5%
- Beef extract - 0.3%
- Agar - 2%
- L-tyrosine - 0.5%
- pH - 7

**Tyrosine Broth**-

*Figure 1: Biotransformation of L-tyrosine to L-DOPA by tyrosinase*
Tyrosine was dissolved in distilled water and a few drops of chloroform in pH 7.

**Enrichment media for bacteria:**
- Yeast extract: 0.3%
- Peptone: 1%
- NaCl: 0.5%
- pH: 7

**Enrichment media for fungi and Actinomycetes:**
- Glucose: 3%
- Yeast extract: 0.5%
- Peptone: 0.5%
- NaCl: 0.5%
- pH: 8.2

**Chemical detection of L-DOPA:**
- 0.5 N Hydrochloric acid
- Nitrite-molybdate reagent: Dissolve 10 gm. of sodium nitrite and 10 gm. of sodium molybdate in 100 ml. of distilled water
- 1 N sodium hydroxide
- Standard curve of L-DOPA (Sigma Aldrich) estimation using nitrite-molybdate reagent (Range: 0.01-0.1mg/ml)

**Buffer systems for pH optimization:**
- 0.2M Acetate buffers of pH 4, 4.6, 5 and 5.6
- 0.2M Phosphate buffers of pH 6, 6.6, 7, 7.6, and 8.

**Tyrosinase assay:**
- 0.2M Phosphate buffer (pH 6.6)
- 0.001M L-tyrosine (Sigma Aldrich)

**HPLC:**
- Column C-18 250/4.6 mm length and diameter Cremar prominence (THENOMENEF), mobile phase is 0.1 M Potassium phosphate buffer pH 3.5 with a flow rate of 0.6 ml/min. The detector potential is set at 0.8 V vs the Ag/AgCl electrode wavelength 215 nm and 270 nm. [28]

**Enzyme purification:**
- Ammonium sulphate – analytical grade (60%)
- Dialysis membrane (Hi-Media) (10kDa MWCO)
- 0.2M Phosphate buffer (pH 7)
- SDS-PAGE (mid-range protein marker from Bio-Era)
- Bradford’s reagent for protein estimation

**Methods**
- **Isolation of tyrosinase producers from the soil sample**
  1gm of soil sample was serially diluted and 0.1 ml was spread plated on milk agar. Isolated colonies showing zone of casein hydrolysis were selected.

- **Qualitative detection of tyrosinase production on tyrosine agar and tyrosine broth**
- **Tyrosinase detection on Tyrosine agar**
- Qualitative selection of good tyrosinase producers by spot inoculation on tyrosine agar medium was done to check and compare their capacity to produce melanoidin pigments (brown to black). Incubation was done at 30°C for 24 to 48 hrs.

**Characterization and Identification of Isolates:**
- The organism showing maximum production of tyrosinase and L-DOPA was characterized on the basis of morphological characteristics.

**Tyrosinase detection in Tyrosine broth**
- A loopful of the each of the above isolates was inoculated in 0.1% tyrosine water having pH 7. Few drops of chloroform were added to the inoculated broth to prevent the loss of tyrosinase (if produced by the cultures) from the broth. Incubation was done at 30°C for 24 to 48 hrs. If tyrosinase is produced, broth colour changes from colourless to pink to brown and ultimately black.

**Tyrosinase Assay**
- Spectrophotometer was adjusted to 280 nm and 25°C.
- Following solutions were pipetted into test tube in the following order:

<table>
<thead>
<tr>
<th>Solution to be added</th>
<th>Amount (ml)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.5 M phosphate buffer, pH 6.5</td>
<td>1.0</td>
</tr>
<tr>
<td>0.001 M L-tyrosine</td>
<td>1.0</td>
</tr>
<tr>
<td>Reagent grade water</td>
<td>0.9</td>
</tr>
</tbody>
</table>

The reaction mixture was oxygenated by bubbling oxygen through a capillary tube for 4-5 minutes. Absorbance was recorded at 280 nm for 4-5 minutes to achieve temperature equilibration and to establish blank. 0.1 ml of the supernatant of the enriched culture in tyrosine broth (presumably expected to be producing tyrosinase) was added to the reaction mixture and absorbance was recorded for 10-12 minutes. A non-linear "lag" of 2-3 minutes can be expected. Calculation of enzyme activity was done using the following formula:

\[
\text{Units of enzyme/ ml} = \frac{\Delta A_{280 \text{ nm}}/ \text{min Test} - \Delta A_{280 \text{ nm}}/ \text{min Blank}}{(0.001)(0.1)} (df')
\]

**Protein content: Bradford’s method**
- Protein content was measured with Bovine Serum Albumin (BSA) as standard protein by Bradford’s method [30]. 1 ml of sample was mixed with 5 ml of Bradford’s reagent (Coomasie Brilliant Blue G-250) and incubated for 5 min. Absorbance was measured at 595 nm. Protein content was expressed as milligrams of protein per millilitre of sample. Following tyrosinase assay and Bradford’s method, specific activity of tyrosinase was calculated using the following formula:

\[
\text{Specific activity} = \frac{\text{Units of enzyme/ ml/min}}{\text{mg of protein/ ml}}
\]

**Biotransformation reaction: Quantitative detection of L-DOPA**

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L-DOPA Production was measured according to the method of Arnow for chemical detection [24]. The method has the following steps-

- Enriched culture incubated in tyrosine broth (0.1%) for 24 hrs at 30°C.
- Post filtration (Whatman filter paper No. 1) 1 ml of cell free broth was taken and the following reagents were added in the following order, mixing well after each addition.

<table>
<thead>
<tr>
<th>Reagent</th>
<th>Amount (ml)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.5 N hydrochloric acid</td>
<td>1</td>
</tr>
<tr>
<td>Nitrite-molybdate reagent</td>
<td>1</td>
</tr>
<tr>
<td>Yellow color results at this point</td>
<td></td>
</tr>
<tr>
<td>1 N sodium hydroxide</td>
<td>1</td>
</tr>
<tr>
<td>Red colour develops at this point. Make up volume with distilled water to 5 ml</td>
<td></td>
</tr>
<tr>
<td>Record the absorbance at 530nm</td>
<td></td>
</tr>
</tbody>
</table>

The absorbance recorded is directly proportional to amount of L-DOPA present in the reaction mixture.

**Time course of L-DOPA production during primary screening:**
Isolates showing a brown colouration of melanin production on tyrosine agar were checked for production of L-DOPA in 1% tyrosine broth, over an incubation period of 6 days. At the end of every 24 hrs, chemical detection of L-DOPA was performed, as per the method explained above [24].

**Qualitative detection of L-DOPA production by HPLC- [28]**
Each of the isolates was inoculated in Tyrosine broth. After 48 hrs and 72 hrs sample were withdrawn and centrifuged. The supernatant was collected and was subjected to HPLC analysis for the detection of L-DOPA produced by 5 isolates (as it showed appreciable amount of L-DOPA production).

**Optimization of the pH for enzyme production and enhanced L-DOPA production [11, 23, 24, 25]**
In order to further check the enhanced production of tyrosinase and L-DOPA, different buffer systems were taken having a specific pH which is as follows:

<table>
<thead>
<tr>
<th>Buffer system</th>
<th>pH</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.2M Acetate buffer</td>
<td>4/6</td>
</tr>
<tr>
<td></td>
<td>5/6</td>
</tr>
<tr>
<td>0.2M Phosphate buffer</td>
<td>6/7</td>
</tr>
<tr>
<td></td>
<td>7/8</td>
</tr>
</tbody>
</table>

Cells were harvested from their respective enrichment media (5 gm) and inoculated into these buffers containing 0.1% tyrosine. The flasks were incubated on a shaker at 30°C for 24 hrs. The broth was then centrifuged and the supernatant was checked for enzyme units (enzyme assay) and concentration of L-DOPA produced (chemical detection).

**Optimization of the temperature for enzyme production and enhanced L-DOPA production [11, 23, 24, 25]**
0.1% tyrosine broth inoculated with enriched culture and incubated at different temperatures ranging from 20°C to 60°C for 24hrs. Following incubation, the broth was centrifuged and the supernatant was assayed for tyrosinase activity and L-DOPA production.

**Optimization of the concentration of substrate for enzyme production and enhanced L-DOPA production [23]**
Tyrosine broth of different concentrations ranging from 1mg/ml to 10mg/ml was inoculated with enriched culture and incubated for 24 hrs at 30°C. Following incubation, the broth was centrifuged and the supernatant was assayed for tyrosinase activity as well as L-DOPA production.

**Purification of tyrosinase from Penicillium jensenii: [26]**
Penicillium jensenii was enriched in appropriate enrichment medium. The enriched culture was then re-inoculated in 0.1% tyrosine broth and incubated for 24 hrs at 30°C. The culture was filtered and the tyrosinase was further purified from the filtrate, following the steps given below-

- **Ammonium sulphate precipitation:**
  Analytical grade ammonium sulphate powder was added to the filtrate slowly with continuous stirring in an ice bath, until 60% saturation is achieved. The mixture was refrigerated overnight, followed by centrifugation at 6000-10,000g in a refrigerated centrifuge. The precipitate was dissolved in 0.2 M phosphate buffer (pH 7.0). The suspended precipitate was then checked for tyrosinase activity as well as total protein content.

- **Dialysis:**
  Dialysis membrane of appropriate length was pre-treated in boiling water for 60 min and stored in 0.2 M phosphate buffer (pH7.0). The membrane was filled up with the suspended precipitate and sealed at both ends. The dialysis bag was then suspended overnight at 4°C in a glass cylinder containing 0.2 M phosphate buffer (pH 7.0) with continuous mixing using a magnetic stirrer. The dialysed sample was checked for tyrosinase activity as well as total protein content [29, 30].

**SDS-PAGE-** SDS-PAGE was carried out in a 12% polyacrylamide gel using Tris-glycine buffer (pH 8.3) by the method of Laemmli [27]. The cell free broth (crude extract), ammonium sulphate precipitated protein and dialysed sample obtained from Penicillium jensenii was loaded on to a denaturing polyacrylamide gel and compared with mid-range protein marker. Silver staining was performed in order to visualize the protein bands. The gel results were documented in Gel Doc EZ Imager, BioRad; Software: Image Lab 3.0.
III. RESULTS

From the soil sample 10 isolates were obtained that gave a zone of hydrolysis on (casein) milk agar. Out of these only 8 isolates showed positive result on Tyrosine agar plate. The occurrence of a distinct brown spot which gradually changed its color to black (melanin formation) was indicative of the fact that the above isolates were tyrosinase positive. The yield of L-DOPA obtained from the isolates over a period of 6 days has been compared in Table I. It was seen that the three bacterial isolates viz. DKP-1-B, DKP-2-B and DKP-3-B did not show appreciable production of L-DOPA even after 6 days of incubation. The two fungal isolates DKP-1-F and DKP-2-F produced a maximum of 0.038mg/ml of L-DOPA on the 6th day. The screening results have been graphically represented in Figure 2.

Table I: L-DOPA production by different soil isolates over an incubation period of 6 days

<table>
<thead>
<tr>
<th>Organism</th>
<th>Days</th>
<th>L-DOPA (mg/ml)</th>
</tr>
</thead>
<tbody>
<tr>
<td>DKP-1-F</td>
<td>Day 1</td>
<td>0.025</td>
</tr>
<tr>
<td></td>
<td>Day 2</td>
<td>0.025</td>
</tr>
<tr>
<td></td>
<td>Day 3</td>
<td>0.027</td>
</tr>
<tr>
<td></td>
<td>Day 4</td>
<td>0.032</td>
</tr>
<tr>
<td></td>
<td>Day 5</td>
<td>0.03</td>
</tr>
<tr>
<td></td>
<td>Day 6</td>
<td>0.038</td>
</tr>
<tr>
<td>DKP-2-F</td>
<td>Day 1</td>
<td>0.015</td>
</tr>
<tr>
<td></td>
<td>Day 2</td>
<td>0.016</td>
</tr>
<tr>
<td></td>
<td>Day 3</td>
<td>0.023</td>
</tr>
<tr>
<td></td>
<td>Day 4</td>
<td>0.03</td>
</tr>
<tr>
<td></td>
<td>Day 5</td>
<td>0.032</td>
</tr>
<tr>
<td></td>
<td>Day 6</td>
<td>0.038</td>
</tr>
<tr>
<td>DKP-1-A</td>
<td>Day 1</td>
<td>0.01</td>
</tr>
<tr>
<td></td>
<td>Day 2</td>
<td>0.018</td>
</tr>
<tr>
<td></td>
<td>Day 3</td>
<td>0.02</td>
</tr>
<tr>
<td></td>
<td>Day 4</td>
<td>0.018</td>
</tr>
<tr>
<td></td>
<td>Day 5</td>
<td>0.01</td>
</tr>
<tr>
<td></td>
<td>Day 6</td>
<td>0.01</td>
</tr>
<tr>
<td>DKP-2-A</td>
<td>Day 1</td>
<td>0.015</td>
</tr>
<tr>
<td></td>
<td>Day 2</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>Day 3</td>
<td>0.003</td>
</tr>
<tr>
<td></td>
<td>Day 4</td>
<td>0.005</td>
</tr>
<tr>
<td></td>
<td>Day 5</td>
<td>0.015</td>
</tr>
<tr>
<td></td>
<td>Day 6</td>
<td>0.013</td>
</tr>
<tr>
<td>DKP-3-A</td>
<td>Day 1</td>
<td>0.01</td>
</tr>
<tr>
<td></td>
<td>Day 2</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>Day 3</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>Day 4</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>Day 5</td>
<td>0.001</td>
</tr>
<tr>
<td></td>
<td>Day 6</td>
<td>0.004</td>
</tr>
<tr>
<td>DKP-1-B</td>
<td>Day 1</td>
<td>0.01</td>
</tr>
<tr>
<td></td>
<td>Day 2</td>
<td>0.01</td>
</tr>
<tr>
<td></td>
<td>Day 3</td>
<td>0.01</td>
</tr>
<tr>
<td></td>
<td>Day 4</td>
<td>0.015</td>
</tr>
<tr>
<td></td>
<td>Day 5</td>
<td>0.01</td>
</tr>
<tr>
<td></td>
<td>Day 6</td>
<td>0.025</td>
</tr>
<tr>
<td>DKP-2-B</td>
<td>Day 1</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>Day 2</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>Day 3</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>Day 4</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>Day 5</td>
<td>0.005</td>
</tr>
<tr>
<td></td>
<td>Day 6</td>
<td>0.003</td>
</tr>
<tr>
<td>DKP-3-B</td>
<td>Day 1</td>
<td>0.01</td>
</tr>
<tr>
<td></td>
<td>Day 2</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>Day 3</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>Day 4</td>
<td>0.015</td>
</tr>
<tr>
<td></td>
<td>Day 5</td>
<td>0.002</td>
</tr>
<tr>
<td></td>
<td>Day 6</td>
<td>0</td>
</tr>
</tbody>
</table>
The fungal isolate DKP-1-F was identified on the basis of morphological techniques as *Penicillium jenseii* by ARI (Agharkar Research Institute), Pune. The colony morphology and microscopic observation of *P. jenseii* have been demonstrated in Figure 3 a,b.

**HPLC results:**
The comparison of retention time of standard L-DOPA and standard alpha methyl DOPA with that produced by isolates is given below:

<table>
<thead>
<tr>
<th>Retention time in minutes of standard compounds</th>
<th>Retention time in minutes of test samples</th>
</tr>
</thead>
<tbody>
<tr>
<td>L-DOPA-3.5 to 3.8 min</td>
<td>3.765 (215 nm) DKP-1-F</td>
</tr>
<tr>
<td>Alpha methyl DOPA -5.5 min</td>
<td>5.544 (270 nm) DKP-1-F</td>
</tr>
<tr>
<td></td>
<td>5.508 (215 nm) DKP-1-F</td>
</tr>
</tbody>
</table>

The tyrosinase activity as well as L-DOPA production by *P. jenseii* (DKP-1-F) was optimized with respect to temperature, pH and substrate concentration.

**pH:**
The results summarized in **Table II** and Figure 4 indicated that optimum pH for tyrosinase production was pH 7.0, while that for L-DOPA production is pH 6.

**Table II: Units of tyrosinase and amount of L-DOPA obtained per ml, at different pH values**

<table>
<thead>
<tr>
<th>pH</th>
<th>Enzyme U/ml</th>
<th>L-DOPA (mg/ml)</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>4.6</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>5</td>
<td>4</td>
<td>0</td>
</tr>
<tr>
<td>5.6</td>
<td>5</td>
<td>0.01</td>
</tr>
<tr>
<td>6</td>
<td>6</td>
<td>0.085</td>
</tr>
<tr>
<td>6.6</td>
<td>6</td>
<td>0.08</td>
</tr>
<tr>
<td>7</td>
<td>8</td>
<td>0.032</td>
</tr>
<tr>
<td>7.6</td>
<td>6</td>
<td>0.025</td>
</tr>
<tr>
<td>8</td>
<td>6</td>
<td>0</td>
</tr>
</tbody>
</table>

**Figure 4: Optimization of pH conditions for tyrosinase and L-DOPA production by P. jenseii**

**Temperature:**
Table III and Figure 5 indicate that the optimum temperature for both tyrosinase production as well as L-DOPA production is 30°C.
Table III: Units of tyrosinase and amount of L-DOPA obtained per ml, at different temperature values

<table>
<thead>
<tr>
<th>Temperature (°C)</th>
<th>Enzyme (U/ml)</th>
<th>L-DOPA production (mg/ml)</th>
</tr>
</thead>
<tbody>
<tr>
<td>20</td>
<td>5</td>
<td>0</td>
</tr>
<tr>
<td>30</td>
<td>13</td>
<td>0.025</td>
</tr>
<tr>
<td>40</td>
<td>5</td>
<td>0.005</td>
</tr>
<tr>
<td>50</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>60</td>
<td>4</td>
<td>0</td>
</tr>
</tbody>
</table>

Substrate concentration:
It was observed that equal tyrosinase production was obtained at a substrate concentration of 1mg/ml and 3mg/ml. Maximum yield of L-DOPA was obtained at a concentration of 3mg/ml, as indicated in Table IV and Figure 6.

Table IV: Production of tyrosinase and L-DOPA at various substrate concentrations

<table>
<thead>
<tr>
<th>Substrate concentration (L-tyrosine, mg/ml)</th>
<th>Enzyme (U/ml)</th>
<th>L-DOPA production (mg/ml)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>11</td>
<td>0.001</td>
</tr>
<tr>
<td>3</td>
<td>11</td>
<td>0.014</td>
</tr>
<tr>
<td>5</td>
<td>0</td>
<td>0.002</td>
</tr>
<tr>
<td>7</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>9</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>10</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

Purification of tyrosinase:
The comparison of specific activity and fold purification between the crude extract and the dialysed precipitate has been depicted in Table V. The specific activity of tyrosinase was shown to increase from 933.333U/mg to 3000U/mg after ammonium sulphate precipitation. The table also indicates that tyrosinase was purified by 3.214 fold.

The crude extract as well as the purified enzyme (post-dialysis) was allowed to run on a polyacrylamide gel under denaturing conditions, along with a mid-range protein marker. Results summarized in Figure 7 and Figure 8 revealed the presence of a single band corresponding to approximately 14.7 kDa, which is found to be smaller than the molecular weights of known fungal tyrosinases.
IV. DISCUSSION

The tyrosinase activity of all eight soil isolates was determined qualitatively and quantitatively. Tyrosinase being a bifunctional enzyme catalyses both the orthohydroxylation of monophenols (tyrosine)- monophenolase activity or cresolase activity and subsequent oxidation of diphenols (L-DOPA) to orthoquinones (dopachrome)- diphenolase activity or catecholase activity. Quinones produced, are highly susceptible to non-enzymatic reactions, which lead to the formation of melamins and heterologous polymers [18]. The fungal isolate DKP-2-F produced appreciable amount of L-DOPA after 24 hrs which continued to increase up to the sixth day. As DKP-1-F produced considerable amount of L-DOPA within 24 hrs when compared to that of all the other isolates, it was selected for further study. *Penicillium jensenii* (DKP-1-F) remarkably produced 0.025 mg/ml of L-DOPA at the end of 24 hrs, which increased up to 0.038 mg/ml by the end of 6th day. Since *Penicillium jensenii* gave the fastest and maximum yield of L-DOPA as compared to the other isolates over a period of 6 days, it was further considered for optimization. Post optimization studies, maximum L-DOPA production by *Penicillium jensenii* was compared with those of known fungal tyrosinase producers [11-14, 21, 25].

*Penicillium jensenii* was checked for maximum tyrosinase and L-DOPA production by subjecting inoculated L-tyrosine broth to a range of temperature, pH and substrate concentration. It was found that the maximum yield of L-DOPA was obtained at 30°C, pH 6 and 3 mg/ml of substrate, while maximum units of tyrosinase was obtained at 30°C, pH 7 and 1 mg/ml and 3 mg/ml of substrate.

Production of Alpha-methyl DOPA along with L-DOPA detected in HPLC results is reported for the first time in this paper. The detection of alpha methyl DOPA was purely qualitative and no further work concerning the estimation of alpha methyl DOPA was done in this study. The proposed biochemistry could be as shown in Figure 9.
Partial purification of tyrosinase was carried out. SDS-PAGE results revealed the presence of a single band corresponding to approximately 14.77 kDa. Purification of tyrosinase starting with a bulk volume of 800ml was reduced to 50 ml in just one step of purification (ammonium sulphate precipitation) followed by dialysis. A darker band after partial purification as compared to that obtained from crude extract was due to concentration of protein contents. A single band in the lane for crude extract itself could be because no other substrate other than tyrosine was present in the broth used for L-DOPA production. Thus a single enzyme- tyrosinase is inducibly produced during the biotransformation process.

V. CONCLUSION

Further purification of the enzyme tyrosinase with murine membrane filtration from Penicillium jenseni following by detailed study of kinetic parameters could be done. Antioxidant activity of L-DOPA towards the organs of the body including brain could be further investigated. Like other transformed nano blood brain barrier and reaching the dead nerve cells [20]. The brain. This prevents the metabolism of LFDOPA, which is a psychoactive drug. Once all parameters are determined, an attempt to scale-up the biotransformation process.

ACKNOWLEDGMENT

I would like to thank Dr E.M Khan, Principal, Abeda Inamdar Senior College for providing us the necessary infrastructure conducive for research.

REFERENCES


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Effect of Nutrition Counseling on Junk Food Intake and Anthropometric Profile among Adolescent Girls of Working Mothers

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Abstract- Sixty adolescent girls of working mothers aged 16-18 years who used to eat junk foods frequently were selected from two schools in Ludhiana and divided equally into two groups viz. Experimental (E) and Control (C). Nutrition counseling was imparted for a period of three months. The data on demographic information, junk food consumption pattern, food intake and anthropometric parameters were recorded before and after nutrition counseling. The mean monthly per capita income was Rs. 4432.2±3309.46 and Rs.7347.73±9068.23 in both the groups respectively. It was observed that 86.7 & 93.3 per cent of subjects spent their monthly pocket money on junk foods in group E & C and majority ate junk foods once a week. Junk foods contributed to 54 & 57 per cent and 50 & 54.32 per cent to total energy intake in group E & C before and after nutrition counseling respectively. The daily intake of cereals, pulses, roots & tubers, green leafy vegetables, other vegetables, fruits and milk & milk products increased, while intake of fat & oils decreased in group E after nutrition counseling. A significant (P≤0.01) reduction in weight i.e. 55.5 to 54.5 kg and BMI i.e. 22.09 to 21.06 kg/m2 was observed in group E. The results of present investigation suggested that there is need to focus on nutrition counseling to facilitate the intake of healthy junk foods like fermented foods, wheat noodles by adding lots of vegetables, sprouted pulses, sprouted tikki, vegetable samosa & cutlets, wheat and multigrain bread.

Index Terms- Adolescent girls, food intake, junk food, nutrition counseling, weight

I. INTRODUCTION

Junk foods are unhealthy, contain chemical additives. School canteens are offering foods high in fat and sugar which actually contributing to the youth weight gain along with other problems like infections, food poisonings and dental diseases. Consuming junk foods might stop the children from taking healthy meals either at school or at home. The practice of high consumption of junk foods like maggi noodles, burgers, paobhaji, sandwiches, hot dogs, patties, pastries, pop-corn, potato chips, carbonated drinks, biscuits, muffins, toast, kulcha-channa, samosa, chocolates etc have become common feature of adolescent’s diet throughout the world (Pathak 2010).

In India, adolescents account 20 per cent of the total population (UNICEF 2011). Eratic eating behaviors such as unhealthy dieting or meal skipping are not uncommon. Adolescent’s eating behaviors are strongly influenced by their social environments, which include family, peer networks, schools, advertising, religion and knowledge. They frequently overconsume fast foods and underconsume fruits, vegetables and dairy products (Gomathy and John 2008).

According to WHO, in India, more than 3 per cent of the population is in the obese category. Obesity is an emerging major public health problem throughout the world among adolescents. Poor dietary habits combined with decreased physical activity have led to an increase in overweight and obesity among adults and children (Singh 2010).

Nutrition counseling is a process by which beliefs; attitudes, environmental influences and knowledge about food and health are channelized into actual practices which are sound and consistent with the individual needs, purchasing power, food availability, health and socio-cultural background. It is one of the most effective tool of changing the food habits without affecting their sentiments (Monga et al 2008). Nutrition counseling regarding the importance of balanced diet, harmful effects of junk foods will help to curb the junk food addiction and improving their nutritional status. Keeping this in view, the present study has been planned to determine effect of nutrition counseling on junk food intake and anthropometric profile among adolescent girls of working mothers.

II. MATERIAL AND METHODS

A. Selection of subjects

A sample of 60 adolescent girls of working mothers aged 16-18 years who used to eat junk foods frequently were selected randomly from two schools and divided equally into two groups viz. Experimental (E) and Control (C). Nutrition counseling was imparted to group E, while group C was not be given any nutrition counseling.

B. Food intake and anthropometric parameters

Food intake of the subjects was recorded for seven consecutive days by “24 hour recall method” using standardized containers before and after nutrition counseling and was compared with ICMR (1999) recommendations. Height, Weight, Mid upper arm circumference (MUAC), Triceps skin fold thickness (TSFT) were recorded before and after nutrition counseling using

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standard methods given by Jelliffe (1966). Based on the measurements, Body mass index (BMI) was calculated.

C. Nutrition counseling
Nutrition counseling was imparted to the subjects of group E in the form of modules, as well as lectures, visual aids like charts and posters and flash cards for a period of three months (fortnightly) on the balanced diet, cooking practices, ill effects of junk foods and also how to make junk foods healthy.

D. Statistical analysis of data
The data was analyzed statistically by using appropriate statistical tools such as mean, standard error and percentage. To test the significance, student’s t-test was applied. The relevant correlation coefficient (r) was also computed (Singh et al 2004).

III. RESULTS AND DISCUSSIONS

Demographic information of the subjects
In the present study, the mean age was 17.00±1.00 and 17.00±1.00 years in both the groups respectively. It was also observed that majority of fathers (60 & 60 per cent) and mothers (80 & 50 per cent) were involved in service, while 13.3 & 33.3 per cent of fathers and 20 & 50 per cent of mothers were engaged in business and self employment like boutique, beautician, tutor, packing of tiffin system etc. The mean monthly income was Rs. 17220±14273.71 and Rs. 28448.28±31690 in both the groups respectively. It was observed that 50 per cent of subjects skipped breakfast daily due to lack of time in group E. Further, 33.3 per cent skipped lunch in group E due to lack of appetite. However, after nutrition counseling, majority of the subjects in group E started taking regular meals at proper time, instead of eating junk foods. It was also seen that majority of the subjects (86.7 and 93.3 per cent) spent their monthly pocket money on junk foods in group E and C respectively. Further, 53.3 & 23.3 per cent consumed junk foods at least once a week and 20 & 33.3 per cent thrice a week in both the groups respectively.

Junk Food Consumption Pattern
Consumption of various junk foods among adolescent girls before and after nutrition counseling is given in table 1. The results revealed that 50 & 40 per cent, 50 & 50 per cent and 20 & 20 per cent of subjects consumed south Indian foods like dosa, idli and uttapam once a week in group E & C before nutrition counseling respectively. The most common Chinese food items were noodles (60 & 50 per cent), macroni (60 & 73.4 per cent), pasta (40 & 40 per cent) and magi (13.3 & 43.4 per cent) in both the groups respectively. Table 2 depicted that 100 & 100 per cent, 100 & 100 per cent, 100 & 73.4 per cent, 80 & 90 per cent, 63.4 & 73.4 per cent, 66.7 & 80 per cent and 43.4 & 40 per cent of subjects consumed fried foods like potato chips, kurkure, kulche/bhatura channe, paneer pakora, bread pakora, cutlets and samosa in group E & C before nutrition counseling respectively. It was observed that frequency of consumption of junk foods decreased after nutrition counseling in group E, as they were motivated to decrease the consumption of high fat foods, market foods, ready to eat foods, junk foods like pizza, burger, fried foods etc. and were taught to consume healthy junk foods like fermented foods, wheat noodles by adding lots of vegetables, sprouted pulses, vegetable samosa, cutlets, wheat and multigrain bread and use of less oil in cooking to remain healthy and fit. However, negligible change was found among subjects of group C. It was also observed that daily consumption of coffee was most common in 40 and 30 per cent in group E before and after nutrition counseling respectively. The subjects were taught to reduce the intake of caffeinated beverages as it directly affects the brain and also causes acidity. It was also observed that 43.3 and 36.7 per cent of subjects in group E preferred carbonated drinks with meals before and after nutrition counseling respectively. They were also taught to reduce the intake of carbonated drinks as it would increase the risk for obesity, tooth decay and bone fractures. The data revealed in the present study that 83.3 & 73.4 per cent and 13.3 & 20 per cent consumed chocolates and ice cream before nutrition counseling. Inspite of nutrition counseling, the intake of ice cream was similar. Mahajan (2011) also observed that the frequency of consumption of fast food items like pakora, burger, macroni, manchurian, magi, noodles, samosa significantly decreased after nutrition intervention.

Per cent contribution of junk foods to the total energy
As depicted in the table 2, junk foods contributed to 54 & 57 per cent and 50 & 54.32 per cent to total energy intake in group E & C before and after nutrition counseling respectively. Further, the results of the present study revealed that fat from junk foods contributed to total energy intake as 37 & 39 per cent and 33 & 38.52 per cent in both the groups respectively.

Food intake
The mean daily food intake by the subjects before and after nutrition counseling is given in table 3. It was observed that the mean intake of cereals among the subjects was 200±1.00 & 175.04±46.92 g and 236±4.73 & 169.31±45.84 g in group E & C respectively. After nutrition counseling, the intake of cereals in group E could be due to increase in intake of cereal foods which contains phenolic acid and phytoestrogens with antioxidant properties and decrease the intake of processed cereals. The mean daily consumption of pulses in group E & C were 45.04±17.92 & 46.45±14.71 g and 53.95±19.42 & 45.30±14.09 g before and after nutrition counseling respectively. A significant (P<0.01) increase in intake of pulses was observed in group E, perhaps due to the more inclusion of sprouted pulse products like stuffed parantha, salad, chat, raita etc. after nutrition counseling. The intake of green leafy vegetables was only in missi roti and it was astonishing to see very little intake of green leafy vegetables in the subjects of both the groups because they did not like the taste of green leafy vegetables in vegetable form. The mean daily intake of green leafy vegetables was only 5.23±10.26 & 12.52±21.65 g and 8.08±12.94 & 12.11±21.38 g in group E & C before and after nutrition counseling respectively. After nutrition counseling, the subjects came to know about the importance of GLV’s being cheap source of vitamins, minerals and fiber. The mean daily intake of roots & tubers by the subjects of group E & C before and after counseling were 79.60±33.77 & 90.78±2.22 g and 88.30±29.14 & 91.71±32.29 g respectively. The mean daily
consumption of other vegetables was 21.76±12.85 & 23.90±18.19 g and 26.00±12.18 & 23.52±16.32 g in group E & C before and after nutrition counseling respectively. However the intake was less than the suggested intake but a significant increase was reported in group E due to more intake of cucumber in the form of salads, other vegetables like cabbage, peas which are high in fiber and provide more satiety in their daily dietary meals.

The commonly consumed fruits by the subjects were apple, banana, orange and tomato etc. The mean daily intake of fruits in group E & C was 41.52±30.09 & 51.04±30.02 g and 55.76±36.44 g and 50.71±29.69 g before and after nutrition counseling respectively. An increase was reported in group E as the subjects used to take amla, ber, guava and papaya as their beneficial effects were taught during nutrition counseling sessions. Srivastava (2009) also suggested that soluble fiber found in legumes and fruits decreases fat absorption and recommended adequate consumption of fresh fruits and vegetables as they contain antioxidants which protect our body from harmful free radicals.

The consumption of milk & milk products was in the form of curd, butter milk, tea, coffee, cheese etc. The mean daily intake of milk & milk products was 213.19±113.52 & 246.00±107.90 g and 252.00±120.31 & 244.00±104.71 g in group E & C before and after nutrition counseling respectively. The subjects in group E who were not in habit of taking milk started consuming milk at least once a week. It was observed that the mean daily intake of non-vegetarian foods in group E & C was only 3.57±8.12 & 5.00±16.68g and 0.71±3.91 & 3.09±14.68 g before and after nutrition counseling respectively due to its high cost. Eggs were taken at least twice a week by only 10 per cent subjects in the form of omelette, boiled egg and scrambled egg, while 7 per cent consumed eggs occasionally. Fats & oils were consumed in the form of vanaspati, refined oil, butter and fried foods such as pakoras, samosa, parantha, puri, bhatoora, pinni, paneeri and groundnuts as the subjects were in the habit of eating some of these items at lunch-break from school canteen. It was observed that the average intake of fats & oils in group E & C was 28.86±8.38 & 33.02±10.59 g and 25.5±4.39 & 32.50±10.56 g before and after nutrition counseling respectively. The intake of fats & oils in the group E was marginally less, while, it was higher in group C when compared to ICMR recommendations. The subjects in group E were taught about healthy junk foods and decrease intake of fried foods as it could lead to overweight or obesity. It was observed that the subjects shifted to stuffed or plain roti with curd or vegetables etc instead to take butter, ghee, cream along with parantha after nutrition counseling sessions. The sugar was mainly consumed in the form of biscuits, cakes, chocolates, gajrela, ice cream pinni, paneeri, shakes, soft drinks, sweets, toffees and by addition in milk, tea, coffee etc. Statistically, no significant increase in intake of sugar was observed in group E as the subjects were taught to reduce the intake of sweet meats and sweet dishes as it resulted in overweight and obesity, diabetes, hypertension etc. Intake of sugar and jaggery was found to be lesser i.e 25 and 22 g among children of Jalandhar and Kapurthala was reported by Nahar et al (2009).

Anthropometric Measurements

Table 1 Consumption pattern of Junk foods before and after nutrition counseling

Distribution of subjects according to grades of obesity

According to BMI classification, majority of subjects i.e. 76.6 and 86.6 per cent fell in the normal category followed by 20 and 13.3 per cent were pre obese and only 3.4 and 0.0 per cent were underweight in group E before and after nutrition counseling respectively. It was also noticed that majority i.e. 56.6 and 50 per cent were underweight followed by 40 and 46.6 per cent were come under normal category in group C respectively. Bisla et al (2009) reported that 29.22, 13.33 and 46.66 of girls in Rajasthan ranged BMI <18.5, 18.5-20 and 20-25 kg/m² respectively.

Coefficient correlation (r) between junk foods intake and anthropometric parameters

Table 7 showed that most relevant significant (P≤0.01) relationship between fried food vs weight (r=0.966 & 0.869) in group E & C, sweet meats vs weight (r=0.780), while Chinese foods was also highly significant (P≤0.01) and positively correlated to weight and BMI (r=0.573, 0.508) in group E respectively. The data in the table revealed that correlation coefficient were significant and positive between fried foods vs BMI (r=0.344, 0.794) in both the groups respectively. The relationship could be explained on the basis that adolescents with high intake of fat in the form of fried foods, fast foods, cakes, pastries.
<table>
<thead>
<tr>
<th>Food items</th>
<th>Group E (n=30)</th>
<th>Group C (n=30)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Before</td>
<td>After</td>
</tr>
<tr>
<td>South Indian foods</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dosa*</td>
<td>15(50)</td>
<td>8(26.7)</td>
</tr>
<tr>
<td>Wada*</td>
<td>10(33.4)</td>
<td>4(13.3)</td>
</tr>
<tr>
<td>Idli*</td>
<td>15(50)</td>
<td>6(20)</td>
</tr>
<tr>
<td>Utapam*</td>
<td>6(20)</td>
<td>0(0)</td>
</tr>
<tr>
<td>Chinese foods</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Noodles*</td>
<td>18(60)</td>
<td>9(30)</td>
</tr>
<tr>
<td>Macroni*</td>
<td>18(60)</td>
<td>10(33.4)</td>
</tr>
<tr>
<td>Manchurian*</td>
<td>16(53.3)</td>
<td>8(26.7)</td>
</tr>
<tr>
<td>Pasta*</td>
<td>12(40)</td>
<td>8(26.7)</td>
</tr>
<tr>
<td>Spring rolls*</td>
<td>11(36.7)</td>
<td>6(20)</td>
</tr>
<tr>
<td>Chaupsy*</td>
<td>5(16.7)</td>
<td>2(6.7)</td>
</tr>
<tr>
<td>Magi*</td>
<td>4(13.3)</td>
<td>2(6.7)</td>
</tr>
<tr>
<td>Fried foods</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Potato chips*</td>
<td>30(100)</td>
<td>25(83.3)</td>
</tr>
<tr>
<td>Kurkure*</td>
<td>30(100)</td>
<td>25(83.3)</td>
</tr>
<tr>
<td>Kulcha channa*</td>
<td>30(100)</td>
<td>23(76.7)</td>
</tr>
<tr>
<td>Paneer pakora*</td>
<td>24(80)</td>
<td>18(60)</td>
</tr>
<tr>
<td>Bread pakora*</td>
<td>19(63.4)</td>
<td>8(26.7)</td>
</tr>
<tr>
<td>Cutlets*</td>
<td>20(66.7)</td>
<td>13(43.4)</td>
</tr>
<tr>
<td>Tikki*</td>
<td>13(43.4)</td>
<td>4(13.3)</td>
</tr>
<tr>
<td>Samosa*</td>
<td>13(43.4)</td>
<td>5(16.7)</td>
</tr>
<tr>
<td>Pao – bhaji*</td>
<td>11(36.7)</td>
<td>8(26.7)</td>
</tr>
<tr>
<td>Kazhori*</td>
<td>8(26.7)</td>
<td>2(6.7)</td>
</tr>
<tr>
<td>Burger*</td>
<td>8(26.7)</td>
<td>5(16.7)</td>
</tr>
<tr>
<td>Bakery items</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bread*</td>
<td>14(46.7)</td>
<td>8(26.7)</td>
</tr>
<tr>
<td>Cakes*</td>
<td>10(33.4)</td>
<td>3(10)</td>
</tr>
<tr>
<td>Petties*</td>
<td>9(30)</td>
<td>5(16.7)</td>
</tr>
<tr>
<td>Pastry*</td>
<td>7(23.4)</td>
<td>4(13.3)</td>
</tr>
<tr>
<td>Biscuits*</td>
<td>6(20)</td>
<td>4(13.3)</td>
</tr>
<tr>
<td>Pizza*</td>
<td>6(20)</td>
<td>4(13.3)</td>
</tr>
<tr>
<td>Sweet dish</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pinni*</td>
<td>20(66.7)</td>
<td>13(43.4)</td>
</tr>
<tr>
<td>Chocolate*</td>
<td>25(83.3)</td>
<td>18(73.4)</td>
</tr>
<tr>
<td>Gajrela*</td>
<td>20(66.7)</td>
<td>13(43.4)</td>
</tr>
<tr>
<td>Halwa*</td>
<td>15(50)</td>
<td>8(26.7)</td>
</tr>
<tr>
<td>Sweet meats*</td>
<td>13(43.4)</td>
<td>8(26.7)</td>
</tr>
<tr>
<td>Ice-cream*</td>
<td>4(13.3)</td>
<td>3(10)</td>
</tr>
<tr>
<td>Beverages</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tea *</td>
<td>19(63.3)</td>
<td>15(50)</td>
</tr>
<tr>
<td>Coffee*</td>
<td>12(40)</td>
<td>9(30)</td>
</tr>
<tr>
<td>Carbonated drink *</td>
<td>13(43.3)</td>
<td>11(36.7)</td>
</tr>
</tbody>
</table>

* Multiple Responses

Figures in ( ) parenthesis are percentage

Table 2 Per cent contribution of carbohydrates, protein and fats to the total energy intake from junk food intake

<table>
<thead>
<tr>
<th>Nutrient</th>
<th>Group E (n=30)</th>
<th>Group C (n=30)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carbohydrate</td>
<td>54.00</td>
<td>50.00</td>
</tr>
<tr>
<td></td>
<td>57.00</td>
<td>54.32</td>
</tr>
<tr>
<td>Protein</td>
<td>9.00</td>
<td>11.00</td>
</tr>
<tr>
<td></td>
<td>9.80</td>
<td>9.50</td>
</tr>
</tbody>
</table>
Table 3 Mean daily food intake of subjects before and after nutrition counseling (Mean ± SE)

<table>
<thead>
<tr>
<th>Food group</th>
<th>Group E (n=30)</th>
<th>Group C (n=30)</th>
<th>References # (g)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Before</td>
<td>After</td>
<td>t-value</td>
</tr>
<tr>
<td>Cereals</td>
<td>200±1.00</td>
<td>236±4.73</td>
<td>2.850*</td>
</tr>
<tr>
<td>Pulses</td>
<td>45.04±17.92</td>
<td>53.95±19.42</td>
<td>2.518*</td>
</tr>
<tr>
<td>Green leafy vegetables</td>
<td>5.23±10.26</td>
<td>8.08±12.94</td>
<td>1.988**</td>
</tr>
<tr>
<td>Roots and tubers</td>
<td>79.60±33.77</td>
<td>88.30±29.14</td>
<td>2.061**</td>
</tr>
<tr>
<td>Other vegetables</td>
<td>21.76±12.85</td>
<td>26.00±12.18</td>
<td>2.003**</td>
</tr>
<tr>
<td>Fruits</td>
<td>41.52±30.09</td>
<td>55.76±36.44</td>
<td>2.222**</td>
</tr>
<tr>
<td>Milk and milk products</td>
<td>213.19±113.52</td>
<td>252.00±120.31</td>
<td>2.321**</td>
</tr>
<tr>
<td>Fats and oils</td>
<td>28.86±8.38</td>
<td>25.5±4.39</td>
<td>1.757**</td>
</tr>
<tr>
<td>Sugar and jiggery</td>
<td>14.45±7.09</td>
<td>14.31±7.04</td>
<td>0.189NS</td>
</tr>
<tr>
<td>Meat, Fish and poultry</td>
<td>3.57±8.12</td>
<td>0.71±3.91</td>
<td>2.112**</td>
</tr>
</tbody>
</table>

# ICMR (1999) * Significant at 1% NS - Non significant **Significant at 5%

Table 4 Anthropometric profile of subjects before and after nutrition counseling (Mean ± SE)

<table>
<thead>
<tr>
<th>Anthropometry</th>
<th>Before</th>
<th>After</th>
<th>t-value</th>
<th>Before</th>
<th>After</th>
<th>t-value</th>
<th>Reference standard</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (yrs)</td>
<td>16</td>
<td>162.09±5.49</td>
<td>162.45±4.77</td>
<td>1.490NS</td>
<td>162.26±5.35</td>
<td>162.54±5.25</td>
<td>-</td>
</tr>
<tr>
<td>Height (cm)</td>
<td>17</td>
<td>164.5±3.58</td>
<td>164.5±3.38</td>
<td>-</td>
<td>151.68±3.45</td>
<td>151.68±3.45</td>
<td>-</td>
</tr>
<tr>
<td>Overall</td>
<td>18</td>
<td>158.75±2.62</td>
<td>159.5±1.73</td>
<td>1.568NS</td>
<td>158.83±4.00</td>
<td>158.83±4.00</td>
<td>-</td>
</tr>
<tr>
<td>Weight (kg)</td>
<td>16</td>
<td>57.54±5.49</td>
<td>55.28±2.89</td>
<td>2.772*</td>
<td>43.40±3.37</td>
<td>43.65±3.33</td>
<td>1.463NS</td>
</tr>
<tr>
<td>Overall</td>
<td>17</td>
<td>63.6±8.65</td>
<td>61.38±6.81</td>
<td>3.147*</td>
<td>42.52±3.19</td>
<td>42.77±3.04</td>
<td>0.175NS</td>
</tr>
<tr>
<td>MUAC (cm)</td>
<td>18</td>
<td>45.25±15.90</td>
<td>47.5±5.41</td>
<td>0.446NS</td>
<td>47.83±3.48</td>
<td>47.83±3.48</td>
<td>-</td>
</tr>
<tr>
<td>Overall</td>
<td>16</td>
<td>55.5±10.00</td>
<td>54.5±5.03</td>
<td>-</td>
<td>45.00±3.35</td>
<td>45.00±3.35</td>
<td>-</td>
</tr>
<tr>
<td>Height (cm)</td>
<td>17</td>
<td>24.72±2.61</td>
<td>25.36±2.06</td>
<td>0.746NS</td>
<td>23.25±1.93</td>
<td>23.25±1.93</td>
<td>-</td>
</tr>
<tr>
<td>Overall</td>
<td>18</td>
<td>26.6±2.57</td>
<td>26.73±2.43</td>
<td>1.074NS</td>
<td>23.12±2.37</td>
<td>23.12±2.37</td>
<td>-</td>
</tr>
<tr>
<td>MUAC (cm)</td>
<td>16</td>
<td>25.25±1.91</td>
<td>26.5±1.00</td>
<td>1.732NS</td>
<td>24.00±2.00</td>
<td>24.00±2.00</td>
<td>-</td>
</tr>
<tr>
<td>Overall</td>
<td>17</td>
<td>26.00±2.36</td>
<td>27.20±1.83</td>
<td>-</td>
<td>23.46±2.10</td>
<td>23.46±2.10</td>
<td>-</td>
</tr>
<tr>
<td>Weight (kg)</td>
<td>18</td>
<td>14.49±1.99</td>
<td>14.56±1.53</td>
<td>0.467NS</td>
<td>13.43±1.97</td>
<td>13.51±1.82</td>
<td>0.168NS</td>
</tr>
<tr>
<td>Overall</td>
<td>17</td>
<td>13.72±2.21</td>
<td>14.00±1.39</td>
<td>2.838*</td>
<td>14.46±2.31</td>
<td>14.58±2.05</td>
<td>0.175NS</td>
</tr>
<tr>
<td>Overall</td>
<td>18</td>
<td>13.50±4.20</td>
<td>14.10±3.35</td>
<td>1.000NS</td>
<td>11.36±0.93</td>
<td>11.36±0.93</td>
<td>-</td>
</tr>
<tr>
<td>BMI (kg/m²)</td>
<td>16</td>
<td>21.92±1.90</td>
<td>20.86±1.07</td>
<td>3.266*</td>
<td>17.54±2.06</td>
<td>17.65±2.06</td>
<td>1.462NS</td>
</tr>
<tr>
<td>Overall</td>
<td>17</td>
<td>23.50±3.10</td>
<td>22.67±2.48</td>
<td>3.177*</td>
<td>18.47±1.33</td>
<td>18.58±1.30</td>
<td>1.000NS</td>
</tr>
<tr>
<td>Overall</td>
<td>18</td>
<td>20.85±5.45</td>
<td>19.66±2.02</td>
<td>0.645NS</td>
<td>20.01±4.15</td>
<td>20.01±4.15</td>
<td>-</td>
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<tr>
<td>Overall</td>
<td>22.09±3.50</td>
<td>21.06±2.00</td>
<td>-</td>
<td>19.00±1.90</td>
<td>19.00±2.50</td>
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<td>-</td>
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</table>

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259
ISSN 2250-3153
# WHO (2005) @ Jelliffe (1966) ¥ ICMR (1990) *Significant at 1 % NS - Non significant

Table 5 Distribution of subjects according to BMI classification before and after nutrition counseling

<table>
<thead>
<tr>
<th>Categories of body mass index (Kg/m²)*</th>
<th>Risk of co-morbidity</th>
<th>Group E (n=30)</th>
<th>Group C (n=30)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Frequency</td>
<td>Percentage</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Before</td>
<td>After</td>
</tr>
<tr>
<td>Underweight (&lt;18.5)</td>
<td>Low (but risk of other clinical problems)</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Normal (18.5-24.99)</td>
<td>-</td>
<td>23</td>
<td>26</td>
</tr>
<tr>
<td>Overweight (≥25.00)</td>
<td>Average</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Pre obese (25-29.99)</td>
<td>Increased</td>
<td>6</td>
<td>4</td>
</tr>
<tr>
<td>Obese I (30-34.99)</td>
<td>Moderate</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Obese II (35-39.99)</td>
<td>Severe</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Obese III (≥40)</td>
<td>Very severe</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

* WHO (2005)

Table 6 Coefficient correlation (r) between junk foods intake and anthropometric parameters

<table>
<thead>
<tr>
<th>Nutrient</th>
<th>Group E (n=30)</th>
<th>Group C (n=30)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Weight</td>
<td>BMI</td>
</tr>
<tr>
<td>South Indian foods</td>
<td>0.040NS</td>
<td>0.055NS</td>
</tr>
<tr>
<td>Chinese foods</td>
<td>0.573*</td>
<td>0.508*</td>
</tr>
<tr>
<td>Fried foods</td>
<td>0.966*</td>
<td>0.344***</td>
</tr>
<tr>
<td>Bakery products</td>
<td>0.372**</td>
<td>0.254NS</td>
</tr>
<tr>
<td>Sweet dishes</td>
<td>0.780*</td>
<td>0.092NS</td>
</tr>
</tbody>
</table>

*Significant at 1 % ** Significant at 5% *** Significant at 10 % NS- Non Significant

IV. CONCLUSION

In the light of above discussion, the scrutiny of the data indicated that faulty food habits, more intake of junk foods, inadequate intake of fibrous foods resulted in increased incidence of obesity. Therefore, all the subjects if given proper guidance and counseling regarding food choice and lifestyle modifications could help in maintaining weight. Nutrition counseling helps in improving feeding pattern of adolescents.

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AUTHORS

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SMART ANTENNAS IT’S BEAM FORMING AND DOA

SURYA MUBEEN, DR.A.M.PRASAD, DR.A.JHANSI RANI

Abstract- Smart antenna technology has the potential to significantly increase the efficient use of the spectrum in wireless communication applications in comparison to the existing methods in use. Through intelligent control of the transmission and reception of signals, capacity and coverage in mobile wireless networks can be significantly improved. Smart antenna is one of the most promising technologies that will enable a higher capacity in wireless networks by effectively reducing multipath and co-channel interference [3], [4], [5], [6]. This is achieved by focusing the radiation only in the desired direction and adjusting itself to changing traffic conditions or signal environments. Smart antennas employ a set of radiating elements arranged in the form of an array. The signals from these elements are combined to form a movable or switchable beam pattern that follows the desired user. In a Smart antenna system the arrays by themselves are not smart, it is the digital signal processing that makes them smart. The process of combining the signals and then focusing the radiation in a particular direction is often referred to as digital beam forming [3], [4].

Index Terms- DOA, BEAMFORMING, RADIATION PATTERN

I. INTRODUCTION

Smart antenna systems were designed for use in military applications to suppress interfering or jamming signals from the enemy [15]. Since interference suppression was a feature in this system, this technology was borrowed to apply to personal wireless communications where interference was limiting the number of users that a network could handle. It is a major challenge to apply smart antenna technology to personal wireless communications since the traffic is denser. Also, the time available for complex computations is limited. However, the advent of powerful, low-cost, digital processing components and the development of software-based techniques has made smart antenna systems a practical reality for cellular communications systems.

Figure 1: Smart Antenna Block Diagram

There are basically two approaches to implement antennas that dynamically change their antenna pattern to mitigate interference and multipath affects while increasing coverage and range. They are Switched beam & Adaptive Arrays. The Switched beam approach is simpler compared to the fully adaptive approach. It provides a considerable increase in network capacity when compared to traditional omni directional antenna systems or sector-based systems. In this approach, an antenna array generates overlapping beams that cover the surrounding area as shown in figure (1).

Figure 2: Beam formation for switched beam antenna system

The Adaptive array system is the “smarter” of the two approaches. This system tracks the mobile user continuously by
steering the main beam towards the user and at the same time forming nulls in the directions of the interfering signal as shown in figure 4.2. Like switched beam systems, they also incorporate arrays. Typically, the received signal from each of the spatially distributed antenna elements is multiplied by a weight. The weights are complex in nature and adjust the amplitude and phase. These signals are combined to yield the array output. These complex weights are computed by a complicated adaptive algorithm, which is pre-programmed into the digital signal-processing unit that manages the signal radiated by the base station.

II. BEAMFORMING IN ADAPTIVE AND SWITCHED BEAM SYSTEMS

Basically, there are two major configurations of smart antennas: Switched-Beam: A finite number of fixed, predefined patterns or combining strategies (sectors). Adaptive Array: A theoretically infinite number of patterns (scenario-based) that are adjusted in real time according to the spatial changes of SOIs and SNOIs. In the presence of a low level interference, both types of smart antennas provide significant gains over the conventional sectorized systems. However, when a high level interference is present, the interference rejection capability of the adaptive systems provides significantly more coverage than either the conventional or switched beam systems [4].

Figure 4 Adaptation procedures: (a) Calculation of the beam former weights
(b) Beam formed antenna amplitude pattern to enhance SOI and suppress SNOIs.

Now, let us assume that a signal of interest and two co-channel interferers arrive at the base station of a communications system employing smart antennas. Fig. below illustrates the beam patterns that each configuration may form to adapt to this scenario. The switched-beam system is shown on the left while the adaptive system is shown on the right. The light lines indicate the signal of interest while the dark lines display the direction of the co-channel interfering signals. Both systems direct the lobe with the greatest intensity in the general direction of the signal of interest.

Coverage patterns for switched beam and adaptive array antennas

Beam forming lobes and nulls that Switched-Beam (left) and Adaptive Array (right)
The adaptive system chooses a more accurate placement, thus providing greater signal enhancement. Similarly, the interfering signals arrive at places of lower intensity outside the main lobe, but again the adaptive system places these signals at the lowest possible gain points. The adaptive array concept ideally ensures that the main signal receives maximum enhancement while the interfering signals receive maximum suppression.

III. SWITCHED-BEAM ANTENNAS

A switched-beam system is the simplest smart antenna technique. It forms multiple fixed beams with heightened sensitivity in particular directions. Such an antenna system detects signal strength, chooses from one of several predetermined fixed beams, and switches from one beam to another as the cellular phone moves throughout the sector, as illustrated in Fig.

Switched-Beam Coverage Pattern

The switched-beam, which is based on a basic switching function, can select the beam that gives the strongest received signal. By changing the phase differences of the signals used to feed the antenna elements or received from them, the main beam can be driven in different directions throughout space. Instead of shaping the directional antenna pattern, the switched-beam systems combine the outputs of multiple antennas in such a way as to form narrow sectorized (directional) beams with more spatial selectivity that can be achieved with conventional, single-element approaches. A more generalized to the Switched-Lobe concept is the Dynamical Phased Array (DPA). In this concept, a direction of arrival (DOA) algorithm is embedded in the system [2]. The DOA is first estimated and then different parameters in the system are adjusted in accordance with the desired steering angle. In this way the received power is maximized but with the trade-off of more complicated antenna designs. The elements used in these arrays must be connected to the sources and/or receivers by feed networks. One of the most widely-known multiple beam forming networks is the Butler matrix.

IV. ADAPTIVE ANTENNA APPROACH

The adaptive antenna systems approach communication between a user and a base station in different way by adding the dimension of space. By adjusting to the RF environment as it changes (or the spatial origin of signals), adaptive antenna technology can dynamically alter the signal patterns to optimize the performance of the wireless system. Adaptive array systems [12] provide more degrees of freedom since they have the ability to adapt in real time the radiation pattern to the RF signal environment; in other words, they can direct the main beam toward the pilot signal or SOI while suppressing the antenna pattern in the direction of the interferers or SNOIs. To put it simply, adaptive array systems can customize an appropriate radiation pattern for each individual user. Fig. below illustrates the general idea of an adaptive antenna system. The adaptive concept is far superior to the performance of a switched-beam system, as it is shown in Fig. above. A functional block diagram of the digital signal processing part of an adaptive array antenna system is shown in Fig. below.

Figure 5: Adaptive array coverage: A representative depiction of a main lobe extending toward a user with nulls directed toward two co-channel interferers.

V. DOA ESTIMATION

Eigen Structure DOA Methods

The families of DOA estimation algorithms that depend on an Eigen decomposition of the array covariance matrix are so named the Eigen structure methods. These methods rely on the following properties of the array covariance matrix $R$:

$$R = XX^H$$

Where $X$ is the data matrix whose rows are $N$ samples from each element of the array, $H$ denotes Hermitian Transpose. First, the space spanned by its eigenvectors can be partitioned into two subspaces, namely, the signal subspace and the noise subspace. Second, vectors that correspond to directional sources are used.

5.1. Spectral Estimation Methods

DOA estimation methods that first compute a spatial spectrum, then estimate DOAs by local maxima of this spectrum are called the Spectral Estimation Methods [1]. Essentially these methods apply weights to each element in the array so as to steer the antenna pattern towards a known look direction. The received power is then estimated for a large number of look directions and

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the look directions with maximum received power are chosen as the DOAs. Variants of the spectral estimation methods differ by how the weights are calculated to steer the main beam. Methods that fall under this class of DOA estimators include the Maximum Likelihood method, Bartlett Method and the Linear Prediction Method [1]. These methods are inherently simple, but suffer from lack of resolution. For this reason the high resolution Eigen structure methods are most often used. orthogonal to the noise subspace, and are contained in the signal subspace [1].

5.2. SPATIAL FILTERING
The ability of the smart antenna to use the spatial dimension is the key factor to achieving the performance gains of adaptive arrays. Once accurate estimates of the DOAs impinging on the array have been made, desired signals can be passed through to the demodulator to further enhance the accuracy while attenuating interfering signals. This process effectively changes the receive antenna pattern from Omni-directional to directional, which can increase the BER rate performance and leads to the concept of spatial division multiple access (SDMA).

Delay and Sum Beam forming
The delay and sum beam former is the simplest of all spatial filtering schemes. If a desired signal from a known DOA is chosen then the main beam of the antenna array can be steered towards this direction by simply multiplying each element by a complex weight, corresponding to a delay, so that when the signals are combined the signal from the desired direction at each element add completely in phase. Consider the case of an M element Uniform Linear Array (ULA), an array whose elements are placed in a straight line equidistant apart. If a desired signal impinges on the array at an angle θ then there will be a constant time delay of this signal across the array τ. If the analytical signal received at each element is then multiplied by the complex weighting factor: $w_i = s_i e^{j2πiθ}$.

Here $i$ corresponds to the $i$th antenna element, the main beam of the array will be pointed in the direction $θ$. In general a vector whose elements correspond to the above weight factors is called a steering vector [1]. Figure 2 shows a plot of an M = 4 element array antenna pattern (-90° to 90°) after delay and sum weights have been applied. Two signals are impinging on the array from -32° and 15° at an SNR of 10 dB, the DOA estimation is done using ESPRIT and the simulation is done in Matlab. The axis represents the relative gain of the receive pattern.

NULL STEERING BEAM FORMING
The delay and sum beam former is attractive because of its simplicity and ease of implementation. The limiting factor in the overall performance of this method is that though it can steer its main beam it has no control over its side lobes. This is evident from figure 2 where a side lobe of the antenna pattern allows the interfering signal, although attenuated, to reach the receiver after the weights are applied. The solution to this problem is the null steering or pseudo inverse beam former. If $s_0$ is the steering vector associated with the desired signal of interest and vectors $s_i$ are the $k$ steering vectors associated with $k$ interfering signals on an M element array, then the desired weight vector $w$ is the solution of the following set of simultaneous equations [1]:

$$W_{0's} = 1 ; W_{i's} = 0 \ ; i = 1, \ldots, k$$

Figure 3 shows the antenna pattern of a four element uniform linear array (-90° to 90°) under the same conditions of figure 2. Notice that a deep null has been steered in the direction of the interference, while gain is maintained in the direction of the signal of interest.

MVDR BEAM FORMING
The null steering scheme described in the previous section maximizes the SIR but does not maximize the overall output SNIR, that is it does not minimize the total noise including interferences and uncorrelated noise. It has been shown in [4] that the solution vector to the following optimization problem will yield the weights that maximize the output SNIR. Minimize \( \mathbf{w}^H \mathbf{R}^{-1} \mathbf{s}_0 \). This is equivalent to minimizing the mean output power while maintaining gain equal to the number of antenna elements in the direction of the signal of interest. The solution is given as:

\[
\mathbf{w} = \frac{\mathbf{R}^{-1} \mathbf{s}_0}{\mathbf{s}_0^H \mathbf{R}^{-1} \mathbf{s}_0}
\]

Figure 4 shows a simulation of a 4 element array antenna pattern (-90° to 90°) after MVDR (Minimum Variance Distortion less Response) weights have been applied. Two signals are impinging on the array from -32° and 15° at an SNR of 10 dB, the DOA estimation is done using ESPRIT.

VI. FUTURESSCOPE

Perhaps the reason why only a handful of companies are producing viable commercial smart antenna products is because their practical implementation is extremely difficult. DOA and beam forming algorithms require a large number of computations which makes it difficult for them to keep up with the high data rates of today’s wireless systems; this makes research into highly efficient and robust DOA and beam forming methods.

REFERENCES


Multiple Slotted Antenna for WLAN/HIPERLAN/2/RADAR Applications

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Abstract- A novel miniaturized design of a multiple slotted antenna is designed and simulation results are presented in this paper. The proposed antenna uses I-, U- and inverted L-shaped slots in the radiation patch. The resonance frequencies can be controlled by adjusting the dimensions of the slots. The proposed antenna can meet the demand of WLAN, HIPERLAN/2 and radar applications. The key parameters like return loss, input impedance, gain are simulated, analyzed and optimized using High Frequency structure Simulator. The results show that the preference of the proposed antenna can be greatly improved compared to traditional microstrip patch antennas.

Index Terms- Microstrip antennas, HIPERLAN/2, WLAN

I. INTRODUCTION

The trends of antenna design in today’s wireless applications are toward compactness, robustness and ease of integration with RF circuit components. Microstrip antennas have found extensive applications in wireless communication system owing to their advantages such as low-profile, conformability, low cost and ease of fabrication. However, conventional microstrip antenna suffers from very narrow bandwidth with respect to the center frequency. To overcome this, slot antennas have been considered a good candidate in conforming to these trends. In order to reduce antenna size, recent research has proposed many miniaturization techniques for slot antennas. For compact slot antenna design, increasing the length of the slot [1] or adjusting the shape of the slot [2] is needed. By employing different shapes of the slots [3-6], the antenna size can be reduced for a given operating frequency.

By using slotted antennas, broad bandwidth can be obtained, without increasing the thickness or area of the antenna [5]. In planar slot antennas slot width and feed structure affects the impedance bandwidth. The wider slot gives more bandwidth and optimum feed structure ensures good impedance matching [7-8]. In the design presented in this paper, slotting of the radiating patch has been used. As compared to other techniques, slotting offers the promise of saving space while giving good performance, if done appropriately. Multiple shaped slots are employed inorder to obtain good performance characteristics.

II. ANTENNA DESIGN

The configuration of the proposed patch antenna is shown in Figure 1. The antenna is built on a FR4 substrate with a dielectric constant of 4.4 and a thickness of 0.32 cm. The dimensions of the rectangular patch are 2.37 cm length and 1.93 cm width with three linear narrow slots of different dimensions which are created on the non radiating edges of the patch as shown in Figure 1. The size of the substrate is 4.5 × 3.8 × 0.32 cm³. The antenna is fed by coaxial feed of 50 ohm.

Fig 1: Proposed Patch Antenna

Fig 2: Antenna Model

The dimension of I-shaped slot is 1.2 × 0.1 cm², the dimension of the U-shaped slot is 0.15 × 0.4 cm² and the dimension of the inverted L-shaped slot is 0.15 × 0.5 cm². Figure 2 shows the antenna model in commercial software HFSS.

III. RESULTS AND DISCUSSION

The proposed antenna has been simulated using High Frequency Structure Simulator (HFSS). Figure 3 shows the variation of return loss with frequency. Plot result shows the
The proposed antenna resonates at three frequencies. The return losses at 3.17 GHz, 5.56 GHz and 6.87 GHz are -20.81 dB, -19.91 dB and -30.27 dB respectively. The operating bands of the proposed antenna are also shown in the Figure.

Figure 4 shows the VSWR curve for the proposed antenna. A low VSWR means the antenna is well-matched. From the figure, the VSWRs at 3.17 GHz, 5.56 GHz and 6.87 GHz are 1.58 dB, 1.75 dB and 0.53 dB respectively. For the proposed antenna the VSWR is less than 2 dB.

Figure 5 shows the input impedance smith chart of the proposed antenna. The rms of 0.67 and impedance bandwidth of 0.91% is attained from the current design.

Figures (6-7) shows the antenna gain in 2D and 3D patterns. The gain of the proposed antenna is 5.46 dB.
Looking at the current (magnetic field) and voltage (electric field) variation along the patch, the current is maximal at the center and minimal near the left and right edges, while the electric field is zero in the center and maximal near the left and minimal near the right edges. The figures (11-12) below clarify these quantities. Figure 13 shows the surface current distribution.

Figure 14 shows the current distribution on the patch and from the figure it is clear that current distribution is more on the patch when compared to the substrate.

IV. CONCLUSION

Multiple slotted antennas have been designed and simulation results are presented in this work. The proposed antenna operates at three bands, 3.1-3.25 GHz, 5.4-5.67 GHz and 6.67-7 GHz respectively. Thus, it is applicable to WLAN, HIPERLAN/2 and radar system applications. The obtained experimental results show good radiation characteristics for the three operating bands of the proposed antenna.
ACKNOWLEDGMENT

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REFERENCES


The Effect of Arrowroot (Maranta arundinacea) Extract on the Survival of Probiotic Bacteria in Set Yoghurt

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Abstract- The objective of this study was to determine the effect of Arrowroot carbohydrates on the survival of lactobacilli in bio-yoghurts. There were four treatments; probiotic yoghurt (control), probiotic yoghurt with 3% Arrowroot extract, probiotic yoghurt with 1.65% Raftilose® and yoghurt without probiotics or prebiotics. Lactobacilli population of control was 4.82 log CFU/mL at 11th day of refrigerated storage whereas Arrowroot carbohydrates and Raftilose® increased (P<0.05) it by 1.44 log CFU/mL and 1.17 log CFU/mL respectively compared to the control. These results support the conclusion that Arrowroot carbohydrates can be used to enhance the Lactobacilli population in bio-yoghurt during refrigerated storage.

Index Terms- arrowroot, bio-yoghurt, prebiotics, probiotics

I. INTRODUCTION

The therapeutic properties of fermented milk are widely known and the contribution of yoghurt bacteria to the improvement of intestinal microflora has been widely recognized. Lactobacillus bulgaricus and Streptococcus thermophilus (yoghurt starter culture) are not bile acid resistant and do not survive the passage through the intestinal tract. However, L. acidophilus and B. bifidum (probiotic bacteria) incorporated into a yoghurt starter culture results in a milk product “of excellent therapeutic value” due to the ability of these species establish themselves amongst gut microflora (Tamime and Robinson, 2007).

In recent years, there has been growing interest in using probiotic microorganisms as dietary adjuncts in the dairy industry. To produce the desired benefits, probiotic bacteria should be presented in the product in sufficient quantities during its whole shelf-life. Shah (2000) recommended that the minimum dose able to assure therapeutic effect should 6 log CFU mL-1. However, the survival of bacteria in yoghurt is quite low because the pH of yoghurt ranges from 4.2 to 4.6. Lankaputhra et al. (1996) reported the survival of 3 out of 9 bacterial strains in the pH range of 3.7 to 4.3. Further, he found that 14 out of 17 strains lost their viability in fermented milk in the first week of storage. Therefore, the strict strain dependence and poor survival of probiotics under adverse processing conditions including low pH, oxygen tension and nutrient depletion are some of the problems faced by the fermented milk industry.

Many recent studies have shown that incorporation of prebiotic ingredients in probiotic yoghurt would probably leads to enhancement of the survival of those microorganisms.

Prebiotics are selectively fermented ingredients that allow specific changes, both in the composition and/or activity in the gastrointestinal microbiota which confer benefits upon host well-being and health (Gibson et al., 2004). A range of oligosaccharides has been tested so far, with inulin and oligofructoses most frequently assessed and commercially incorporated in different products.

Arrowroot (Maranta arundinacea) is a locally available rhizomatous herbaceous plant. Arrowroot rhizomes have high level of fructo-oligosaccharides which may possess prebiotic properties and may be useful in manufacturing bio-yoghurt. This study was carried out to assess the effect of incorporating watersoluble carbohydrate extracted from Arrowroot rhizomes on the sensory properties and the survival of lactobacilli and lactic acid bacteria in set-type yoghurt during refrigerated storage.

II. MATERIALS AND METHODS

Extraction of Arrowroot (Maranta arundinacea) carbohydrates

Arrowroot carbohydrates were extracted as outlined in Figure 1.
Preparation of Cultures

Probiotic cultures were prepared using a freeze dried lactic culture (ABT-3, Hanson, Denmark). This culture contained Lactobacillus acidophilus, Bifidobacterium bifidum and Streptococcus thermophilus. Standardized and pasteurized (90 °C, 5 min) cow milk was inoculated and incubated at 42 °C for 5 h. The prepared probiotic culture was stored at 4 °C. Yoghurt starter culture (Rich®), which contain Streptococcus thermophilus and Lactobacillus delbrueckii sub sp. Bulgaricus was used to produce non-probiotic yoghurt.

Preparation of Yoghurt

Set-yoghurts were manufactured at the Dairy Technology Laboratory, Department of Animal Science, Faculty of Agriculture, University of Peradeniya using standardized, low fat, cow milk (fat 1.4%, SNF 8.03) with slight modifications to the yoghurt composition. Table I shows the formula for different treatments.

Table I: Formula for different yoghurt treatments

<table>
<thead>
<tr>
<th>Ingredients /1 L of yoghurt mix</th>
<th>Yoghurt without probiotics (T₁)</th>
<th>Control (T₂)</th>
<th>Probiotic yoghurt with Raftilose® (T₃)</th>
<th>Probiotic yoghurt with Arrowroot (T₄)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cow milk (L)</td>
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<td>1.0</td>
<td>1.0</td>
<td>1.0</td>
</tr>
<tr>
<td>Sugar (g)</td>
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<td>100.0</td>
<td>100.0</td>
<td>100.0</td>
</tr>
<tr>
<td>Gelatin (g)</td>
<td>7.0</td>
<td>7.0</td>
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</tr>
<tr>
<td>ABT-3 Probiotic culture (g)</td>
<td>*</td>
<td>20.0</td>
<td>20.0</td>
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</tr>
<tr>
<td>Rich®</td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Yoghurt culture (g)</td>
<td>20.0</td>
<td>*</td>
<td>*</td>
<td>*</td>
</tr>
<tr>
<td>Arrowroot (g)</td>
<td></td>
<td></td>
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<tr>
<td>Raftilose®</td>
<td></td>
<td></td>
<td>30.0</td>
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</tr>
<tr>
<td>(g)</td>
<td></td>
<td></td>
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<tr>
<td>*Ingredients do not include in the respective treatments.</td>
<td></td>
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</table>

Three replicate trials were conducted in the manufacturing of yoghurt. There were four treatments; probiotic yoghurt without prebiotics (control), probiotic yoghurt with 3% Arrowroot, probiotic yoghurt with 1.65% inulin (Raftilose®), BENEO-Orafti, Morris Plains, USA) and yoghurt without probiotics or prebiotics. Raftilose® contains 98% inulin whilst water soluble carbohydrates in Arrowroot contain 55% fructo-oligosaccharides. To match the quantity of prebiotics in Arrowroot and Raftilose® 3% and 1.65% levels of incorporations were selected respectively for the experiment. The yoghurt mixtures were heated at 90 °C for 5 min after addition of sugar. Then they were cooled to 45 °C and inoculated with 2% (w/v) of probiotic cultures. The yoghurt mixtures used for non-probiotic yoghurt were inoculated with 2% (w/v) of yoghurt starter culture. They were dispensed into 80 mL polyethylene cups and incubated at 42 °C for 3.5 h. Then samples were stored at 4 °C. They were withdrawn at 1, 6, 11 and 16 days of storage for objective quality evaluation.

Analysis of Yoghurt

Microbiological analysis

Yoghurt samples (1 mL) were mixed for 2 minutes using a VORTEX-GENIE™ machine (Model K-550-GE, Scientific Industries, Bohemia, USA) and serially diluted 10 fold with sterilized Ringer solution (BR 52, Oxoid Ltd, Hampshire, UK). An aliquot (100 μL) was plated on the following agar media using spread plate technique. Lactobacilli were enumerated on Rogosa agar (CM 0627, Oxoid Ltd, Hampshire, UK). Bacterial population was counted after anaerobic incubation at 39 deg C for 48 h in anaerobic jars (Oxoid Ltd, Hampshire, UK) with anaeroGen™ sachets (AN 0025A, Oxoid Ltd, Hampshire, UK). The numbers of total lactic acid bacteria (Lactobacilus sp., S. thermophilus and Bifidobacterium sp.) were determined on MRS agar (CM 361, Oxoied Ltd, Hampshire, UK) after anaerobic incubation at 37 deg C for 48 h. Bacterial populations were expressed as log₁₀ CFU/mL of yoghurt samples.

Titratable acidity

Titratable acidity (TA) as percent lactic acid was measured for all the treatments using 0.1N NaOH and 1% phenolphthalein (Sigma-Aldrich Co, USA) solution as endpoint indicator according to the technique of Marshall (1992).

pH

The pH was determined for all the samples with a Microprocessor pH meter (Model 211, TOA Electronics Ltd, Tokyo, Japan).

Sensory analysis

Sensory characteristics of the yoghurt samples were evaluated using 30 untrained panelists. Colour, odor, taste, texture and overall acceptability were evaluated using a five-point hedonic scale from 1-like extremely to 5-dislike extremely.

Statistical analysis

A Completely Randomized Design (CRD) was used for the experiment. Analysis of variance was followed by a mean separation procedure using Turkey’s test. All analyses were performed using procedures for the General Linear Model (PROC GLM) of SAS (SAS institute Inc., Cary, NC, USA). Each experiment was replicated 3 times. The data obtained were analyzed at 0.05 level of significance. Data from sensory analysis was analyzed by Friedman non-parametric test using a Minitab 14 software package.
III. RESULTS AND DISCUSSION

Recovery percentage of Arrowroot carbohydrate was 9.6%. There were 78.7% (w/w) starch, 9.9% (w/w) moisture, 7.8% (w/w) polysaccharides and 3.6% (w/w) reducing sugars in the extracted Arrowroot carbohydrates and 55.1% (w/w) of starch in Arrowroot carbohydrates was fructo-oligosaccharides. Probiotic lactobacilli survived well in bio-yoghurts with prebiotics for up to 11 days of storage under refrigerated conditions (4 °C) and thereafter the counts decreased (P<0.05) below 10^6 CFU mL^{-1} (Fig. 2), the minimum population for an acceptable probiotic product. However, bio-yoghurt without prebiotics reached this value at 8th day of storage.

![Figure 2: Changes of lactobacilli population in Yoghurts](image)

Lactic acid bacteria survived in prebiotics (Arrowroot carbohydrate and Raftilose®) incorporated yoghurt up to 15 days of storage and thereafter the counts decreased (P<0.05) below an acceptable level (Fig. 3).

![Figure 3: Changes of lactic acid bacteria population in Yoghurts](image)

However, lactic acid bacteria can survive only 13 days of storage under 4 °C in bio-yoghurt without incorporation of prebiotics. These results are similar to the finding of Aryana et al. (2007). He reported that 1.5 % (w/v) inulin enhance the survival of Lactobacilli in fat free plain yoghurt during refrigerated storage. Oliveira et al. (2008) reported that fructo-oligosaccharides led to lower post acidification and lactic acid release. Survival of probiotic bacteria under low pH ranges from 4.2 to 4.6 is very low (Lankaputhra et al., 1996). Therefore, the incorporation of Arrowroot carbohydrates could reduce the post acidification than the control during refrigerated storage and thus improve the stability and survival of probiotic Lactobacilli and lactic acid bacteria.

Figure 4 and 5 show the variation in TA and pH of yoghurt samples during storage at 4 °C.

![Figure 4: Changes in Titratable acidity in Yoghurts](image)

![Figure 5: Changes in Titratable in Yoghurts](image)

Probiotic yoghurt with Arrowroot carbohydrate showed significantly lower (P<0.05) TA than the control at 16th day of storage.
storage whereas inclusion of Raftilose® (P<0.05) increased TA. The effect of the duration of storage period on pH of yoghurt is not significant (P>0.05). This difference could be due to the degree of polymerization in fructo-oligosaccharides. It is possible that Arrowroot has higher degree of polymerization than Raftilose®. An increase of TA was found to be significant (P<0.05) after 6 days of storage for all four treatments. According to the SLS (1989) the levels of TA should lie between 0.8 and 1.25 lactic acid % (w/w) during their shelf-life. The, non-probiotic yoghurt samples reached maximum levels of SLS specification with respect to TA on the 13th day of refrigerated storage. Furthermore, all the samples that include probiotic bacteria showed lower (P<0.05) TA than non-probiotic yoghurt at 16th day of storage. According to the findings of Hekmat et al. (2008) most probiotic bacteria grow slowly in milk and the rate of acid production is usually too slow to support an adequate fermentation process in yoghurt. Standard yoghurt culture, L. delbrukkii ssp. bulgaricus and S. thermophilus on the other hand, work together and cause an accelerated and efficient lactic acid production during fermentation process of yoghurt. However, incorporation of Arrowroot carbohydrate reduced (P<0.05) the development of TA compared to the control at 16th day of storage and may be used to extend the shelf-life of the bio-yoghurt. Figure 6 shows the effect of incorporation of Arrowroot carbohydrates and Raftilose® on the sensory properties of yoghurt.

![Figure 6: Sensory attributes of yoghurt samples](image)

The sensory score presented in Figure 6 indicate that Raftilose® incorporated yoghurt was more acceptable than Arrowroot incorporated yoghurt. This is may be due to the nature of gelatinization in Arrowroot carbohydrates and it may lead to presence of granules in yoghurt. This result is similar to the findings of Shah (2007). He reported that yoghurt incorporating 2% inulin had good overall acceptability. Panelists found that the samples tested to have similar odor. In terms of texture the highest scores (related to the presence of granules in the product) were given by the panelists to the yoghurt incorporating Arrowroot carbohydrate.

IV. CONCLUSION

The results of this study support that the incorporation of Arrowroot carbohydrate extract is a possible method for development of bio-yoghurt with enhanced survival of probiotic bacteria during prolonged cold storage. However, use of Arrowroot seems to negatively affect the smooth texture and taste of yoghurt possibly due to the presence of granules consisting of gelatinized carbohydrates and the low acidity of the product.

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AUTHORS

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DISASTERS STATISTICS IN INDIAN SCENARIO IN THE LAST TWO DECADE

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Abstract- Disasters during 1990-2009 periods have been discussed in terms of natural and man-made disasters in the Indian subcontinent as well as in India. As per EM-DAT data, India has experienced 772 disasters during the period of 1990-2009. This paper combines the scattered disasters data during last two decades into one record. The purpose of this paper is to provide graduate students, researchers, and responsible personnel with an overview on the statistics of various disasters in India and the subcontinent. The disasters data for the covered region have been collected from several sources such as the technical reports, general and research articles, internet web sites, India government reports and EM- data 2012.

Index Terms- Disasters, Natural disasters, Man-made disasters, India

I. INTRODUCTION

Disasters, one of man’s oldest concerns, reach back to periods of pre-history and myth, yet strangely enough, are hardly an area of critical scrutiny[1]. A disaster is defined by the Asian Disaster Risk Reduction Center[2] as “Disasters are known as sudden events, which bring serious disruption to society with massive human, material and environmental losses and these losses always go beyond the capacity of the affected society to cope with its own resources.” Natural disasters are catastrophic events resulting from natural causes such as volcanic eruptions, tornadoes, earthquakes, etc., over which man has no control. Natural disasters are often termed “Acts of God”[3]. Man-made disasters, on the other hand, are those catastrophic events that result from human decisions. The International Federation of Red Cross and Red Crescent Societies (2003) [4] highlighted that a man-made disaster refers to non-natural disastrous occurrences that can be sudden or more long-term. Sudden man-made disasters include structural, building and mine collapses when this occurs independently without any outside force. In addition air, land, and sea disasters are all man-made disasters.

Long-term man-made disasters tend to refer to national and international conflicts. There are disasters that result from both human error and natural forces. These are hybrid disasters. An example of a hybrid disaster is the extensive clearing of jungles causing soil erosion, and subsequently heavy rain causing landslides.

Disaster definitions: There are many definitions of a disaster: definitions have been given by Turner and Pedgeon (1997) [5], Prehospital and Disaster Medicine (2002) [6], Denis (1995) [7] and Keller and Al-Madhari (1996) [8]. The definition used seems dependent upon the discipline using the term. Turner and Pedgeon (1997) [5] pointed out that no definition of “disaster” is universally accepted. Parker (1992) [9] reviewed the concept of disaster, and suggested that the preferred definition of disaster is: . . . An unusual natural or man-made event, including an event caused by failure of technological systems, which temporarily overwhelms the response capacity of human communities, groups of individuals or natural environments and which causes massive damage, economic loss, disruption, injury, and/or loss of life. This definition encompasses medical accidents and disasters such as those which affect of whooping cough vaccine, Opren and HIV/AIDS haemophiniac cases.

Disaster Types: Types of disasters have been the subject of research and concern to academicians and to government and independent agencies. The complete EM-DAT[10] divides disasters into 2 categories (natural and technological), and further divides the natural disaster category into 5 subcategories, which in turn cover 12 disaster types and more than 30 subtypes (see Table 1). The principal categories and subcategories are shown below.

Disaster subcategory definitions

- Geophysical: Events originating from solid earth
- Meteorological: Events caused by short-lived/small to meso-scale atmospheric processes (in the spectrum from minutes to days)
- Hydrological: Events caused by deviations in the normal water cycle and/or overflow of bodies of water caused by wind set-up
- Climatological: Events caused by long-lived/meso-to macro-scale process (in the spectrum from intra-seasonal to multi–decadal climate variability)
- Biological: Disaster caused by the exposure of living organisms to germs and toxic substances.

II. TYPES OF DISASTERS IN INDIA

Many regions in India are highly vulnerable to natural and other disasters on account of geological conditions. About 60% of the total area of the country is vulnerable to seismic damage of buildings in varying degrees. The most vulnerable areas, according to the present seismic zone map of India, are located in the Himalayan and sub-Himalayan regions. Kutch and the Andaman and Nicobar Islands, which are particularly earthquake hazard prone. Over 8% Indian area of 40 million hectares is
prone to floods, and the average area affected by floods annually is about 8 million hectares. Of the nearly 7,500 kilometers long coastline, approximately 5,700 kilometers is prone to cyclones, and 68% area is susceptible to drought (India, Ministry of Home Affairs, 2004, p. 3) [11].

Table 1: Natural Disaster Categories, Types, and Subtypes

<table>
<thead>
<tr>
<th>Biological</th>
<th>Geophysical</th>
<th>Hydrometeorological</th>
<th>Meteorological</th>
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<tbody>
<tr>
<td>Epidemic</td>
<td>Earthquake</td>
<td>Flood</td>
<td>Storm</td>
</tr>
<tr>
<td>Viral infectious disease</td>
<td>Volcano</td>
<td>General flood</td>
<td>Tropical cyclone</td>
</tr>
<tr>
<td>Bacterial infectious disease</td>
<td>Mass movement (dry)</td>
<td>Storm surge/coastal flood</td>
<td>Extra-tropical cyclone</td>
</tr>
<tr>
<td>Parasitic infectious disease</td>
<td>Rock-fall</td>
<td>Rock-fall</td>
<td>Local storm</td>
</tr>
<tr>
<td>Fungal infectious disease</td>
<td>Landslide</td>
<td>Landslide</td>
<td></td>
</tr>
<tr>
<td>Prion infectious disease</td>
<td>Avalanche</td>
<td>Avalanche</td>
<td></td>
</tr>
<tr>
<td>Insect infestation</td>
<td>Subsidence</td>
<td>Subsidence</td>
<td></td>
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<tr>
<td>Animal stampede</td>
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<td></td>
<td><strong>Drought/ wildfire</strong></td>
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</table>

India which supports just on 2 per cent landmass, one-sixth of the world’s population suffers heavily from natural disasters of different kinds that hit the poorest of the poor and which is why the considerations of disaster safety deserves prime attention. The Parliament of India passed the Disaster Management Bill 2005. According to the Bill No: LV5: (d) “disaster” means a catastrophe, mishap, calamity or grave occurrence affecting any area, arising from natural or manmade causes, or by accident or negligence which results in substantial loss of life or human suffering or damage to, and destruction of, property, or damage to, or degradation of, environment, and is of such a nature or magnitude as to be beyond the coping capacity of the community of the affected area; . . . (India, Parliament, Rajya Sabha, 2005) [12].

India has a highly diversified range of natural features. Its unique geo- climatic conditions make the country among the most vulnerable to natural disasters in the world. Disasters occur with amazing frequency in India and while the society at large has adapted itself to these regular occurrences, the economic and social costs continue to mount year after year. It is highly vulnerable to flood, drought, cyclones, earthquakes, landslides, volcanoes, etc. Almost all parts of India experience one or more of these events (Gupta 2000) [13]. The country also from time to time experiences some man-made disasters, which cause considerable damages to property and loss of lives.

Natural Disasters

During 1980-2010, India has experienced 431 natural disasters. The natural disasters resulted in 1,521,726,127 fatalities, and 143,039 casualties [10]. Natural disasters which occurred in India have been summarized in Table -2 (1980-2010) and shown in Figure 2(1990-2009).

Although several studies by De & Joshi (1995, 1999) [14-15], Srivastava, Sinha Roy & De (2000) [16] and Bhaskar Rao, Naidu & Srinivasa Rao (2001) [17] show a decreasing trend in frequency of Tropical Cyclones (TC) and Monsoon Depressions (MD) over the north Indian Ocean (The Bay of Bengal and the Arabian Sea) in recent years, their potential for damage and destruction still continues to be significant. A severe Super Cyclonic Storm with winds of upto 250 km/h crossed the coast in Orissa on October 29, 1999. This may prove to have been the worst cyclone of the century in the Orissa region and is responsible for as many as 10,000 deaths, for rendering millions homeless and for extensive damage (WMO, 1999) [18] High magnitude floods during the monsoon season are considered to be India’s recurring and leading natural disaster (Kale et al., 1994) [19]. The country has to face loss of life and damage to property due to severe floods time and time again. Heavy flood damages were experienced in the country during the monsoons of 1955, 1971, 1973, 1977, 1978, 1980, 1984, 1988, 1989, 1998, 2001 and 2004. Central Water Commission has compiled the damage figures due to flood from 1953 to 2004 on the basis of which yearly average loss to life is reported to be about to 1590 and the damage to public utilities Rs. 8068 billion ( *USD 184 Billion) [20].

Table 2: Natural Disasters from 1980 – 2010

<table>
<thead>
<tr>
<th>Overview</th>
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<tbody>
<tr>
<td>No of events: 431</td>
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<tr>
<td>No of people killed: 143,039</td>
</tr>
<tr>
<td>Average killed per year: 4,614</td>
</tr>
<tr>
<td>No of people affected: 1,521,726,127</td>
</tr>
<tr>
<td>Average affected per year: 49,087,940</td>
</tr>
<tr>
<td>Economic Damage (US$ X 1,000): 48,063,830</td>
</tr>
<tr>
<td>Economic Damage per year (US$ X 1,000): 1,550,446</td>
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</tbody>
</table>

Source: Disaster Prevention Web [32]

Severe losses were also caused by floods in recent past, e.g. heavy monsoon rains triggered landslides and flooding in India in July, 2006, specifically in the regions around Mumbai. Over 1,100 people lost their lives, and the insured property damage amounted to USD 0.8 billion. Swiss Re reports in the year 2007[21] related to 20 worst catastrophes in terms of victims has also indicated that India is one of the most victim-prone countries compared with others (Swiss Re reports, 2006 [22], 2007 [21]). The numbers of people affected in the rest of the world were 111,159, in Asia the number was 554,439 and within Asia, 24 per cent of deaths due to disasters occurred in India (Shashi Shankar, 2007) [23].

A study by Chowdhury, Dandekar & Raut (1989) [24] have ranked the year 1918 as the worst drought year of the last century - a year when about 68.7% of the total area of the country was affected by drought. Likewise the severe drought years of 1877 and 1897 were followed by flood years of 1878 and 1888. In the 19th century the droughts of 1877 and 1899 followed by the early droughts of the twentieth century. In the last century the drought of 1987 and 1972 are the next in order of severity. Occurrence in drought of consecutive years has been reported in 1904-05, 1951-52, 1965-66. These pair of years was associated with moderate droughts, where at least 25% of the country was affected. During 1999, 2000 and 2001 drought conditions prevailed over some parts of India, not affecting the country as a whole significantly. During 2002 twelve out of 36 subdivisions of the country came under the grip of moderate to severe drought when about 29% of the total area of the country was affected by drought.

Fifty-seven percent of the country is prone to seismic activity. During the international decade of natural disaster reduction, India suffered the adverse impact of several earthquakes, the most significant being in Uttarkashi, Latur and Jabalpur. Some of the most devastating earthquakes which India has faced in the past include the Kutch earthquakes of 2001 and 1819, the Shillong earthquake of 1897, the Kangra earthquake of 1905, the Bihar-Nepal earthquake of 1934, the North-East and Assam earthquake of 1950 the Anjar earthquake in Gujarat of 1956, etc. The seismic zonation map of India shows the north-eastern states, Kutch region of Gujarat and Uttarakhand as most vulnerable [25].

In 1996, flash floods intruded into the desert state of Rajasthan. The floods killed about 100 people. But in subsequent months more than 1,000 lives were lost due to a malaria
epidemic, as the flood-accumulated waters became an ideal breeding ground for mosquitoes. Amplified by a systemic failure, the epidemic took a heavy toll, far more than the flood itself, in a region not known for water-borne diseases [25].

**Man-made disasters**

Man-made disasters can be sudden or long term disasters (IFRCRCS, 2003) [4]. Sudden man-made disasters are known as Industrial accidents and Transportation accidents. India has experienced several man-made disasters. India has experienced 480 man-made disasters in the period of 1990-2009 [10]. On December 3, 1984, a highly toxic cloud of methyl isocyanate leaked from Tank – E610 engulfing the city of Bhopal. The leak was the consequence of a large volume of water entering one of the MIC storage tanks around 9:30 pm the day before. This triggered off a chemical reaction resulting in a tremendous increase of temperature and pressure in the tank. Around 12:30 am 40 tonnes of MIC along with hydrogen cyanide and other reaction products exploded into the night air of Bhopal. Of the 800,000 people living in Bhopal at that time, no one knows exactly how many people were affected that night. While the UCC, in its official statement on the tragedy, maintained that 3,800 died, the Indian Government argued that 1,754 people were killed and 200,000 injured. Sources like the Delhi Science Forum and Amnesty International however, place the toll at 5,000 and 7,000 respectively [26]. According to Shrivastava (1987, p. 65) [27] circumstantial evidence of death, based on the number of shrouds sold and quantity of cremation wood used, seems to suggest that around 10,000 people died that night. Lapiere and Moro (2002, p. 371) [28] place the death toll in between 16,000-30,000. Union Carbide contended that the gas leak could only have been caused by deliberate sabotage.

There have been many transportation accidents in India. The deadliest head-on mid-air collision of aircrafts in the world, the worst air disaster in India, and the fourth deadlier air disaster in the world, occurred over Charkhi Dadri, near Delhi on November 12, 1996, killing 349 people. The aircrafts involved were a Saudi Arabian Airlines Boeing 747 passenger aircraft carrying 312 passengers and crew and an Ilyushin II-76TD belonging to Kazakhstan Airlines, carrying 37 passengers and crew. One of them, or both, did not stick to the prescribed height, and did not maintain the required vertical separation. Both the planes collided at a speed of 500 km per hour and instantly caught fire. There were no survivors [29].

June 22, 2003, in the first major accident on the Konkan Railway, 53 people, including three children, were killed and 25 injured when the engine and three coaches of the Karwar-Mumbai Central Holiday Special train derailed after crossing Vaibhavwadi station in Sindhudurg district in Maharashtra [30].

**III. FINDINGS**

Disasters have been classified into natural, man-made disasters. Natural disasters are catastrophic events resulting from natural causes. Natural disasters are often termed “Act of God”. Although the natural disasters are beyond the control of human being, however, the impacts of the natural disasters can be reduced by setting up of advanced warning systems which forecast the impending natural disasters, also the consequences of the natural disasters can be reduced through an effective disaster management. The occurrence of disasters from all kinds of hazards is among the highest in Asia and Pacific. In Asia alone in last decade more than 83% of the total reported disasters were due to floods [31].

In figure 1, the number of disasters, occurred during 1990-2009, has been plotted against types of Disaster viz. Natural and Man-made disasters in South Asia subcontinent. During this period, the subcontinent has faced 1,860 disasters out of which there were 894 natural disasters and 966 man-made disasters (EM-DAT data, 2012) [10]. The subcontinent is one of the most populated, underdeveloped region and highly vulnerable to such types of disasters. As per figure 1, the subcontinent has received highest number of natural disasters from flood and storm which are 402 and 173 in numbers respectively. Apart from these disasters, the subcontinent has also faced numerous natural disasters in the form of earthquake, epidemics and mass movement like avalanche and landslide. As far as man-made disasters are concerned, the subcontinent has received 738 disasters related to transport accidents and 95 related to industrial accidents (see lower frame of figure 1).

![Figure 1: Number of Disasters in terms of natural (upper frame) and man-made (lower frame) have been plotted for South Asia subcontinent during 1990-2009.](www.ijsrp.org)

There were 133 disasters in the subcontinent related to miscellaneous accidents, like fire, structural collapse, explosion etc., during the period.

For the analysis of the data in the Indian context, similar types of graphs have been plotted in figure 2. India has received total 772 disasters during 1990-2009 (EM-DAT data, 2012 [10]), out of which there were 292 natural and 480 were man-made disasters. As per figure 2, India has faced highest natural disasters in the form of flood (141 in number) and storm (56 in numbers). India has also received several disasters in the form of epidemics (39), mass movement (26), drought (21) and earthquake (9) (see upper frame of figure 2). As far as man-made disasters are concerned, like in subcontinent, India has faced 340 disasters in the form of transport accidents (see lower frame of figure 2). It has also faced 81 miscellaneous and 59
have been reviewed in brief and the disaster types in terms of natural vulnerable to India and, hence, the south Asia subcontinent is highly industrial related disasters. From these observations, naturally India and, hence, the south Asia subcontinent is highly vulnerable to-

Figure 2: Number of Disasters in terms of natural (upper frame) and man-made (lower frame) have been plotted for India during 1990-2009.

- monsoon related natural disasters, like flood, storm, landslides etc., as well as man-made transport disaster.

In terms of their percentage sharing, we can summarize the data as follows:

- India has experienced 292 natural disasters which are 37.8% of total disasters. Most of the natural disasters were resulted from the heavy rains. The numbers of flood were 48% of the natural disasters whereas other disasters viz. earthquake, drought, storm, epidemics and mass movement share 52%.
- India has experienced 480 man-made disasters. The man-made disasters were 62.2% of the total disasters. Out of these, India has experienced 59 industrial disasters. The industrial disasters were 12.3% of the man-made disasters. Whereas, India has experienced 340 transport disasters. The transport disasters were 70.8% of the man-made disasters while miscellaneous disasters were 81 in number and shares 16.9% of the total man-made disasters.

IV. CONCLUSION

The disaster definition and types of disasters worldwide have been reviewed in brief and the disaster types in terms of natural and man-made in South Asia subcontinent and in India have been reviewed. The natural disasters and man-made disasters have also been reviewed in terms of their sub categories like flood, drought, transport and industrial disasters etc. In the final conclusive words, the natural disasters can be reduced by setting up advanced warning systems, which forecast the impending natural disasters timely. The consequences of the natural disasters also can be reduced through an effective disaster management. In addition to this, natural and man-made disasters can also be prevented or reduced through public participation, community conducting workshop and training programme, community participation, capacity building, mock drills etc.

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Improving the Transient and Dynamic stability of the Network by Unified Power Flow Controller (UPFC)

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Sri Aditya Engineering College, India
Abstract- The capability of increasing transient and dynamic stability of the power system network by unified power flow controller (UPFC) is the main focus in this paper. Consequently, three control methods, namely, voltage control through shunt compensation, real power flow control through quadrature voltage injection and reactive power flow control through inphase voltage injection for the UPFC were examined in order to improve the transient stability of the power system. The quadrature voltage control was found to be effective in reducing the transient swings where as inphase voltage control was effective in improving the transient stability margin. Finally, the overall performance of the UPFC was evaluated in a single machine infinite bus system by nonlinear simulations, and results obtained showed the effectiveness of the controller in improving the dynamic stability of the system and provide better damping to electromechanical oscillations. Simulations were carried out using MATLAB and PSCAD software to check the performance of UPFC.

Index Terms- Unified power flow controller (UPFC), real power, reactive power and dynamic stability

I. INTRODUCTION

FACTs means alternating current transmissions systems incorporating power electronic based and other static controllers to enhance controllability and increase power transfer capability [1]. Unified Power Flow Controller (UPFC) is one of the FACTS devices, which can control power system parameters such as terminal voltage, line impedance and phase angle [6]. Therefore, it can be used not only for power flow control, but also for power system stabilizing control. Unified power flow controllers are capable of directing real and reactive power flows through a designed route and regulating the system voltage through reactive power compensation. Thus UPFC provides several features of power flow control namely voltage control through shunt compensation, real power flow through quadrature voltage injection and reactive power flow control through inphase voltage injection. Hence, the capability of transmission facilities can be better utilized. The mechanism of three control methods of UPFC in improving the transient stability of the power system will be examined.

A synchronous power system has transient stability if, after a sudden large disturbance, it can regain and maintain synchronism. A sudden large disturbance includes application of faults, clearing of faults, sudden load changes and inadvertent tripping of lines and generators. The maximum power which can be transferred through the system without the loss of stability under sudden disturbances is referred as transient stability limit. Transient stability is the ability to remain in synchronism during the period following a disturbance and prior to the time that the governors can act. Ordinarily the first swing of machine rotors will take place within about 1 second following the disturbance, but the exact time depends up on the characteristics of the machines and the transmission system.

Dynamic stability is the ability of power system to remain in synchronism after the initial swing or transient stability period until the system has settled down to the new steady state equilibrium condition. When sufficient time has elapsed after a disturbance, the governors of the primemovers will react to increase or decrease energy input, as may be required, to reestablish a balance between energy input and existing electrical load. This usually occurs in about 1 to 1.5 second after the disturbance. The period between the time the governors begin to react and the time that steady state equilibrium is reestablished is the period when dynamic stability characteristics of a system are effective. Dynamic stability studies cover longer real time intervals, perhaps 5-10 seconds, occasionally up to 30 seconds depending on the inertias of the system and the characteristics of the governors.

The main function of UPFC is to inject an ac voltage with controllable magnitude and phase angle at the power frequency in series with the voltage of the transmission line via an insertion transformer. The inserted series voltage can be resolved into inphase and quadrature components with respect to the sending end voltage, providing two control aspects. The inphase component causes the magnitude of the receiving end voltage to change and the quadrature component causes the phase angle to change.

This paper investigates the three control methods namely, voltage control through shunt compensation, real power flow control through quadrature voltage injection and reactive power flow control through inphase voltage injection for the UPFC in order to improve the transient and dynamic stability of the power system, thus providing the security for the increased power flow.

II. POWER SYSTEM MODEL WITH UPFC

A simple power system is chosen and studied in PSCAD/EMTDC environment in order to evaluate the performance of the UPFC with different control strategies. The power system whose parameters are given in appendix comprises a 100 MVA, 16.66kV synchronous generator connected to an infinite bus through a transmission line and a transformer stepping up the voltage to 330kV. The generator is assumed to have Automatic Voltage Regulator (AVR) controlling its terminal voltage. The single machine infinite bus system (SMIB) used in this study is for better understanding of transient stability of the system. The UPFC is placed between bus 2 and bus 3 on the transmission line as shown in Figure 1. The UPFC is designed to control the power (real and reactive) through line as well as the voltage at bus 3 using PWM power controller.
III. GENERATOR MODEL

A detailed dynamic generator model for the single-machine infinite bus system is used for a UPFC controller design to give more accurate controller parameters. It is given as follows

\[
\Delta \delta (t) = w(t) \\
\Delta \delta (t) = - (D_m/2H) w(t) + w_0/2H [ P_m - P_d(t)] \\
\Delta P_e(t) = P_d(t) - P_m 
\]

Where \( \Delta \delta(t) = \delta(t) - \delta_0 \) and \( \delta(t) \) is the power angle of the generator; \( \delta_0 \) is the relative speed of the generator; \( P_m \) is the mechanical input power (assumed constant); \( P_d(t) \) is the real power delivered by the generator; \( w_0 \) is the synchronous machine speed; \( D_m \) is the per unit damping constant; \( H \) is the inertia constant.

\[
\dot{E}_d(t) = 1/T_{ds}[E_d(t) - E_q(t)] 
\]

Where \( \dot{E}_d(t) \) is derivative of the transient Electromotive force (EMF) in the quadrature axis of the generator, \( E_d(t) \) is the EMF in the quadrature axis; \( E_d(t) \) is the equivalent EMF in the excitation coil; \( T_{ds} \) is the direct axis open circuit transient time constant.

\[
E_d(t) = (X_{ds}/X_{d'}) E_d(t) - [(X_d - X_{d'})/X_{d'}] V_E \cos(\delta(t)) \\
P_e(t) = (V_e/ X_{ds}) E_d(t) \sin(\delta(t)) \\
I_d(t) = (V_e/ X_{ds}) \sin(\delta(t)) = P_d(t)/(X_{sd} I_d(t)) \\
Q(t) = (V_e/ X_{ds}) E_d(t) \cos(\delta(t)) - V_E^2/ X_{ds} 
\]

Where \( E_d(t) \) is the transient Electromotive force (EMF) in the quadrature axis of the generator; \( E_q(t) \) is the EMF in the quadrature axis; \( Q(t) \) is the reactive power; \( I_d(t) \) is the excitation current; \( I_q(t) \) is the quadrature axis current; \( X_{sd} \) is the mutual reactance between the excitation coil and the stator coil; \( X_{d'} \) is the direct axis reactance of the generator; \( X_{d'} \) is the direct axis transient reactance of the generator; \( X_{d''} \) is the mutual transient reactance between the direct axis of generator and transformer; \( \delta(t) \) is the power angle of the generator; \( \delta_0 \) is the mutual reactance between the direct axis of generator and transformer; \( X_T \) is the reactance of the step up transformer; \( X_E \) is the reactance of the Thevenin equivalent viewed from bus \( V_1 \); \( V_E \) is the voltage magnitude of the Thevenin equivalent viewed from bus \( V_1 \).

IV. UPFC MODEL AND CONTROL STRATEGIES

The function of UPFC is to inject an ac voltage with controllable magnitude and phase angle at the power frequency in series with the voltage and the transmission line via an insertion series transformer [2].

The mathematical UPFC model was derived with the aim of being able to study the relations between the electrical transmission system and UPFC in steady-state conditions. The basic scheme of this model is shown in Figure 2.

This figure represents a single-line diagram of a simple transmission line with impedance, UPFC, sending-end voltage source and receiving end voltage source. According to Figure 2, the power circulation and the line flow are calculated by the following expressions

\[
P_{sh} - P_{se} = 0 \quad \text{neglecting losses} \\
P_t = V_2(V_{m2}\sin(\theta_2-\alpha_2) - V_1 \sin(\theta_2 - \theta_1))/X_{12} \\
Q_t = - V_2 (V_2 - V_1 \cos(\theta_2 - \theta_1) + V_{m2} \cos(\theta_2-\alpha_2))/X_{12} 
\]

Where \( P_{sh} \) is the power at the shunt side of the UPFC; \( P_{se} \) is the power at the series part of UPFC; \( P_t \) is the real power flow; \( Q_t \) is the reactive power flow; \( V_2 \) is the voltage at the bus 2; \( V_{m2} \) is the series voltage of UPFC; \( V_1 \) is the voltage at bus 1; \( X_{12} \) is the reactance between buses 1 and 2; \( \theta_1 \) and \( \theta_2 \) are the angles of buses 1 and 2 respectively.

Consider \( V_{m2p} \) and \( V_{m2q} \) are the components of the series voltage of UPFC. They are proportional to the voltage at the point of connection of UPFC and can be written as

\[
V_{m2p} = V_2 \gamma(t) \quad \text{and} \quad V_{m2q} = V_2 \beta(t) 
\]
where $\beta(t)$ and $\gamma(t)$ are the control variables. And also

$$V_2 + V_{m2q} + X_{d2} \sin \phi = V_3 \cos \delta$$  \hspace{1cm} (16)

$$V_{m2p} + X_{d2} \cos \phi = V_3 \sin \delta$$  \hspace{1cm} (17)

Multiplying $V_2$ to above two equations (16 & 17)

then we get

$$P_2 = (V_2 V_3 X_{d2}) \sin \delta - (V_2 V_{m2p} X_{d2})$$  \hspace{1cm} (18)

$$Q_2 = (V_2 V_3 X_{d2}) \cos \delta - (V_2 V_{m2q} X_{d2}) - (V_2^2/X_{d2})$$  \hspace{1cm} (19)

The partial derivatives of $P_2$ and $Q_2$ are calculated as respectively

$$dP_2/dt = (\partial P_2/\partial \delta) (d\delta/dt) + (\partial P_2/\partial V_{m2p}) (dV_{m2p}/dt)$$  \hspace{1cm} (20)

$$dQ_2/dt = (\partial Q_2/\partial \delta) (d\delta/dt) + (\partial Q_2/\partial V_{m2q}) (dV_{m2q}/dt)$$  \hspace{1cm} (21)

Therefore, modulation controller for series-injected voltage can be designed by using (20) and (21). The value of $K$ is chosen so that the injected series voltage remains at its nominal value. The values of $V_2$ and $V_3$ can be chosen as 1.0 per unit (p.u). The injected series voltage, $V_{m2}$ is calculated as

$$V_{m2} = (V_{m2p}^2 + V_{m2q}^2)^{0.5}$$  \hspace{1cm} (22)

And $\delta = \tan^{-1}(V_{m2p}/V_{m2q})$

UPFC can be controlled in a variety of ways to meet different objectives. Basically, UPFC has two different control strategies, namely, (1) series compensator consisting of series inverter and series transformer modeled as a fully controllable voltage source which controls the real and reactive power flow through the transmission line. (2) Shunt compensator comprising shunt inverter, shunt transformer and connection filter modeled as a fully controllable voltage source with connection impedance including the leakage of the shunt transformer.

The series inverter provides the main function of the UPFC by injecting a voltage with magnitude $V_{m2}$ which is controllable and a phase angle $\delta$ in series with the line via an insertion transformer[3]. This injected voltage acts essentially as a synchronous ac voltage source. The transmission line current flows through this voltage source resulting in a reactive and active power exchange between itself and the ac system. The inverter generates the reactive power exchanged at the ac terminal internally. The active power exchanged at the ac terminal is converted into dc power, which appears at the dc link as a positive or negative real power [4].

The basic function of shunt inverter is to generate or absorb the real power demanded by series inverter at the common dc link. The power demand by the series inverter at the dc link is converted back to ac by the shunt inverter and fed to the transmission line bus via a shunt-connected transformer. In addition to this the shunt inverter can also generate or absorb controllable reactive power if desired and thereby provides independent shunt reactive compensation for the line [5].

V SIMULATION RESULTS

To test the effectiveness of the UPFC controller, a balanced three-phase fault is applied to the line at the end close to bus 3 (see Figure 1) at 5.0 s when the generator is operating at its rated power level. The duration of the fault is 0.10s. The system responses are simulated using PSCAD/EMTDC. Figures 3 to 11 show the system responses with and without UPFC. It can be observed from these figures that the UPFC with power system network can greatly improve the damping of the system and its stability. The equations used in the simulation were from 1 to 11 and 13 & 14.

The simulation results of shunt compensation are shown in Figure 3 to Figure 5. It is observed that the dynamic oscillations in Figure 3 are well damped when UPFC is connected to the system, although they have large first swing after the fault is cleared. From Figures 4 and 5, it can be seen that the real and reactive power could be controlled to a specific value after the fault is cleared, which shows that the UPFC is very effective in line flow control. This, of course, limits the electrical power output of the generator which makes the rotor angle increase more than that when there is no UPFC.

The two components of series compensation control are considered with respect to the injected voltage. These components are in-phase voltage and quadrature voltage. The simulation results of the quadrature voltage control are as shown in Figures 6 to 10. It is observed that the transient swings are reduced, but it is poor in load flow control and damping control.

However, from the equal area criterion, it can be predicted that after the rotor angle reaches the maximum value in the first swing, this control strategy should be changed and should be aiming at damping of the subsequent swings. But, with in-phase voltage control, the transient stability margin is significantly improved (see Figure 11). It is noteworthy that the in-phase component contributes to the real power exchange between the series and shunt branch of the UPFC, and reduces the fluctuation in capacitor voltage at its zero value.
Figure 3: Speed response of synchronous generator

Figure 4: Transient corresponding to line real power

Figure 5: Transient corresponding to line reactive power

Figure 6: Speed response by quadrature voltage control

Figure 7: Load angle response by quadrature voltage control

Figure 8: Terminal voltage response by quadrature voltage control
VI APPENDIX

The power system network used in this work is having the following ratings.

<table>
<thead>
<tr>
<th>TABLE 1: GENERATOR RATINGS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rated power</td>
</tr>
<tr>
<td>Rated voltage</td>
</tr>
<tr>
<td>Rated current</td>
</tr>
<tr>
<td>Inertia constant H</td>
</tr>
<tr>
<td>Frequency</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>TABLE 2: MAIN TRANSFORMER RATINGS</th>
</tr>
</thead>
<tbody>
<tr>
<td>MVA rating</td>
</tr>
<tr>
<td>Frequency</td>
</tr>
<tr>
<td>Primary/secondary ratings</td>
</tr>
<tr>
<td>Leakage reactance</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>TABLE 3: SHUNT AND SERIES TRANSFORMER RATINGS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shunt transformer ratings</td>
</tr>
<tr>
<td>Series transformer ratings</td>
</tr>
<tr>
<td>DC link voltage $V_{dc}$</td>
</tr>
<tr>
<td>Capacitance</td>
</tr>
</tbody>
</table>

VII CONCLUSION

In this paper, the capability of regulating power flow in a Single-machine Infinite bus system using UPFC has been investigated. The mechanism of the three control methods, namely, in-phase voltage control, quadrature voltage control and shunt compensation was also examined in improving the transient stability of the power system and these three control methods were separately considered in this work. The quadrature voltage control was found to be effective in reducing the transient swings whereas in-phase voltage control was effective in improving the transient stability margin. The performance of the UPFC model has been evaluated in a single-machine infinite bus system by nonlinear simulations. The results show that the controller significantly improves transient and dynamic stability of the system and provides better damping to electromechanical oscillations.

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Production Management and Industrialization: A Divine Perspective

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Abstract- Divine view is to production and industrialization a part of the process of economic development. The divine rules of governance become Ibadah (form of worship), hence industrialization within the divine ambit is also an Ibadah. Divine messages, therefore, stresses both the moral quality and skills in the production of goods. People are getting benefits from industry from different ways, sometimes their ritual prayers have been done comfortably through the well supports from industrial goods and services. As per common observation devotee don’t find any relationship of industrialization with divine messages. In this paper an effort has been taken to present the divine messages with regard to production management and industrialization.

Index Terms- Industry, religion, Production, Services, Resources.

I. INTRODUCTION AND GENERAL CONCEPTION ABOUT PRODUCTION MANAGEMENT AND INDUSTRIALIZATION

In materialistic world production management has been perceived as a very important issue. The pervasiveness of production management depends upon the wideness of industrialization. Economic development of any country relies on production management. Basically, production management is related to production planning, supervision, maintenance, product development and quality control etc. The main objective of production management is to adopt the production target according to the capability of machineries and other inputs to produce quality product economically and timely. From the very beginning of the civilization, economic development depends upon the success or failure of production management. The concept of production management specially owes to the natural management of Allah (SWT).

Industry and industrialization are general and appealing issues in modern science millennium. All concerned are trying to enhance this area through their efforts due to its devastating requirements for person, society and nation as a whole. People are getting benefits from industry from different ways, sometimes their ritual prayers have been done comfortably through the well supports from industrial goods and services. As per common observation devotee don’t find any relationship of industrialization with divine messages.

The term “Production Management” may be defined as a wide range of activities and situations outside of manufacturing (services) as well as within manufacturing of an organization. Indeed, it involves with the functions of production planning, supervision and controlling of both manufacturing and service organization. It involves a process of conversion from inputs to outputs. It has various terminologies, such as: Operations Management, Engineering Management, Manufacturing Management etc.

One commonly heard definition of industrialization is the transformation of an economic society built largely on mechanized industry rather than agriculture, craftsmanship or commerce. However, this definition has the tendency to push agriculture development and the growth and significance of the non-manufacturing sectors into the background in favor of manufacturing-based industrial development. The critical linkages between the manufacturing and non-manufacturing sectors, the urban-based and rural-based industries, the resource-based and non-resource-based industries and the complementary roles of commercial activities can only be ignored at the peril of being entrapped in an overly constrained definition of industrialization. The effective utilization of all God-endowed available natural and other resources produced by industries other than the manufacturing branch must merit as a case for industrialization.

In general, industrialization leads to a continuous increase in the size of the industrial sector. Industry is a fundamental activity in the economic life of a nation. It is a means towards the creation of a strong society in the midst of modern challenges and assisting it in safeguarding the welfare of the citizens of the Islamic state, whether Muslims or non-Muslims. The continuous and rapid change in the present realities, the new demands of our modern societies as well the political and economic events in the area of globalization have enhanced the need for local made products. This is essential in order to ensure that a country can attain independence in the true sense of the word and has the political and economic power to determine its own future.

II. METHODOLOGY AND OBJECTIVES OF THE STUDY

The study is mainly based on secondary data. The major sources of data were the Holy Quran, Sayings of Prophets and Islamic management literature, Journals and different related research study. Some academicians and experts in theology discipline have also been consulted. The main objective of the study is to evaluate religious thinking regarding industrialization. The specific objectives are as follow:

(a) To analyze some issues relating to production management and industrialization mentioning divine references.
(b) To analyze the thinking of economic development by industrialization through production from divine verses.
III. INDUSTRIALIZATION AND PRODUCTION MANAGEMENT: A RELIGIOUS OBLIGATION

The importance of introduction and use of new technology is undeniable. We have to be adequately equipped with the latest technology in all kinds of industries so as to be competitive economically at the international level of continuous growth and development and able to, at least, defend ourselves from external threats.

The urge to acquire the new knowledge and skill is embodied in the Divine maxim:

“Wisdom in the right of believer wherever it is found, they have more right over it”.

In an Islamic legal maxim, it is stated that:

“A thing is a duty if another duty can not be performed without it.”

The above maxims provide the justification for the believer to consider industrialization and production activities as a moral and religious obligation in the light of the present circumstances. We need to have a sufficient number of experts in different fields in order to build the nation. This very obvious in the field of medicine, engineering, information technology and security.

IV. SOME ISSUES OR FACTOR OF PRODUCTION MANAGEMENT IN DIVINE PRESPECTIVE

(i) Selection of suitable location and production inputs

At the first step of production activities production manager has to select a suitable location. Human beings have learnt this concept of location selection from the suitable placing of the world in the solar system created by Allah (SWT). It can be rightly mentioned if the location of the earth would be less than one crore and thirty lacks miles from the Sun, then the weather and climate that is the environmental balance would be jeopardized. Regarding inputs of production it can be said that Almighty Allah (SWT) has preserved huge materials in the surface, inner the earth, in the sky and sea-bottom for the well being of human being. The management of human being has lot of limitations, but Allah (SWT) has no limitations. The mineral wealth, water resources forest resources and the ingredients of air etc. are decreasing by the use of the human being.

(ii) Collection, Installation and Starting Production Process

Production manager has to proceed with specific plan for collection and use of the above mentioned things. Allah (SWT) has created everything from the very beginning of these creation in the universe. He has created the heaven and the earth within six days. The Moon and the Sun are created for specific purposes. He has preserved thousands of blessings inside surface of the world for use as raw materials and the sun are created for specific purposes. He has preserved thousands of blessings inside surface of the world for use as raw materials and power. The most important matter is that the Almighty Allah (SWT) is not dependent upon anyone like the earthial managers.

After that one manager has to start the production process with the collected materials. Earthial production manager should try to get some lessons from Almighty Allah (SWT), the creator of everything.

Allah Jalla Sanhu has started operation of the Moon, Sun, River, Sea and Air from the very beginning of their creation and this process will continue up to qiamah (day of judgement). After birth till death the physiological activities of human being do not stop for a moment, the flows of river, sunrise and sunset do not stop and the production of corn do not stop. If Almighty Allah (SWT) would not create corn, how human being would produce lot of things from the corn.

(iii) Product Development

The function of product development is a continuous process in production management. Because, the taste, preference and habit of customers are perpetually changeable. The emergence or trend of human civilization has a great similarity with product developmental functions of production management. It is to be lightened from the pleasantry creation of human being of Allah (SWT). It is known to us that each and every product has a life cycle. It means, products go through a series of stages from its innovation to obsolescence stages. They are:

(i) Innovation stage;
(ii) Introduction stage;
(iii) Growth stage;
(iv) Maturation stage;
(v) Decline stage; and
(vi) Obsolescence stage.

It is graphically shown below:

![Product Life Cycle](image.png)

Human life style may be compared with this product life cycle. At first it begins with innovation stage in mother's womb, proceeding through child, adolescence, youth, old age and finally death. As the demand of the product is to be sustained through proper co-ordination with changeable situation, the physical and mental conditions of human being may be kept sound through following the preventive principles of Islamic Shariah. Gradually, after a certain period of time the life of human being is expired for responding to the call of death. In this regard the holy Quran says-

It is Allah who created you in a state of (helpless) weakness, then gave (you) strength after weakness. then after strength, gave (you) weakness and a hoary head. He creates whatever he wills, and it is He who has knowledge and power.

(iv) Designing and Updating

Without plan for design of the products production activities are not to be continued properly. A lot of differences among customers for their taste, preference, habit and fashion to the products are to be considered. So, the size, shape, pattern, external appearance etc. of product should be fixed-up by considering the reactions of customers towards the product and design of its competitive product. Designing is not the end, but in the competitive market, a production manager should be played an important role to create attention of its customers. In this...
regard he has to attempt to upgrade the products perpetually. If men go through deeply towards the structure or design of the universe and its creatures including human being, it will be observed that, how Allah (SWT) created human body (Ashraful Makhlukat) at the best appearance along with all other creatures perfectly. Indeed Allah has thrown a challenge to find out any fault from his mysterious creation of universe. But hither to nobody finds out any fault or spot. Allah says in the holy Quran- 

"He who created the seven heavens one above another; No want of proportion wilt thou see in the creation of the most gracious. So turn thy vision again: Seest thou any flaw? Again turn thy vision again a second time: (thy) vision will come back to thee dull and discomfuted."

Another indication is found in the holy Quran regarding updating. Allah says in the holy Quran – Everyday in (new) splendor doth the (shine) Prophet (SAW) also said in this regard. 

"Ó He whose two days are equal is loose"

(v) Human Factor and Design of Working Condition

For any organization, human factor or labour is treated as the most important element among the factors of production. This is why its important is prior to all and it plays a vital role in production management. So, the production manager must keep in mind the physical appearance and fitness of body of human being for ensuring their proper utilization in the plant. Because, all people are not equal by nature. Their physical fitness, appearance, shape, ability, patience and muscle type are different from one another. So, Infra-structure development activities, furniture, fixture and other materials along with sound working conditions should be managed by considering some factors in human body. In this regard, explicit directions are given in the well defined principles of Islam, prophet (SAW) Said-

"Your brothers are your servant whom Allah has made your subordinates. So, the man who has his brother as his subordinate, should give him to eat from what he himself eats, and to wear from what he himself wears. And do not put on them the burden of any labour which may exhaust them. And if you have to put any such burden on them, then help them yourselves."

The employees of any organization can work together satisfactorily with full satisfaction of mind if a harmonious relationship is established among all employees. For this reason, the relationship of Ukhwh (brotherhood) between believers each-other should be maintained. The holy Quran declared in this regard,

"The believers are but a single brotherhood; So, make peace and reconciliation between your two (contending) brothers. And fear Allah, that you may receive mercy."

Besides these, a production manager’s need is to establish Justice (Adl) in the organization for ensuring proper utilization of human factor. The holy Quran commands believer (managers) in this context, "And when you judge between people that you Judge with justice, varily how excellent is the teaching which to gave you".

(vi) Capacity Utilization

The optimum use of each and every factor particularly the human factor of production in the plant must be ensured for producing right quantity of products in right time. In this respect both employer and employee of the organization should be very much careful. Employer should not be assigned any work to the employees or workers out of their ability. Similarly, the employees should not be taken any fraud or misuse the ability by not utilizing their full capacity. A worker will have to be dependable and trustworthy with a sense of accountability. The holy Quran declared in this case "Ó The best worker is the one who is strong and trustworthy". In other place Allah (SWT) said "Ó On no soul doth Allah place a burden greater than it can bear. It gets every good that it earns, and it suffers every ill that it earns." The prophet (SAW) said in this regard. "Ó There is no faith in the man who lack a sense of accountability or betrays a trust".

(vii) Inventory Control

For the production management of any industrial organization, inventory control is a must. Because, it will not be possible for production manager to supply goods as per order of the customers in right time without reserve of required inventories. The principles or direction of divine message has emphasized an inventory control for meeting the needs of human being properly. Prophet (SAW) prohibited any stock of consumer goods more than 40 days so that any person can not achieve excess profit through speculative business or creation of artificial crisis.

It will be observed from the nature of creation of Allah (SWT) that The river, the sun, the moon, the star, the mountain, water etc. are moving Properly maintaining the balanced position. In this world every thing is created and furnished at optimum level as per requirements of human being.

(viii) Decision Making

In the field of production management decision making involves production planning, supervision and controlling of goods or services. The functions of production depend upon production decision. So it is important in production management. A production manager must choose and follow that best method among the alternatives to complete the activities of production for goods or services or for solution of problems relating to production. This is done in decision making process in case of conventional production management.

Indeed, Allah (SWT) has given a chance to human being for decision making immediately after their creation. A man can devote himself by applying his merit and spirit of knowledge as per requirement of his wishes by avoiding the well disciplined principles given by Allah (SWT). On the contrary. a man can perform his day to day life as per requirement of satisfaction of Allah (SWT).

In this case, a person has to choose one way between two alternative options. Here a freedom is given by Allah (SWT) to accept and follow one way for performing his individual, family of social life. The concept of participative decision making given by conventional management, which has come from Islamic management principles. Allah(SWT) said in the holy Qur’an to his prophet (SAW) - And consult them in affairs, then, when you have taken a decision put our trust in Allah, for Allah (SWT) loves those who put their trust (in Him)."
control of production in management of Allah (SWT). In traditional product if every ingredient is appropriate quantity then there is no mentionable difference. But in natural system for the cause of diversification of products’ quality all customers are satisfied though its choice, variation, taste, smell and fashion are different. On the other hand production managers have to take keen interest from the beginning of the production process to control cost. But Allah, the Almighty gives all freedom to mankind for use of materials for production. But He prohibited to deprive the really needy person by preserving extra products. It is adverse to cost control. Allah says ÔIn order that it may not (merely) make a circuit between the wealthy among you’. Allah (SWT) further says- Ôverily spendthrifts are brother of satan’. So it will not be exaggeration to say that the concept of production control has been borrowed from Allah (SWT).

V. THE HOLY SCRIPTURE AND INDUSTRIALIZATION

The Qur’an constitutes the word of God (Allah) upon which general and specific rules of affairs, between man and his Creator, man and his fellowmen, man and his environment and man with himself, are ordained. The same principles that govern man’s relationship with his Creator will manifest in man’s other relationship. And because industrialization is part of man’s economic affairs and the latter being a subset of all man’s affairs stated earlier, hence, industrialization will necessarily be governed by the same general and specific rules of affairs in Islam. And because all that subscribe to the Islamic rules of governance become Ibadah (form of worship), hence industrialization within the Islamic ambit is also Ibadah.

Given this spectrum of understanding, one of the Quranic thrusts is to declare that man’s efforts in acquiring and utilizing the God-endowed resources (including through industrialization) should be perceived only as a means to greater goodness and purity. Subsequently, industrialization is not an end by itself. Neither is the state of being a highly industrialized country the apex of total development. Rather, industrialization should be a God-blessed process, culminating with a society, which is an epitome of economic, spiritual and moral excellences. Allah says in the Qur’an:

“He (Allah) made you strong with His help and bestowed great benefits upon you, so that you might give thanks”.

“He (Allah) will make a good provision for you till an appointed day and will bestow His grace upon those that have merit”.

“Eat of the good and lawful things which Allah has bestowed on you and give thanks for His favors if you truly serve Him”.

Craftsmanship and industrial aptitude had been the ways of the Prophets upon whom we attempt to emulate. Prophet Daud (AS) was endowed with the art of making coats of mail while Prophet Nuh (AS) was a builder of a huge and sturdy ark.

“We (Allah) taught him (Daud) the craft of making coats of mail, so that you might have protection in your wars. Will you then give thanks?”

“On Daud, We (Allah) bestowed Our favors. (We said): ‘Mountains and you birds, echo his songs of praise’. We made hard iron pliant to him (saying): ‘Make coats of mail and measure their links with care. Do what is right: I see all your actions’.

“We (Allah) revealed (Our Will) to him (Nuh) saying: Build an ark under Our watchful eye, according to Our guidance and Our inspiration’.”

Engaging in monumental projects was not alien to the tasks undertaken by the Prophets. For this, the events related to Prophets Sulaiman (AS) and Dzulqarnain (AS) are illustrative.

“To Sulaiman (We subdued) the wind, traveling a month’s journey morning and a month’s journey evening. We caused a fountain of molten copper to flow at his behest and jinn who served him by leave of his Lord. Those of them who did not do Our bidding, We shall punish in the fire of Hell. They made for him whatever he pleased: sanctuaries and statues, basins as large as watering troughs and fixed cauldrons. We said: ‘Give thanks, House of Daud.’ Yet, few of My servants are truly thankful’.

“He (Dzulkarnian) said: ‘The power which My Lord has given me is better (than any tribute). Lend me a force of laborers and I will raise a barrier (a high dam) between you (a certain community) and them (Ya’juj and Majuj). Come, bring me blocks of iron’. At length, when he dammed up the valley between the two mountains, he said: ‘Blow (with your bellows)’. And when he made the iron blocks red with heat, he said: ‘Bring me molten copper to pour on them’.”

The Qur’an and other authentic religious scriptures may not contain explicit statements on the more intricate deliberations of industrialization. Allah knows best for this. Nonetheless, the broad framework for action and the appropriate spirit in facing such challenges are sufficiently provided in the Qur’an.

One can appreciate the Quranic emphases on the proper use of the intellect, the need for wise ponderance over the bounties of Allah and its uses, the enjoinder upon mankind to travel, learn and apply newly-acquired knowledge and experience meticulously, the necessity of ensuring that one’s nafs (desires) do not transgress the limits of goodness and virtues, the need to suppress uncontrolled emotions in favor of objectivity, etc. This is because, while Islam identifies a broad and definite framework if the conduct of man’s affairs, the detailed strategies and approaches to problem-solving and decision-making are very much left to man’s wish and faith-related use of the intellect which Allah has endowed. As Allah says in the Qur’an:

“In the creation of the heavens and the earth, and it the alternation of night and day, there are signs for men of sense; those who remember Allah when standing, sitting, and lying down, and reflect on the creation of the heavens and the earth (saying): ‘Lord. You have not created these in vain. Glory be to You! Save us from the torment of the Fire, Lord’.”

To begin with, the Qur’an, in the more places than one, makes mention of natural resources which constitute as inputs of various degrees: raw, intermediate or for immediate consumption.

“We (Allah) made hard iron pliant to him (Daud)”.

“And We caused a fountain of molten copper to flow at his (Sulaiman’s) behest”.

“We have sent down iron, with its mighty strength and diverse uses for mankind, so that Allah may know those who support Him, though unseen, and support His Apostle”.

“He (Allah) sends down water from the sky which fills the riverbeds to overflowing, so that their torrents bear a swelling...
foam, akin to that which rises from smelted ore when make ornaments and tools”. 38

The Qur’an also contains verses implying possible types of industries quite common to many civilizations. One mode of categorization to facilitate our understanding of these verses may be to classify them under one of the following headings: 39
d. Essentials industries.
e. Semi-essentials industries; and.
f. Comfort industries.

VI. ESSENTIALS INDUSTRIES

i) Food-related industry

The following verses are most relevant about food-related industry.

“And (it is He, Allah, Who creates) horses and mules and asses so that you may be able to bring forth the goods of the earth, and (to make) furnishings and goods for temporary uses of their (rough) wool and their soil, furry and their hair”. 38

Although these may not contribute directly to the economy in the form of material productivity, these are crucial to the development of other industries.

And (God) Who has made ships subservient to you, so that they may sail through the sea at His behest, and has made the rivers subservient (to His Laws, so that they may be of use) to you”. 53

“And (it is He, Allah, Who creates) horses and mules and asses for you to ride, as well as for their beauty: and He will yet create things of which (today) you have no knowledge”. 54

“Reclining there (in Paradise) upon soft couches, they shall feel neither the scorching heat nor biting cold”. 51

“And cushions ranged, and carpets spread out”. 52

ii). Transport and communications industry

Transport and communications are service-oriented industries. Although these may not contribute directly to the economy in the form of material productivity, these are crucial to the development of other industries.

“Do you not see that He (Allah) had subdued to you all that are on the earth? He has also given you ships which sail the sea at His bidding”. 57

“You can see ships ploughing through the craves, so that you might (be able to) go forth in quest of His (Allah’s) bounty, and thus have cause to be grateful”. 58

These verses, among others, have a bearing on the need to establish efficient and wide networks of transportation and communication, if God’s bounties are to be fully reaped.

iii) Defense industry

“And God propounds (to you) a parable: (Imagine) a town which was (once) secure and at ease, with its sustenance coming to it abundantly from all quarters”. 59

X. COMFORT INDUSTRIES

Islamic permits the enjoyment of the comforts of life, as long as the indulgences do not transgress into the realms of extravagance, waste and neglect of one’s obligations to Allah. Rather, such indulgences into life’s comforts and luxuries should, in order to be meaningful, enhance one’s thankfulness to the Creator and his deepened recognition of Allah’s bounties graced upon him. As such, the Qur’an expresses references to luxuries,

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among others, such as beautiful mansions (9:72); garments of silk, brocades, soft couches (20:131); splendor of the worldly life (20:131); bracelets of gold. Pearls and silk (22:23); rich brocade (55:54); silver bracelets and heavy brocade (76:21); pearls and coral (55:22) and rubies (55:58).

XI. SECTON SUMMARY

Not all the relevant verses of the Qur’an have been identified vis-à-vis the relevant industries. Nonetheless, what have been mentioned should at least establish the following:  
7. The Qur’an promotes, rather than impedes industrial activities;
8. God’s bounties are to be utilized to the fullest but not in forms that contradict goodness and justice;
9. Mankind has to be sufficiently conscientious before they can reap the benefits inherent in many of God’s bounties;
10. The Qur’an may not contain many explicit statements on industrialization per se, but it does clearly define a picture within which the priority needs of mankind are identified;
11. Establishment of industries or undertaking industrialization is not an end by itself, but rather a means to achieve a more holistic form of success, culminating with a blessed abode in the hereafter; and,
12. Lastly, inferences other than those made in this paper can be made on the various verses of the Qur’an. For example, when iron and copper are mentioned in the cases of Prophets Daud (AS) and Sulaiman (AS) respectively, it can visualize the Quranic viewpoint on the significance of the iron and other metal industries. Similarly, the Quranic references to ships and smelted ore indicate the significance of shipbuilding, the shipping and the mining industries.

XII. THE SAYING OF PROPHETS AND INDUSTRIALIZATION

The Sunnah constitutes the traditions of Prophet Muhammad (SAW), be it his saying, his action and his silence that can be interpreted as his agreement, consent and acknowledgement. The Sunnah details out the Qur’an with the Prophet Muhammad (SAW) as the manifestation of what the Qur’an stands for. Hence, it is impossible to comprehend everything in the Qur’an without reference to the Sunnah.  

It is not possible to pursue a task of identifying every relevant hadith of the subject of industrialization in this limited paper. However, to state in broad terms, much of the Sunnah, if not all, have either direct or indirect relevance to this issue. In more specific words, the Sunnah contains various principles of plan and action (including of the economic nature), plus the proper attitude and spirit that must be imbued into one who desires both material and spiritual bliss.

To appreciate this rope of the Sunnah, one can perhaps attempt to derive some relevant lessons from the following hadith:
The Prophet once passed by a dead goat and upon seeing it said: “Why did you not take off its skin? You could put it to use after tanning it.” The Companions replied: “It was dead” Thereupon, the Prophet said: “Only its eating is prohibited”.

The above hadith expresses several lessons.
i) One should be clear as to the Islamic law such that an incomplete interpretation will not impede one’s progress.
ii) Knowledge and (technological) expertise are implied herewith as relevant to the maximum utilization of Allah’s bounties.

This hadith among others calls for initiative from Muslims such that there remains no under utilization or wastage of resources.

On the virtues of self-dependency and refraining from perpetual of long-term dependence on the charity of others, we can take heed of the following two ahadith:
“No one has ever eaten better food than what he eats as a result of the labor of his hand. And verify, Allah’s Prophet Daud (AS), used to eat by the work of his hand”.

“Anyone of you who gathers a bundle of fuel-wood (and carries it to the bazaar) on his back, is better than one who begs from anyone and he grants or refuses (to grant) him”.

Other ahadith of the Prophet determines the basic values that must be adopted for a blessed progressive society. Values such as acting justly, trustworthiness. These act to remind Muslims that it takes more than just skills, knowledge, material richness and mundane factors to ensure perpetual economic strength and stability. Indeed, some things cannot be bought or acquired at any material value. People’s confidence in us, our own dignity as an honorable society and similar intangible attributes can only be acquired when there exist the desire and commitment in acquiring it. This is what, among others, will be a significant contribution of the Sunnah to our industrialization efforts.

XIII. COSTS AND BENEFITS OF INDUSTRIALIZATION

The Irwell River near Manchester, Britain became badly polluted during Manchester’s transformation from a rural trade center into a large, industrial city. Pollution remains a side effect of industrialization. Today, as in the past, analysts discuss and debate whether the benefits of industrialization justify its costs. Some of the advantages and disadvantages that characterize present-day advanced industrial societies, such as those in western Europe and North America, are listed in the table below. Certainly the biggest advantage of industrialization is that it eases the daily responsibilities and tasks of people by placing most of the bulk of tasks on technology and other resources. Industrialization also opens the door to lots of employment opportunities which, in turn, also open the door to establishing businesses to satisfy the needs of those employed by the industry. In all, everyone is equally satisfied and well-compensated with industrialization.

<table>
<thead>
<tr>
<th>Advanced industrial Societies</th>
<th>Advantages</th>
<th>Disadvantages</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Creation and mass production of many useful, affordable products</td>
<td>Dependence on nonrenewable resources, such as fossil fuels and metals</td>
</tr>
<tr>
<td>High average agricultural productivity per person from industrialized agriculture (more food per person)</td>
<td>Large amount of energy used per person for manufacturing, agriculture, transportation, lighting, heating, and cooling</td>
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</tbody>
</table>
XIV. CONCLUSION

Industrialization and production issues in the contemporary world have developed from inherent desire in human nature for prosperity and prestige. These are not the outcome of only religious support or any other ethical encouragement. To develop general sense and to encourage people to be production oriented the above discussion are highly influential. In fact it is a crying need at present scientific world. To develop general sense and to encourage people for industrialization the above discussion are highly influential. The effective utilization of God-endowed natural and other resources can be possible through industrial process through proper production process. These are means towards the creation of a strong society in the midst of modern challenges and assisting it in safeguarding welfare of the citizen of any state. To uphold the economic status, standard of living and alleviate poverty at present production through industrialization is a religious obligation.

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Design of a Robotic Arm for Picking and Placing an Object Controlled Using LABView

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Abstract - This paper focuses on designing a robotic arm for picking and placing an object controlled using LABView. This is expected to improve the accuracy and simplicity in control.

Index Terms - Accelerometer, DOF, Inverse kinematics, Kinematics, LABView, Robotics, Robotic arm

I. INTRODUCTION

Robot is a machine to execute different tasks repeatedly with high precision. Thereby many functions like collecting information and studies about the hazardous sites which is too risky to send human inside. Robots are used to reduce the human interference nearly 50 percent. Robots are used in different types like fire fighting robot, metal detecting robot, etc.

The first robotic arm to be used in an automobile industry was “UNIMATE” in GM motors USA in 1950s. From then there has been tremendous improvement in the research and development in robotics. Now robots are an integral part of almost all industries. Robots have to do different tasks including welding, trimming, picking and placing etc. These robots are controlled in different ways like keypads, voice control, etc.

In this paper, we introduce LABView based control of the robotic arm. The LABView is designed to input the coordinates of object in the real time environment. To select the real time object, the corresponding coordinate is inputted. The action of picking or placing is also given through the LABView panel. Once the robot gets the coordinates, it uses the inverse kinematics to calculate the required rotation.

II. HARDWARE

A. Mechanical

The robotic arm has 2 links and 3 joints. It is mounted on the center of a table or the platform on which it is supposed to deal with the objects. The end point of the second link has an electromagnet and all objects are magnetically attractive.

The range of the arm is the total length of the two links. The length of each link can be designed as per requirement. It can be of equal or different lengths. The arm has 3 degrees of freedom. Each joint has a dc geared motor for the link movement.

B. Electronics

The robot electronics consists of a PIC microcontroller, PC with LABView installed in it, motor driving unit, accelerometer at the tip of the arm and a power supply.

The LABView panel consists of two switches for selection of picking and placing. And it also consists of 4 knobs for selecting the X and Y coordinates of picking and placing respectively. The position graph shows the position of the robotic arm at each point, and this helps in tracking the arm position. This is done with the help of accelerometer.

The accelerometer is placed at the tip of the arm and the corresponding X and Y coordinates are fed back to the PC using the same RS232 cable.

The motors used are dc geared motors with appropriate torque and rpm. Solenoid type relay is used as the motor drive unit.

A lead acid battery is used as power source for the entire system.

III. MATHEMATICAL MODELING

A. Inverse Kinematics

O is the point to be reached. ‘c’ and ‘a’ are lengths of first and second link respectively.

From figure1 and figure3;

\[ \theta_1 = \theta \]

\[ \theta_2 = A \]

\[ \theta_3 = B \]

By Pythagoras theorem,

295
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\[ b^2 = x^2 + y^2 + z^2 \]  (1)

\[ \theta = \tan^{-1}(y/x) \]  (2)

\[ \phi = \tan^{-1}(z/ x^2+y^2) \]  (3)

We know that area of a triangle is given by;

\[ \text{Area} = (s(s-a)(s-b)(s-c))^{1/2} \]  (4)

Where, \( s = (a+b+c)/2 \)  (5)

Here, c and a are arm length of link one and two respectively.

We also know that the area of a triangle is given by;

\[ \text{Area} = \frac{1}{2} \times \text{base} \times \text{altitude} \]  (6)

From figure (2);

\[ \text{Area} = \frac{1}{2} \times b \times h \]  (7)

But \( h = c \times \sin A \)  (8)

Now, by substituting (8) in (7), we get;

\[ \text{Area} = \frac{1}{2} \times b \times c \times \sin A \]  (9)

As we know values of a, b and c, the area is calculated as per equations (4) and (5)

Hence, from equation (9);

\[ \sin A = \frac{2 \times \text{Area}}{(b \times c)} \]

Or

\[ A = \sin^{-1} \left( \frac{2 \times \text{Area}}{(b \times c)} \right) \]  (10)

Similarly,

\[ B = \sin^{-1} \left( \frac{2 \times \text{Area}}{(a \times c)} \right) \]  (11)

---

**B. Kinematics**

From figure (2),

X coordinates are decided by the arm lengths c, a, angles \( A, C, \theta, \phi \).

As the effective length decreases with increase in angles, A and C, it has a cosine relationship with the x coordinate.

The effective length decreases with increase in the values of \( \theta \) and \( \phi \).

Hence, the x coordinate can be written as;

\[ X = (c \cos A + a \cos C) \cos \theta \cos \phi \]

Similarly,

Y coordinates are decided by the arm lengths c, a, angles \( A, C, \theta, \phi \).

As the effective length increases with increase in angles, A and C, it has a sine relationship with the y coordinate.

The effective length decreases with increase in the values of \( \theta \) and \( \phi \).

Hence, the y coordinate can be written as;

\[ Y = (c \cos A + a \cos C) \sin \theta \cos \phi \]

Similarly,
Z coordinates are decided by the arm lengths c, a, angles A, C, θ, Ø.
As the effective length increases with increase in angles, A and C, it has a sine relationship with the z coordinate.
The effective length increases with increase in the value of Ø.
There is no relation for z with respect to θ.
Hence, the z coordinate can be written as;
\[ Z = (c\sin A + a\sin C) \sin \theta \cos \phi \]
Hence the kinematic equations for the robotic arm are;
\[ X = (c\cos A + a\cos C) \cos \theta \cos \phi \]
\[ Y = (c\cos A + a\cos C) \sin \theta \cos \phi \]
\[ Z = (c\sin A + a\sin C) \sin \phi \]

Matrix Transformation;
\[
\begin{bmatrix}
\cos \phi \cos \theta & \cos \phi \sin \theta & 0 \\
\sin \phi \cos \theta & \sin \phi \sin \theta & 0 \\
0 & 0 & 1
\end{bmatrix}
\begin{bmatrix}
c \cos A + a \cos C \\
(c \cos A + a \cos C) \sin \theta \\
(c \sin A + a \sin C)
\end{bmatrix}
= \begin{bmatrix} X \\ Y \\ Z \end{bmatrix}
\]

C. Motor Rotation

From equations (2), (9) and (10), the values of θ, A and B are obtained.

Ø is the angle of rotation for the base motor. A is the angle of rotation for the motor connecting the first link and B is the angle of rotation for the motor connecting the second link.

Here, we consider that all motors are of 10rpm. And hence, all the motors cover 60° in one second.
To improve accuracy, the motor is turned on only for 1ms in one loop in the program.

Hence the motor covers an angle of 0.06° in one on loop.

Once the angles are calculated by using the inverse kinematics, the PIC microcontroller decides the number of on loops to be executed for each motor.

For example, if the angle to be covered by the base motor is 24°, then the PIC microcontroller will execute the on loop 400 times.

D. Transformation from initial to final point

Once the robot gets the coordinate values, it computes the angles using the inverse kinematics and proper rotations are made by the motors. These angle values are stored in eeprom of the controller.

When the next coordinates are obtained, again the robot calculates the angles, but this time it looks back to the values stored in eeprom and compares it with the newly computed angle values. Then the robot rotates the motors in such a way that the new angles are achieved. And the newly computed angles are overwritten on the previously stored values.

For example;

If the robot has rotated the motors in the following sequence;
A with 15°
B with 20°
Ø with 10°
Ø with 25°
And if the newly calculated angles are
A with 17°
B with 19°
Ø with 10°
Ø with 27°
Then the robot will make the following rotations;
A with 2° positive rotation
B with 1° negative rotation
Ø with 0°
Ø with 2° positive rotation
Thus transformation is done from initial point to the final point.

IV. SOFTWARE

Onboard software is mainly developed with micro C. This software interfaces between the PC and the robot by receiving interrupts through RS232, to control all robot functions. Simulations have been executed in PIC simulator. The LABView panel was developed using the LABView software. It is designed in such a manner to send the command signals and receive the coordinate details from accelerometer through RS232.
Figure 3: LABView Panel

V. SAMPLE WORKING

If we have an object at a coordinate (1, 5), and we have to move it to a coordinate (3, -6), we first press the pick button in the LABView panel and then adjust the X and Y values to 1 and 5 using the knobs. Then we press the place button and adjust the X and Y values to 3 and -6 using the knobs. These data are taken by the PIC microcontroller through serial communicator.

Now using the equations (2), (10) and (11), the controller calculates the values of θ, A and B respectively. These values are stored in separate variables and then the number of on loops to be executed are calculated and executed one by one.

When all the motors are rotated accordingly, the tip of the second link is magnetized and this helps in holding the magnetically attractive object. Once the destination coordinate is reached, the tip is demagnetized to place the object.

The output of the accelerometer is fed to the PC and thus the position of the arm can be viewed in the LABView panel.

VI. CONCLUSION

LABView controlled robotic arm was successfully designed. The robotic arm was found to be user friendly and the integration of accelerometer was much helpful in attaining the feedback regarding the position of the arm.

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Design of a Humanoid Robot using High Speed Internet for Communication

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Abstract- This paper focuses on the design of a 30 DOF self securable humanoid robot using high speed internet for communication. The robot consists of hip, neck, shoulder, elbow, wrist and finger joints. The robot secures itself from hacking and power problems. The robot is controlled by a combination of a human master and a local master connected to a sensor fusion unit.

Index Terms- Humanoid, DOF, High speed internet, hacking, sensor fusion unit.

I. INTRODUCTION

Robot is a machine to execute different task repeatedly with high precision. Thereby many functions like collecting information and studies about the hazardous sites which is too risky to send human inside. Robots are used to reduce the human interference nearly 50 percent. Robots are used in different types like fire fighting robot, metal detecting robot, etc. Humanoids are robots which resembles human joints. Humanoids are nowadays used in industrial purpose, military, research etc. This paper focuses on designing a 30 DOF humanoid robot. The software is schemed in such a way that the humanoid can secure itself from hacking and power problems. The robot is controlled by a human master and a local master controller which is connected to a sensor fusion network.

II. HARDWARE CONCEPT

A. Mechanical Part

The humanoid consists of a hip, neck, shoulder, elbow, wrist and finger joints. The humanoid has 30 degrees of freedom.

The humanoid has a platform on which it is mounted. The platform helps the humanoid to move around in a plane surface. The platform consists of four wheels each of which is connected to dc geared motors. The hip joint of the humanoid has one degree of freedom and allows the upper body of the humanoid to rotate in horizontal direction. The neck joint helps to rotate the head in horizontal direction. A web camera is mounted in the eyes of the humanoid.

The humanoid has shoulder, elbow, wrist and finger joints on both hands. The shoulder has 2 DOF, elbow has 3DOF, wrist has 4 DOF and the finger unit has 5 DOF. All these together makes 30 DOF humanoid.
There are 14 motors with 10 rpm each including the four in the platform which are connected to the wheels.

**Neck motor:**
The motor is placed at neck which will make the head rotate in the horizontal plane.  
Weight of the head including the web camera is 0.5 Kg.  
The distance from the shaft of the motor is 25 cm.  
Hence torque required to make proper movement is \(0.5 \times 6 = 3\) Kgcm  
Required power = \(2\pi N T / 60\)  
= 3.12 Watts  
Where \(N\) is rpm of the motor and \(T\) is torque

**Hip motor:**
The motor is placed at hip which will make the upper body rotate in the horizontal plane.  
Weight of the upper body is 5.5 Kg.  
The distance from the shaft of the motor is 30 cm.  
Hence torque required to make proper movement is \(5.5 \times 30 = 165\) Kgcm  
The required torque is 50% of the calculated torque due to the symmetry of the upper body.  
Hence actual torque = 82.5 Kgcm.  
Required power = \(2\pi N T / 60\)  
= 85.8 Watts

**Shoulder motor:**
The motor is placed at the shoulder which will make the hand rotate in the vertical plane.  
Weight of the hand is 1.5 Kg.  
The distance from the shaft of the motor is 70 cm.  
Hence torque required to make proper movement is \(1.5 \times 70 = 105\) Kgcm  
The required torque is 50% of the calculated torque as one of the end is hinged which supports the rotation.  
Hence actual torque = 52.5 Kgcm.  
Required power = \(2\pi N T / 60\)  
= 54.95 Watts

**Elbow motor:**
The motor is placed at elbow which will make the arm rotate in the horizontal plane.  
Weight of the arm is 0.6 Kg.  
The distance from the shaft of the motor is 20 cm.  
Hence torque required to make proper movement is \(0.6 \times 20 = 12\) Kgcm  
The required torque is 50% of the calculated torque as one of the end is hinged which supports the rotation.  
Hence actual torque = 6 Kgcm.  
Required power = \(2\pi N T / 60\)  
= 6.24 Watts

**Wrist motor:**
The motor is placed at the wrist which will make the palm yoke.  
Weight of the palm is 0.3 Kg.  
The distance from the shaft of the motor is 20 cm.  
Hence torque required to make proper movement is \(0.3 \times 20 = 6\) Kgcm  
Required power = \(2\pi N T / 60\)  
= 6.24 Watts

**Finger motor:**
The motor is placed at the finger which will make the finger grasp.
Weight of the finger unit is 0.05Kg.
The distance from the shaft of the motor is 10 cm.
Hence torque required to make proper movement is
\[0.05 \times 10 = 0.5 \text{ Kgm}\]
Required power = \(2\times\pi\times N\times T/60\)
\[= 0.52 \text{ Watts}.\]

Wheels motor:
The motors are coupled to the wheels of the platform for free movement in a plane surface.
The weight of the body is equally distributed to four wheels. Thus each wheel will bear a load of 10Kg.
Distance of the wheel from axis of the motor = 2cm.
Hence torque required for 1 wheel is 10*2 = 20Kgcm.
Required power = \(2\times\pi\times N\times T/60\)
\[= 20.8 \text{ Watts}\]

III. ELECTRONICS

The platform is designed to fit a laptop, sensors, and four 12V 7aH lead acid batteries. The platform also contains the electronics hardware including a relay based circuit for driving the dc geared motors, a pic microcontroller circuits, and ultrasonic sensors.

The task to be executed is given as voice commands [14] by the human master at the client pc. A serial code is generated for each word and is transmitted to the laptop on the robot platform. For generating, transmitting and receiving the code software’s known as Roboclient and Roboserver is used. Both these software’s are developed in Microsoft Visual Studio. The client pc and the server laptop is connected to internet using high speed 3G network. The serial code is transmitted from the laptop to the microcontroller circuit by a RS-232 cable. When the microcontroller receives this signal, it checks for the environmental conditions using the ultrasonic sensors. The environmental condition, here, refers to any obstacle for the task execution. Now if there are no obstacles, then, the robot executes the task. But if there is any obstacle, it sends the human master a serial code indicating its problem and waits for further instruction from human master. The human master can view the area under survey with the help of the camera mounted on the robot platform. This is made possible by using the Gmail video chat or the Skype software.

The robot platform also contains a battery monitoring circuit. If this circuit identifies a power crisis, then, the circuit switches to the next power source. The number of power sources can be fixed according to the need and availability. If the last battery is switched, then, the robot closes all its applications and comes back to the source point by using the data in the eeprom. The robot also returns to the source point if it identifies a security issue in the communication link.

Identification of a security issue in communication link
The client pc and the server laptop continuously exchange a serial code. If the pic microcontroller does not receive this code in a specified delay, it comes to a conclusion that the communication link is lost or hacked. In that case, the robot closes all its communication links and other activities and returns back to the source point. By using the data stored in eeprom.

Returning of robot to the source point using the data in eeprom
The robot stores all the movement codes in the internal eeprom of the pic microcontroller. The first location contains the movement code and the next location contains the time delay for the code. This continues for all the movement codes. When the robot faces a security or power problem, the robot executes the data in eeprom in last in first out method. The controller swaps the forward and backward instructions. That is if there is a forward movement in the eeprom location, the robot moves backward and vice versa. The rest of the instructions remain the same. This helps robot from protecting itself from exploitation from unauthorized access.

A. Visual sensor
This part is the place to install sensors which are used for searching vital sign of the victims like camera [11]. The camera can be made to continuously rotate as per the command from human master. The visuals obtained by the camera are transmitted through the Gmail video chat or the Skype software.

B. Monitoring and navigation of robot
The robot is monitored using the camera in the robot platform. The robot uses ultrasonic sensors for identifying any obstacle in the path of its motion. The sensors are connected to the controller circuit for making appropriate decision. When the robot navigates automatically, it uses the data in eeprom. For the patrol robot navigation several methods are used like sensing the paths, graphical user interface, map following algorithms and compass, other Kalman filtering methods[6][5][7][8][9]. All
these approaches are somehow complex. This can be overcome by using the EEPROM of the microcontroller. PIC16F877A has 256 bytes of EEPROM inside it. So memory can use it to store data that need on a permanent basis and we can read it back from it. There are two functions to accomplish the task. Eeprom_Read and Eeprom_Write.

Eeprom_Read function returns an integer and takes a parameter of the address from which the data has to be fetched. Eeprom_Write takes two parameters the first one is the address and the second one is the data.

```c
unsigned short Eeprom_Read(unsigned int address);

void Eeprom_Write(unsigned int address, unsigned short data);
```

Most of the robot will navigate with different algorithm.[10][11][12][13] The robot will navigate with respect to the commands from the user (initially from A to B) as shown in fig.7. All the running commands are stored in the memory and also a counter is set to determine how long the commands are executed. Now the current position of the robot is at B. Whenever it needs to return, the last stored command will execute first (LIFO). If the last executed command is forward, that swaps it into backward command.

Similarly,

```
Backward  ≈  Forward
```

![Figure 4: Path Schematic](image)

IV. SOFTWARE

Onboard software is mainly developed with micro C. This software interfaces between the operator station software and the robot by receiving operator’s command to control all robot functions. Simulations have been executed both in Mat lab and PIC simulator. In Mat lab the approaches were implemented under ideal hypothesis, more realistic settings. The commands are send through serial communication with the help of the software Roboclient developed in Microsoft Visual studio. The data is received using the software Roboserver developed in Microsoft Visual studio. Real time visuals can be captured and displayed on the window with the help of Gmail video chat or Skype software.

V. SAMPLE WORKING

The required action is commanded by the human master as a specific word which is picked by the microphone and converted to a code alphabet by the client PC using Roboclient software. This alphabet is transmitted to the server laptop at the robot platform through high speed internet. At the reception end the alphabet is transmitted to the master controller from the server laptop through RS-232 cable. Now the master controller controls the slaves according to the program for the particular alphabet. For example, when a command ‘move’ is said by the human master, a code alphabet ‘m’ is transmitted and the microcontroller on receiving this ‘m’, executes the internal loop program and waits for the next instruction.

VI. CONCLUSION

The 30 DOF humanoid robots were designed successfully and were found to have advantages of unbounded control with the use of high speed internet. The humanoid also has the advantage of self securing ability.

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EVALUATION OF PEROXIDASES FROM VARIOUS PLANT SOURCES

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Abstract—Wide applications of peroxidase in different areas of clinical biochemistry, biotechnology, food industry etc. enhances the interest for further study on the enzyme. The distribution of peroxidase activity and the kinetic parameters of three plant species [(Nicotiana tabaccum, Brassica oleracea capitata var. albaL. and Raphanus sativus (mooli in India, winter varieties)] were evaluated. To describe the rate of hydrogen peroxide decomposition for all the three plant peroxidases a first order kinetic expression with respect to both the substrate and the enzyme was used. Based on their linear regression analysis (Lineweaver-Burk plot) over the substrate concentration rang of 0.05 x 10⁻⁷M to 0.5 x 10⁻⁷M the \( K_m \) and \( V_{max} \) of the three plant peroxidases (for \( \text{H}_2\text{O}_2 \) in presence of O-dianisidine) were: 0.250 mM and 9.09 uM min⁻¹ (tobacco peroxidase), 0.370 mM and 11.11 uM min⁻¹ (cabbage peroxidase) and 0.277 mM and 10.02 uM min⁻¹ (radish peroxidase) respectively. Kinetic studies revealed that Tobacco peroxidase (source- N. tabaccum) had lower apparent \( K_m \) values and it has more peroxidase than the other two plant peroxidases examined. The highest specific activity was recorded for cabbage peroxidases [in B. oleracea capitata var. albaL. (1.677±0.12)]. Optimum pH and temperature for all the three plant peroxidases were also determined. B. oleracea capitata var. albaL. had shown high thermal stability. These peroxidases may prove as a highly promising enzyme for practical application in biotechnological field.

Index Terms— Peroxidases, Cabbage, \( K_m \), pH, Thermo stability

I. INTRODUCTION

Peroxidase (E.C. 1.11.1.7) are widely distributed in nature and are found in plants, micro-organisms and animals, where they catalyze the reduction of hydrogen peroxide (\( \text{H}_2\text{O}_2 \)) to water, rendering it harmless. \( \text{H}_2\text{O}_2 \) is a common end product of oxidative metabolism, and being a strong oxidizing agent, could prove toxic if allowed to accumulate. Thus, peroxidases serve to rid plant cells of excess \( \text{H}_2\text{O}_2 \) under normal and stress conditions (Laloue et al., 1997). Peroxidases are found mainly as haemoproteins and use hydrogen peroxide as the oxidizing substrate, although other more unusual peroxidases have been shown recently to contain either metal ions, such as selenium and vanadium, or a flavin prosthetic group. From the reviews of literature it was found that variety of electron donors were used, including aromatic amines, phenols and enedioles like ascorbic acid to detect peroxidase activity in plant extract. In this experiment a dye like o-dianisidine was used as electron donor to detect peroxidase because it gives stable colored oxidized product and shows high sensitivity for the reaction. On the basis of sequence similarity peroxidases were categorized into two super families: the mammalian peroxidase superfamily and the plant peroxidase superfamily (Dunford 1999, Welinder 1992). But di-heme cytochrome C peroxidase (Fulop et al., 1995) or chloroperoxidase (Sundaramoorthy et al., 1995) was excluded from these two superfamilies. They are typically named after either their sources, e.g. Horseradish peroxidase (HRP) and Soybean peroxidase (SBP) or their substrates, such as Lignine peroxidase (LiP) and cytochrome C peroxidase (CcP). Present study was done on three plant peroxidases namely- cabbage peroxidase, radish peroxidase and tobacco peroxidase (named after their sources).

Peroxidases are versatile biocatalyst with an ever increasing number of applications (Colonn et al., 1999, May 1999, Veitch and Smith 2001). Roots of horseradish serves at present as the major source of commercially available peroxidase, however, the researchers still investigate for new peroxidases of elevated stability and properties suitable for different biotechnological, biomedical and other application, eg. spring cabbage peroxidase was suggested as a potential tool in biocatalysis and bioelectrocatalysis (Anna et al., 2007). Naturally thermostable peroxidase have been described and include Soybean peroxidase (Mc Eldoon and Dordick, 1996), peroxidase from leaves of royal palm tree (Sakharov et al., 2001), spring cabbage peroxidase (Anna et al., 2007). Chinidase and peroxidase which were isolated from soybean were considered to be involved in defense of plant against pathogens (Staehelin et al., 1992). Being the most heat resistant enzyme, it is used in food industry as an index of blanching procedures (Reed, 1975). There is an empirical relationship between residual peroxidase activity and the development of flavors and odours in food (Burnette, 1977).

Davis (1942) reported that the greatest peroxidase activity was in the inner seed coat in citrus fruits. With advances in spectral techniques and protein purification methods, Chance (1951) showed the existence of the peroxidase-hydrogen peroxide complexes, compound I and compound II. These are important intermediates formed between peroxidase and the oxidant in peroxidase-catalyzed reactions (Chance, 1952). Peroxidases have been identified on the root surface of many plant species (Mueller and Beckman, 1978; Smith and O'Brien, 1979; Zaar, 1979; Albert et al., 1986). Peroxidases have got several biomedical applications too, eg. HRP is used in a large variety of analytical and diagnostic systems which are very important in the clinical laboratory. There have been numerous reports on

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peroxidase activity in plants. Peroxidase activity has been shown in several species of plant [Padmarajaiah et al., 2009]. Thus, there is a continual search for novel peroxidases for various applications. Although relevant reviews on peroxidase activity in plants are available broad effort for their characterization are very limited. The main objective of this study was to compare the peroxidase activity and kinetic parameters of three widely available angiospermic plant species [(Nicotiana tabaccum, Brassica oleracea capitata var. albaL. and Raphanus sativus (mooli in India, winter varieties)]. As these enzymes are poorly studied compared to widely used, but less thermostable, horseradish peroxidase and thus relatively little is known about the kinetic properties of these plant peroxidases. So, this study seeks to find novel plant peroxidases these three different plant sources. We had compared their kinetic properties (Km and Vmax) and their specific enzyme activities. As these plants are abundant (easily cultivable) so with the advance in purification method they may prove as very cheap enzymatic source.

II. MATERIAL AND METHOD

An ultraviolet-visible spectrophotometer with 1 cm. quarts cell was used for all measurement. A water bath shaker was used to maintain a constant temperature for color development. All the pH measurement and adjustments were done with digital pH meter.

Reagents:
All chemical used in the assay were analytical grade obtained from commercial source. H2O2 (30%), BSA and o-dianisidine was purchased from E. Merk Ltd. (Mumbai, India). Double distilled water was used throughout the experiment. A (20mM) H2O2 stock solution was prepared daily and standardized by potassium permanganate method. Working standard solutions were prepared from the stock solution by dilution.

Plant Material Collection and Preparation of Extract:
As a source of peroxidase leaf portion (cabbage head) of B. oleraceae and N. tabaccum and root of R. sativus were collected from local agricultural field [Kamrup district, Assam (North East India)] and carried at 4°C to the laboratory and stored at -20°C until used. Samples (2g) were washed with distilled water and homogenized in a blender using 10ml of 0.1M phosphate buffer of pH 6.0. The extract was passed through cheesecloth, centrifuged at 12000g for 30 minutes and the supernatant was labeled as crude extract. The extract was heated at 65°C for three minutes to inactivate any catalase present in extract (Rehman et al. 1999). Different dilutions of the crude enzyme were examined for peroxidase activity assay.

III. PROTEIN ESTIMATION

Total protein concentration was determined in triplicate by the method of Lowry et al. (1951) using bovine serum albumin as a standard.

Assay of Peroxidase (POX) Activity:

Assay of peroxidase was carried out according to the method of Malik and Sing with certain modifications. To 2ml of phosphate buffer (pH 6.0/7.0) 100ul of plant extract and 1ml of o-dianisidine solution were added. The reaction was initiated by adding 100ul of 0.2 x 10⁻³M H2O2 and the absorbance was read at (460 nm) every 30 second interval up to 5 minutes. The peroxidase activity was calculated using extinction co-efficient of o-dianisidine and the enzyme activity was expressed as unit per mg of protein.

IV. EFFECT OF PH AND TEMPERATURE ON ENZYME ACTIVITY

The effect of temperature on peroxidase activity was determined by incubating the reaction mixture at different temperatures (in hot water bath) including 10, 20, 30, 40, 50, 60, and 70°C for 5 minutes. The pH optima of the three peroxidases were determined using acetate buffer (pH 4.0-5.0) and potassium phosphate buffer (pH 6.0-8.0) in the range from 0.4-0.7. All the peroxidase activities were assayed under standard conditions (Sakharov et al. 2002; Koksal and Gulcin 2008 a, b; Singh et al. 2010) and percent relative activities were calculated. Percent relative activity is described in terms of the change of absorbance per minute or per second amount of sample added to the extract or to the mixture.

\[
\% \text{ relative activity} = \frac{[100 \times \text{Sample (Treated) OD}]}{[\text{Control (Untreated) OD}]}
\]

Thermo stability of these enzymes was determined by incubating them for 30 minutes, one day and ten days at specific temperatures (of 20, 30, 40, 50 and 60°C).

V. KINETIC STUDIES

Enzyme kinetic studies were performed in ten samples, employing a range of substrate concentration (0.05 x 10⁻³M to 0.5 x 10⁻³M) with constant enzyme level in a final volume of 3 ml. All reactions were carried out at a fix (optimum) pH and temperature i.e. pH 6.0 and 50°C for cabbage peroxidase, pH 6.0 and 40°C for radish peroxidase and pH 7.0 and 40°C for tobacco peroxidase respectively. Controls in which distilled water replaced the enzyme for each substrate concentration were run in parallel and marked as blank. All the reaction mixtures were monitored at a wavelength of 460 nm (showed highest absorbance). The apparent Km and Vmax were determined from the Lineweaver-Burk plot 1/V versus 1/S (Lineweaver and Burk 1934) by following the optimum pH and temperature conditions.

VI. STATISTICAL ANALYSIS

For all the experiments three plant samples were analyzed and all the assays were carried out ten times. The results were expressed as mean ± standard deviation.

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VII. RESULT AND DISCUSSION

One important factor in the preparation of peroxidase from the plant is the tissue to buffer (t/b) ratio. In this study (t/b) ratio from 1:2 to 1:151 g ml⁻¹ were examined and a suitable result was obtained at 1:10 g ml⁻¹ ratio. Common feature of all the three plant peroxidases were their optimum pH and temperature (in the range of 6.0 to 7.0 and 40-50°C respectively). The optimum pH of cabbage peroxidase and radish s found to be 6.0 but for the tobacco peroxidase the optimum pH was found to be 7.0 (fig: 1).

Fig 1: Effect of pH on peroxidase (POX) activities of the three plant peroxidases.

The optimum temperature for cabbage peroxidase was found to be 50 °C, though its activity remains almost constant in the temperature range of 40 °C to 50 °C (Fig: 2). It showed remarkable decreases in its activity at the temperature range of 70-80 °C. Cabbage peroxidase had also shown highest thermostability on incubation at different temperature (20 °C to 60 °C) for thirty minutes, one day and ten days.

Fig 2: Effect of temperature on peroxidase (POX) activities of the three plant peroxidases.

Fig. 3. Lineweaver-Burk Plot for Tobacco peroxidase (N. tabaccum) where [S] represents substrate concentration of H₂O₂ (0.05 x 10⁻⁷M to 0.5 x 10⁻⁷M) and V₀ represents initial reaction velocity of tobacco peroxidase. Inset: Michaelis-Menten plot for Tobacco peroxidase.

Fig. 4. Lineweaver-Burk Plot for Radish peroxidase (R. sativus) where [S] represents substrate concentration of H₂O₂ (0.05 x 10⁻⁷M to 0.5 x 10⁻⁷M) and V₀ represents initial reaction velocity of Radish peroxidase. Inset: Michaelis-Menten plot for Radish Peroxidase.
All the three peroxidases showed first order reaction kinetics for H₂O₂ with o-dianisidine. The \( K_m \) and \( V_{max} \) values were calculated for peroxidase reaction with the substrate using Lineweaver-Burk plot transformation of Michalis-Menten equation. Respective values of their \( K_m \) and \( V_{max} \) evaluated from double reciprocal plot of substrate concentration versus enzyme activity were: 0.250 mM and 9.09 uM min⁻¹ (for tobacco peroxidase, Fig: 3), 0.370 mM and 11.11 uM min⁻¹ (for cabbage peroxidase, Fig: 5) and 0.277 mM and 10.02 uM min⁻¹ (for radish peroxidase Fig: 4) respectively. High R² values (very close to 1) were observed for Lineweaver-Burk plots of all the three plant peroxidases, proving the greater fit of the data to the line. From the Lineweaver Burk plot it was found that both \( N. \) tabacum and \( R. \) sativus shares almost similar kinetic properties. \( N. \) tabacum had lower apparent Km value (Table I). \( N. \) tabacum had also showed the lowest specific activity values (Table I), whereas \( B. \) oleracea capitata var. albaL. showed the highest specific activity and very high thermostability. Because of these significant characteristics \( B. \) oleracea capitata var. albaL. may prove as a potential peroxidase source for biotechnological application. So, with the advance in purification method these plant peroxidases may proof as potential enzymatic source.

**Table I: Determination of kinetic constant and peroxidase (POX) activity in plant extract.**

<table>
<thead>
<tr>
<th>Source</th>
<th>( K_m ) (mM)</th>
<th>( V_{max} ) (uM min⁻¹)</th>
<th>Peroxidase activity (Unit/mg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nicotiana tabacum</td>
<td>0.250</td>
<td>9.09</td>
<td>0.9862 x 0.016</td>
</tr>
<tr>
<td>Brassica oleracea capitata var. albaL</td>
<td>0.370</td>
<td>11.11</td>
<td>1.6771 x 0.12</td>
</tr>
<tr>
<td>Raphanus sativus (moists in India, winter varieties)</td>
<td>0.277</td>
<td>10.02</td>
<td>0.8761 x 0.017</td>
</tr>
</tbody>
</table>

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PORTAL APPROACHES FOR DIGITAL LIBRARY OF INDIAN UNIVERSITIES

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Abstract- One approach is to design multi tired architectures that include an integration layer providing programme level services for user level applications such as a portal. Web portals are seen as positive potential frameworks for achieving order out of chaos. The library portal is one approach to organize information resources and services in a way that supports the users’ needs. However, the library portal will not be the only starting point for access to the library. [1] The future of library websites in fact lies in integration of different effective information management and need based service modules.

Web portals are seen as positive potential frameworks for achieving order out of chaos. As portals become a primary means for transacting information and commerce, libraries of all types are becoming involved in thinking, planning and building various frameworks and services that they call portals. A web portal or public portal refers to a web site or service that offers a broad array of resources and services such as e-mail, forums, search engines, and online shopping malls. The first web portal were online services, such as AOL, that provided access to the web, but by now most of the traditional search engines have transformed themselves into web portal to attract and keep a large audience. Web services allow organizations to communicate data without intimate knowledge of each other’s IT systems behind the firewall unlike traditional client/servers models, such as a web server/web pages system, web services do not provide user with a GUI.[4] Web services instead share business logic, data and processes through a programmatic interface across a network. The application interface, not the users Developers can then add the web services to a GUI to offer specific functionality to users.

Index Terms- Digital library, web portals, Indian universities, portal approaches, metadata, indexing

I. INTRODUCTION

Portal are transformational tools that address the problem of information glut by customizing information content to meet specific end-user needs. The Web environment is growing in its importance as the preferred way of organizing and using information and for organizing work environments. [2] Rapid advances in information technology point to the Web as the main framework for organizing information for work, research and e-commerce. The Web is rapidly becoming the preferred venue for information, financial Transactions, document management and more, with the development of the World Wide Web, the “information search” has grown to be a significant business sector of a global, competitive and commercial market. Powerful players have entered this market, such as commercial internet search engines, information portals, multinational publishers and online content integrators. Will Google, Yahoo or Microsoft be the only portals to global knowledge in 2012? If libraries do not want to become marginalized in a key area of their traditional services, they need to acknowledge the challenges that come with the globalization of scholarly information, the existence and further growth of the academic internet. Today managing library automation is now far more complex than the traditional maintenance of an integrated system. For instance, considering a standalone product, librarians should ask themselves and their vendors how this new product fits with existing efforts toward functional integration. Does the electronic resources management system know about the print journals? If considering a database portal, determine if it will use catalogued electronic resources. [6] For digital access management systems, what can they accomplish that the cataloguing module cannot? If assessing a Meta search tool, find out if it can leverage the valuable features available from the various database providers. If these resources are registered by a digital library at all, then they are in the form of separate lists of links or databases, but are not integrated into local digital library portals. [8]

The future of library websites lies in integration of different information management and services modules. Maintaining standalone modules with loosely integrated or moderately interoperable functions is too expensive for libraries. This is why libraries sought integrated systems in the first place. XML, web services, Open URL, OAI-PMH, and the rapid development and approval of new standards are the true hope for the libraries. Perhaps we’ll come to call them interoperable library systems, or even integrated library services. Web services allow different applications from different sources to communicate with each other without time consuming custom coding, and because all communication is in XML, web services are not tied to any one operating system or programming language. For example, java can talk with Perl, windows applications can talk with UNIX applications. Web services do not require the use of browsers or HTML. [4] Web services are sometimes called application services. An enterprise portal is web-based inter face for users of enterprise applications. Enterprise portals also provide access to enterprise information such as corporate databases, web
Internet search engines, in contrast, have generally relied upon the automatic indexing of HTML text, as opposed to the creation of metadata, and upon the automatic harvesting of Web sites, rather than on the active contributions from data providers. Consequently, these services scale in a way that traditional library approaches do not, and they allow for the creation of massive indexes that dwarf the largest library union catalog. However, Internet search engines cover academic and scholarly materials poorly, burying them in quantities of less reliable resources provided by the commercial sector or by unknown and un-credentialed individuals and organizations. Further, the search engines cover only a portion of "Web space", and frequently favor retrieval of resources based on their own business considerations rather than on the needs of searchers. They are susceptible to page-jacking, index spamming, and other dubious practices. Moreover, an enormous percentage of scholarly materials, from digitized slides to survey data, are not described by static Web pages but rather in myriad databases, consequently, such materials are largely invisible to the search engines. A recent and promising approach attempts to combine the best of library and Internet techniques into a wholly new model for accessing scholarly resources. Ongoing commitment by the principals of the Open Archive Initiative will produce a refinement of the conventions and test bed implementations of this model. This model would apply to a wider range of digital resources of academic and scholarly interest. In addition to e-prints and electronic texts, such resources include science and social science data sets, visual materials, archival collections, geographic information system (GIS) data, sound and music, video, and any other type of resource for which metadata is typically created. The development of both inclusive and specialized search services is possible; in fact, the model encourages the development of many search services competing in terms of functionality, audience, and business models, thereby enriching the entire research environment.

A portal to digital Library of India, Many universities, archives, historical societies, cultural institutions, and other organizations are creating Web-accessible collections of India, often with grant funds. Currently, these materials remain largely invisible to educators and scholars. A service focusing on harvested metadata for India might combine access to archival visual and textual collections. A portal to Environmental information is collected by hundreds of international, federal, state, and private agencies, and described using dozens of metadata formats. This information is used intensively by government and university researchers, despite the difficulty of finding data scattered among such a vast number of sites. A portal built upon harvested metadata could combine access to land, air, and space data from key government agencies with access to white papers, treaties, policy documents, journals, newsletters, and other relevant sources of environmental information. An even more ambitious service might combine search access to environmental information with geographic information resources such as those indexed by the Illinois Natural Resources Geospatial Data Clearinghouse. The academic engine despite the availability of library catalogs, online journal search services, and departmental databases, many university students and researchers turn first to the major commercial Internet search engines for resource discovery. A comprehensive Internet search service oriented toward academic and research resources would be a more productive alternative. Such a service might include all the information covered in more specialized portals[1] (e.g., digital library of India, IISc, GIS), as well as metadata from academic catalogs and databases, Web pages in the ".edu" domain, and commercial resources aimed at the research community. It may not be a huge undertaking to move this vision to reality. The next steps are to formalize the framework, to establish mechanisms to encourage research collections to make their metadata available, and to encourage service providers to build useful tools based upon the harvesting of this metadata. The following areas must be addressed: extending the general framework to encompass tools, business models, and project coordination; formalizing the governance structures for maintaining, documenting, and promoting the technical framework; creating a registry of high-quality research sites with harvestable metadata; and defining a set of demonstration projects to build and test a few catalogs, portals, and other services of interest to the research community to test the validity of the model.

Recent statements from the library community have urged research libraries to step up to the creation of a scholarly information commons—a networked space where users readily and seamlessly traverse the collected wealth of our disparate educational and cultural collections. A workable model for research metadata harvesting may provide the infrastructure needed for approaching this task.

Fig1: Adaptability architecture

The importance of subject gateways - and portals as they develop - to the hybrid library will be readily apparent from the underlying commitment to collation of quality assured web resources. In their relatively Short existence the gateways have done much to raise the profile of the importance of quality assurance with respect to web resources in higher education, as well as fulfilling their fundamental role of easily accessible navigational aids to such resources, arranged by subject. [8]
A general definition of a portal is “a Web site or service that offers a broad array of resources and services, such as e-mail, forums, search engines, and on-line shopping malls”. A variant is the vertical portal, or vortal, that typically provides news, research and statistics, discussions, newsletters, online tools, and many other services relating to a specific industry. This is nearer to the role in the development of the Resource Discovery Network, where a portal means a subject gateway that incorporates information from commercial sources, academic publishers and specialized databases, as well as current news and research. There is a consistency of approach that extends across different classes and formats, to include multimedia materials, directories, web pages, full-text databases, metadata and bibliographic records. Libraries are rapidly changing and expanding to web-based delivery of content and related access services in order to conform to the changing information seeking methods and expectations of their users. Developing an understanding of changing user demands and the basic building blocks of a new architecture will be a challenge in our current library environment. Presently our current technical systems are organized around data (e.g. the catalogue, vendor-based indexes and publishers) or services (e.g. interlibrary-loan, circulation and reference).

Need for the portal approach: Web-based access to services has evolved as a thin layer over library technical infrastructures that were designed to support traditional library services; Web-savvy users who are not familiar with traditional library organization methods do not view our websites as transparent or able to meet their information-seeking requirements. The common task of finding an article provides a useful example of the special knowledge of library organization and practices that is required to navigate a library website. The process begins with selecting a resource to search. Developing an understanding of changing user demands and the basic building blocks of a new architecture will be a challenge in our current technical environment one approach is to design multi-tiered architectures that include an integration layer providing programming-level services for user-level applications such as a portal. The National Science Foundation has identified and recommended a cyber infrastructure that will be necessary to suit the needs of scientists in the future. The cyber infrastructure specifies a service layer that includes several components relevant for libraries that support scientific research and education. They are calling for the specification of services that will provide access to data, information and knowledge management services. In addition, they are requesting the specification of collaboration services that will support the emerging collaborative processes necessary within the sciences. While undoubtedly successful in offering integrated access points, from the library point of view one gets the impression that there is still some development to be done in order to build real end-user services that find the full acceptance of researchers and students. In the era of popular Internet full text search indexes these projects are focusing mainly on metadata by giving reference information about the resource (e.g. a certain server or database) rather than searching within the content sources (such as the full text itself). To support the changing user demands within the Web-based service paradigm, technical infrastructures must be made available to Users in a manner that supports their tasks. The library portal is one approach to organizing information resources and services in a way that supports the users’ needs. However, the library portal will not be the only starting point for access to the library. Other systems, such as course management systems and enterprise portals, may also serve as primary access points for users engaged in a variety of different information gathering tasks. The library portal, along with other application-level interfaces that provide consolidated access to multiple underlying systems, must have integrated connections to every system and information resource. Portals are implemented as application-level interfaces and based on software suites that provide integrated access to information resources and related services. Library websites integrate predominantly online library catalogues and databases with some full text repositories (e.g. e-journals). Freely available academic online content as described above is usually not covered by library portals. If they are selected at all they are mainly organized as HTML-link lists or specific databases that record reference metadata about web repositories.

Decentralized information landscape: The broader information landscape - including library resources among web logs, pre-print archives, and decentralized information resources and repositories mingling with enormous desktop computing power and storage on private devices - is where users and groups find, collect, and use information today. Librarians need to bring better navigational clarity and the ability to customize connections to this more diverse and decentralized information landscape. Web logs are ‘An online journal or commentary usually written by an individual or a small group of people’, and are: ‘space where individual writers can easily publish texts that are easily accessed by interested readers’. This is true micro-publishing; a system where individuals and groups can reach out to influence, inform, debate, campaign or just stay in touch. Essentially Blogs are easy to use, requiring no knowledge of HTML or configuration of systems. Commonly they offer searching, indexing, categorization tools, and track back / share back mechanisms, whereby content on a given topic can be aggregated and tracked. Some possible uses of Blogs in an academic environment are: Personal knowledge management, Class/cohort Web site, Posting student work for viewing/comment by peers, Personal journal with viewing/comment by teacher/tutor, Publication of tutor essays, links or commentary to seed discussion, Community forum, e.g. Crooked Timber, ‘Citizen’ reporting and e-Portfolio. A Wiki was seen as a ‘read/write’ Web page. One use identified would be in the development of system administration documentation. The capability of a Wiki to be made both searchable and indexed makes this an ideal Wiki application. The online library software somehow had to catalogue, or at least provides a gateway to, a huge variety of materials in the hands of many different proprietors. Integrated library systems have met this challenge by converting the simple OPAC into a comprehensive, customer-driven library portal.

In nutshell:

**Federated search:** A well-stocked library may subscribe to hundreds of online databases and other resources on behalf of its
patrons, each with its own search interface and login procedure. A federated search lets the user enter the search criteria once and eliminates duplication among the results.

**User profiles and contexts:** The system knows who the user is and what the user generally wants, and uses that information to tailor its services, integrating with the campus’s administrative information and course management systems. e.g.: My Yahoo.

**Multiple channels of content:** The system can offer weather reports, RSS feeds, and the dining hall menu, in addition to more formal library databases and collections. [2]

**Customizable content and interface:** The library can customize the portal by branding it with its own look and feel. Users can choose interface design and needed tools, by default. Some library portals even offer the flexibility of “skins”: easily interchangeable surface designs such as those featured by MP3 software.

Institutional portals can seem sometimes to subsume the library, by implementing some of the federated searching and meta-searching that the library may already be offering to its users. Where you draw the line is not clear. But the future is probably integration rather than fundamental migration of the functionality totally in one direction or the other”. But what about the future of the portal concept itself? The primary concept that makes the portal possible is that information services can be constructed in a way that makes them independent from a specific appearance they must have on screen. There are many names and styles for this abstraction: Web Services/XML, Open URL, APIs, widgets, and RSS feeds. These “browser less” services provide information when a program asks for it; a user doesn’t need to point and click. The information is returned in a structured form that can be easily processed by the local program that called for it. Once services like specialized search engines are provided this way, the portal can freely combine and repackage them. Hence the user can begin to choose from many interfaces to reach these abstracted services. The interface then becomes a commodity, not a monopoly. The common thread running through these innovations is that each new service helps individuals move and connect more kinds of information from more diverse resources through the various information communities in which they participate. [6] A group of IT professionals has launched India’s first network of technology blogs that allows its members to create their own blogs and share knowledge on information technology named ITVidya.com, the network also hosts expert-managed blogs in areas of coding, design, database, operating systems (OS), emerging technologies, enterprise solutions, out-sourcing, and web and wireless technologies. “With blogs around, the web is now no more just a library, but also an interactive conversation platform allowing active participation by all users not only to read, but also write and comment,” says Ajay Sanghani, founder, ITVidya.com. ITVidya claims that they will offer unique facilities like tagging of content for easy content categorization and rating content submitted by the bloggers. Today Blogging already offers a platform for individual self expression worldwide, what is needed now is to offer easily accessible, user rated professional quality content to information seekers, through content networking. Another breakthrough idea of this project is its ability to support corporate blogging through Professional content, photo blogging and well nurtured communities. Blogs and RSS (Real Simple Syndication/Rich Site Summary) feeds and their applications in libraries are increasing exponentially. These applications range from current awareness type of settings in keeping up-to-date with new information, table of contents alerts of journal articles, feeds based on a research query in electronic databases, and news alerts from different subject areas. Other library related use of blogs and RSS feeds may include availability of new books based on selected keywords, feeds based on new subject guides, creating simple blog entries for course related useful information, and announcing Library related events such as the Scholarly Communications Speaker series.

II. CONCLUSION

Digital Libraries are increasingly hesitant to support big, monolithic and centralized portal solutions equipped with an all-inclusive search interface which would only add another link to the local, customer-oriented information services. Future search services should be based on a collaboratively constructed, major shared data resource, but must come with a whole range of customizable search and browsing interfaces that can be seamlessly integrated into any local information portal, subject specific gateway or personal Research and learning environment. The library portal and other application-layer services that integrate and aggregate information and services across disparate systems are just the tip of the iceberg. These systems are based on infrastructures that have been designed to support higher-level user tasks. To protect our investments in current systems but at the same time make them accessible to multiple and changing needs we will have to develop an integration layer that provides adapters that can interface with existing systems. The challenge is to identify user-level services (applications) that are important to users and to identify generalizations of common programming-level services that can be developed to support those applications. At the same time it is necessary to conceptualize library technology as an integrated whole so that we can leverage information from one system for use in many applications. Programming-level services may be used to simplify access for users and when permissible use information about users to make decisions about presentation.

The Digital library portals need to provide new search and navigation interfaces or improved ranking and display features for academic content. Vendors of integrated library systems have partly responded to this development and offer already separate local and central modules. New requirements for libraries have resulted in the set-up of new systems such as digital library systems, digital collection and e-print servers. The increase of systems alongside with the increased demand on financial and staff resources to maintain these systems have led to discussions within libraries and on a campus wide level in order to find out how these systems interact with each other and investigate potential duplication or even multiplication of services implemented in different systems. The current Grid-research initiatives, that address distributed, large-scale computing in a wider context, could provide valuable technology for the building of distributed data and access networks. Digital
Libraries will need to watch closely these developments and be open for collaborations.

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An Attempt to Analyze & Resolve the Pitfalls in CRM Software through Plug-In Instrumentation

Prasenjit Kundu, Debabrata Das

Abstract- Despite the popularity and myths regarding CRM as it changes the way how a company interacts with customers and the employees perform their jobs throughout the organization, there are many potential areas of failure in a CRM and overcoming these bottlenecks and pitfalls has become a point of interest in contemporary business and IT research. The pitfalls of CRM can be classified as (1) technical (slow execution, memory overhead, performance flaws at runtime etc), (2) strategic (improper planning, inadequate objectives, lack of focus on customer etc.) and (3) operational (slow ROI, slower time to market, negative brand perception etc). In this research paper, a hybrid approach has been proposed through which the CRM software package can be optimized in order to make it more reliable and versatile by solving the identified problems. This proposed approach uses plug-in program instrumentation to optimize a CRM software package at runtime without altering or stopping the execution of the CRM package. The proposed approach also conceives a set of generic policies to overcome the strategic and operational anomalies of an existing CRM package. It can be inferred that the optimization of an existing CRM package based on dynamic program analysis & plug-in instrumentation will open up many avenues of research in this direction and it will also increase the general interest of researchers and academicians for conducting research work in the converging area of application of IT and business administration.

Index Terms- CRM, Plug-in Instrumentation, Dynamic Program analysis, Hybrid Optimization Framework

I. INTRODUCTION

The CRM or Customer Relationship Management is a strategy used to learn more about customers' needs and behaviors in order to develop stronger relationships with them. CRM helps businesses use technology and human resources to gain insight into the behavior of customers and the value of those customers. With an effective CRM strategy, a business can increase revenues by:

- Providing services and products according to customers’ needs and wants.
- Offering better services to the customers.
- Enhancing the effectiveness of cross selling of products.
- Helping the sales executives to close deals faster
- Retaining existing customers and exploring the possibility of discovering new ones [1].

Research on CRM has confined itself on service quality enhancement and betterment of post purchase customer service etc but the effect of consumer behaviour on CRM has been ignored. Major research on CRM has only a single purpose and that is to provide a managerially useful, end-to-end view of the CRM process from a management perspective [2]. In other words, these models focus what the managers need to know about their customers and how that information should be used to develop a complete CRM package [3]. All these models are excellent tools for practicing marketing managers but it lacks the framework on the basis of which marketing analysts and researchers can further improve the CRM process because no such serious effort has been made to explore the relation between consumer behaviour and CRM and also the effect of consumer behaviour on CRM. Recent empirical research with an objective to identify the key factors on which the market and customer relationship depends in services marketing scenario resulted in developing a new model on customer relationship management and this model is PREMASA model [4]. PREMASA Model attempts to bring about a strategic change in CRM policy and this is relevant particularly from managerial point of view, but a CRM software has some limitations which needs to be addressed properly to make it more effective and reliable. This paper attempts to identify the existing and potential limitations and pitfalls in CRM software from mainly technical point of view and proposes a technique to resolve these pitfalls.

II. LITERATURE REVIEW

The usage and applications of CRM software has evolved over the years primarily as a tool to assist and support the effort of the management in attracting, managing and retaining customers. Researchers and industry practitioners agree that CRM software has some serious limitations and these limitations are hindering the true potential of CRM in accelerating business processes and practices ([5], [6], [7], [8], [9], [10], [11]). There are vast differences between the myths regarding CRM software and the actual ground reality.

These limitations can be classified as (i) Technical Limitations of CRM and (ii) Strategic Limitations of CRM ([5], [6], [8], [11]). Few of these limitations are listed below:-

[A] Technical Limitations

5) Slow Execution
6) No provision of Automated Cache Clearance
7) Lack of Dynamic Load balancing
8) Performance & Security flaws.

[B] Strategic Limitations

1) Huge Investment yet slow return
2) Insufficient Resources & Metrics
3) Lack of change management supports
4) Inadequate focus on objectives

Further, Casey Gollan pointed out that as the business grows, requirements of a CRM package are needed to be upgraded but adding these extra features can be quite expensive [12]. It is not always a wise decision to remove the existing CRM package which is running in the organization as it will be a costly affair. PREMESA model highlights some of the strategic issues of CRM and develops a new perspective of customer relationship management. Buehrer & Mueller focuses on middleware approach of CRM in terms of four perspectives: business, process, functionality and infrastructure[13]. From the available literature on CRM software packages it is clear that the CRM has the excellent potential for customer acquisition, management and retention but the pitfalls and limitations in it is adding to its failure to do so. In this scenario, the concept of dynamic program analysis can be used as one of the potential tools to overcome the pitfalls of an existing CRM software packages at runtime.

Dynamic program analysis is the analysis of computer software that is performed by executing programs built from that software system on a real time basis. For dynamic program analysis to be effective, the target program must be executed with sufficient test inputs to extract and produce interesting behaviour. Dynamic program analysis helps to make a computational system reason automatically (or at least with little human assistance) about the behaviour of a program and draws conclusions that are useful to help the software developers to determine exploitability of vulnerabilities or to rapidly develop an exploit code [14]. Dynamic analysis produces output, or feeds into a subsequent analysis, that enables human understanding of the code and makes the design and testing task easy for the developers. Dynamic program analysis approach attempts to tune the application software during execution without stopping, recompiling or even rerunning the application. To achieve this objective it is necessary to use dynamic instrumentation techniques that allow the modification of the application code on the fly [15]. (Ref. Fig.1).

Program instrumentation is a general way to understand what an executing program is doing[16]. The principle of dynamic program instrumentation involves deferring program instrumentation until it is in execution and then inserts, alters and delete this instrumentation dynamically during the actual program execution. The Paradyn group at the University of Wisconsin and University of Maryland first used this approach to develop a special API that supports dynamic instrumentation and the result of their work was called DynInst API. DynInst is an API for runtime code patching that provides a C++ class library for machine independent program instrumentation during application execution. It allows attaching to an already running process or starting a new process, creating a new piece of code and finally inserting created code into the running process. The next time the instrumented program executes the modified block of code i.e. the new code is executed and the program being modified is able to continue its execution and does not require to be recompiled, relinked or restarted [15]. It eliminates the need to modify or recompile the application’s source and it will also support the instrumentation of programs that dynamically generate code [17]. Research shows that it is also possible to change instrumentation at any time during execution by modifying the application’s binary image as well as the runtime behaviour can be extracted from the software using software visualization [18]. Dynamic program analysis can be used to modify an existing software system (CRM package) to make it more powerful and updated, program optimization is the desirable option to achieve faster execution, less memory storage and to draw less power. The dynamic program analysis instrumentation has the potential to graphically represent the various executions traces of a CRM package, thus by helping to debug and speed up the operation [19]. Recent research has also proved that the concept of plug-in instrumentation can be used to insert extra code in the existing CRM software package at runtime without altering its execution [20].

III. RESEARCH OBJECTIVES

The main aim of this paper is to pinpoint the technical limitations of a CRM software package and to optimize them as much as possible so that the CRM software failure rate can be reduced and the software can meet the business organizations’ changing needs and requirements periodically. The endeavour is to carry out the plug-in instrumentation concept as a way forward to answer the challenges posed by the technical limitations of existing CRM software packages. Hence, this paper proposes a set of framework and guidelines so that most of the technical flaws can be overcome in the existing CRM packages at runtime using dynamic program instrumentation followed by optimization techniques to achieve:

- Speed up the execution
- Dynamic Load balancing
- Program Debugging
- Performance tuning of the software.

IV. PROPOSED PLUG- IN INSTRUMENTATION & OPTIMIZATION FRAMEWORK

The proposed framework involves Plug-in Instrumentation to indentify the technical flaws of a CRM packages at runtime and to take appropriate measures to overcome the flaws by different optimization techniques. Finally, the framework also provides a set of generic guidelines to overcome the strategic flaws of CRM (Ref. Fig.2). The entire conceptual framework will work in the following three phases:-

A. Phase -1: Dynamic Plug-In Instrumentation Phase

The proposed Plug-in code can be inserted, when required, into the CRM software without interrupting its normal execution, This phase focuses on:-

- Code tracing
- Debugging and Exception handling
- Profiling
- Logging events
- Performance counter

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The logical block diagram of the Plug-In Instrumentation is shown in figure 3. The diagram itself shows that by clubbing the instrumentation program with CRM in execution state, it is possible to get the visualization of different execution traces using call graph and control dependency methods. The next phase carries out the optimization tasks and after that again the code can be reinserted to the plug-in point.

B. Phase -2: Hybrid Optimization Phase

Optimization mainly focuses on improving system performance in terms of shorter execution time, less memory usage, less disk space, less power consumption etc. The most popular optimization techniques are program and compiler optimization. Each of these techniques has their own benefits. The compiler optimization [16] is preferred for this proposed framework as it is capable of fine tuning the output of a program to minimizing or to maximizing some attributes of an executable computer program([21],[22],[23]).

As most of the business organizations are using the legacy CRM packages till date as part of their enterprise wide IT infrastructure, the use of hybrid optimization techniques (i.e. combination of Dead Code Elimination and Code Block Reordering) is suggested for the proposed framework. The Dead Code Elimination is a technique through which the code that will never be executed or the code that has lost the relevance from the program objective point of view can be safely removed from the program[24]. The Dead code elimination method can be used to reduce the total execution time of the CRM system efficiently. The use of dead code elimination can be illustrated by a real life situation. Let us consider a business organization is maintaining a schema called Customer_Details (Customer_id, name, address, pager_no) in their CRM software package. Whenever the company declares any bonus or discount or any new product promotional scheme they would like to send the textual message to each of their clients' pager numbers whose details are there in Customer_details schema or in the database that is attached to the CRM package. Now in the present scenario as pager based communication no longer exists therefore the corresponding code (written below by underline) need to be removed from the system in order to increase the processing speed (Ref.Fig. 4). The next technique is Code block reordering that alters the order of the basic blocks in a program in order to reduce conditional branches and improve locality of reference. The following code will show that:

Let X(A,B,C,D..) and Y(B,F,G,H) are tables stored at local and remote database of a server respectively. Fig. 5 illustrates the Code Block reordering. During the program execution, the Block B must be accessed before the previous Block A as Block B consists of X, i.e. Block B deals with a local database. That is why faster access will be possible based on locality of preferences. So, the combination of death code elimination and code reorder techniques can be used to optimize the CRM package and both the death code elimination and code reorder techniques can be initiated within a CRM software package by plug-in instrumentation.

C. Phase 3: The Strategic Guideline Phase

The previous two phases mostly focus on the technical aspects of CRM. In this phase, a set of generic guidelines are provided to solve the strategic or operational levels constraints and limitations of a CRM. These are as follows:

- Before the implementation or roll out of CRM a clear and concise presentation on the capabilities and potentialities of CRM should be given to the stakeholders by the IT experts of the firm.
- During CRM implementation, it is better to start by first prioritising requirements.
- During implementation and after implementation of a CRM software package, close co-ordination is needed among the IT experts, sales and marketing leaders of the firm.
- The top level management should focus on three basics, viz; Involvement, Implementation, and Training.
- The IT experts should handle the post-implementation operations of the CRM software carefully.
- More emphasis should be given to the change management issues before and after the CRM implementation.
Figure 1: Dynamic Program Instrumentation

Figure 2: The Proposed Plug-In Instrumentation & Optimization Framework
Figure 3: The Dynamic Plug-In Instrumentation
V. LIMITATIONS & FUTURE DIRECTIONS

The working principle of the proposed plug-in Instrumentation is constrained by the limitation of execution coverage i.e. if the software program on which the proposed technique will be applied never reaches a particular point of execution, instrumentation tool at that point will not collect any data. Application of some instrumentation techniques and tools may trigger a dramatic increase in execution time of particular software and this may limit the application of instrumentation tools to debugging contexts. Our proposed instrumentation is
partially automated and fails to focus on dynamic load balancing issues ([25], [26], [27]). Security issues are another area where the proposed framework hasn’t focused. The challenges of developing a robust instrumentation technique on Windows operating systems lie in managing the kernel/application transitions, injecting the runtime agent into the process and isolating the instrumentation from the application. Future research should address these issues to overcome the limitations of this technique. Researchers have already proposed to develop CRM processes as services using the concept of Service Oriented Architecture (SOA) [28], and the concept developed in this paper will definitely add value to this work.

VI. CONCLUSION

In this paper a conceptual framework dynamic program instrumentation technique has been developed and introduced which can be inserted in an existing CRM package at runtime to extract dynamic behaviour. The main aim for doing so is first to identify the runtime technical flaws of a CRM and secondly to take measures to solve the technical flaws using software visualization which will ultimately increase the level of program understanding. The secondary purpose of the proposed framework is to use some optimization mechanisms based on death code elimination and code re-ordering approach to reduce the processing time of a CRM package so to increase the acceptance of existing CRM softwares in the competitive and rapidly changing CRM market. Finally this paper attempts to provide a small set of measuring steps which are needed to be taken in order to address the operational issues of CRM. We are confident that in future more research will be carried out to specifically address the issues that we have highlighted in our work.

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An Effective Way to Separate the Reflections from Polarized Images

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Abstract- In this paper, we are going to take multiple polarized reflected images which are taken at different polarizing angles with same transparent medium such as glasses as input and ultimately aim to separate the reflections from those images to acquire the original background layer without reflections. Here we incorporated a technique called alpha matte method to separate the reflections. We also consider our work as an optimization problem to exploit the mutually exclusive information from our input polarized images. We also found that our method producing good reflection separation results when compared to other existing methods.

Index Terms- Polarization, Reflection guide map, Mask layers

I. INTRODUCTION

Consider the figure shown in Fig.1 it shows a typical picture taken by a person. The wall across from the painting is reflected by the glass and the picture captures this reflection superimposed on the Mona Lisa image.

A similar problem occurs in various similar settings: photographing window, jewels, and archaeological items protected by glass. Professional photographers attempt to solve this problem by using a polarizing lens. By rotating the polarizing lens appropriately, one can reduce the reflection. However, the amount of polarization depends on the angle of incident light. In most cases, the reflected light is only partially polarized. Consequently, the reduced reflection layer may still remain in the filtered image. It is also common that when we change the rotation angle of the polarizer, reflection is reduced in certain parts of the image only.

Here we use multiple polarized images filtered by a polarizer with different rotation angles for reflection separation. Our work exploits the mutually exclusive image gradients in each of the filtered images to reflection separation. Our study also shows that for planar surface reflection, the region where the contribution of reflection is reduced to the maximum extent varies smoothly across an image as we slowly rotate the angle of the polarizer. Since the effect of reflection is additive, we would obtain a clear background layer with no reflection in an ideal case by combining the minimum intensity pixels of the filtered images.

However, weak reflection still remains in the background layer. We therefore use a better algorithm for reflection separation. To accomplish our result, we assumed that the image gradients of the background layer and the reflection layer are mutually exclusive [1]. Under this assumption, we can classify the image gradients into background layer gradients and reflection layer gradients using the information from the multiple input images. We formulate this reflection separation problem as a constrained optimization problem where the reflection layer, the background layer and the "matte" that determines the mixing coefficients of the both layers.

II. EXISTING METHODS

A. User Polarization and statistical analysis of scenes containing a semi reflector

In this paper[2], they proposed an incorporation of a polarizer into the optical system is a common photographic technique allowing suppression of semi reflective layers Several constructions of such cameras, e.g., a system equipped with a liquid crystal polarizer were recently proposed. However, the polarizer is capable of removing the reflected component completely only when the viewing angle is equal to the Brewster angle. This case results, however, in severe geometric distortions. In other cases, the polarization is not sufficient even when the polarizer is oriented to minimize the reflected component. The virtual image is still visible.

B. Separating Reflections from Images Using Independent Component Analysis

Farid and Adelson apply an analytic version of independent component analysis (ICA) for blindly separating the reflected and the transmitted images[3]. Such an approach does not require any prior knowledge regarding model parameters, and offers
better feasibility in real-world applications. However, the proposed method is not general enough, since it works with two sources only. On the other hand, iterative approaches such as the information maximization algorithm are relatively slow, although they can handle any number of sources, provided a sufficient number of mixtures are available.

C. Separating reflections from a single image using local features

In this paper[4], they proposed an automatic method to find the most-likely decomposition which minimizes the total number of edges and corners in the recovered layers by using a database of natural images. However, these approaches may not work well if an input image contains complex structures or textures, namely many intersections of edges from the reflection and background layers. This approach is very slow, and candidate decompositions found by their database search may not include the desired decomposition. On the other hand, our method can work well even for the scenes containing such complex structures or textures, by automatically classifying the gradients from multiple polarized images with selective user correction.

Several signal post processing approaches were proposed in recent studies; however, they rely mainly on motion, stereo, and focus, and assume that the real and the virtual objects lie at significantly different distances from the camera. Other methods assume some knowledge about the scene, such as the semi reflector angle and refraction index, which makes them hardly feasible in the general case.

III. OBSERVATIONS

It is difficult to directly measure such physical quantities from images without prior knowledge [5]. Such physical quantities could be indirectly estimated by incorporating them as unknown variables into an optimization formulation for reflection separation. However, this would make the optimization formulation overcomplicated.

To address these issues, we instead introduce a reflection model which is based on a smooth alpha matte assumption. The reflectance of each orthogonal component smoothly varies with respect to a continuous change of the angle of incidence. If we assume a pinhole-like camera and an almost planar glass surface, the angle of incidence spatially varies continuously and smoothly on the surface observed from the camera. We can conclude that both the reflected light off the surface and the transmitted light through the polarizer have spatially smooth variations on an image. Accordingly, the alpha matte should be smooth over the image. Using the alpha matte, we address the issue of partial polarization for robust reflection separation.

IV. ALGORITHM

**Input:** $I_1$ to $I_N$

**Output:** $\alpha_1$ to $\alpha_N$, $R$, $B$

Construct the Gaussian image pyramid, For each level in the multi-scale pyramid, do: Compute the mask image and the reflection guide map. If the current scale is the coarsest scale, Initialize $\alpha_i$ using formula. else: Up-sample the results of $\alpha_i$, $R$ and $B$. end if For a fixed number of iterations do: Estimate $(R, B)$ with $\alpha_i$ fixed. Estimate $\alpha_i$ with $(R, B)$ fixed. end for end for

V. IMPLEMENTATION

A. GAUSSIAN PYRAMID CONSTRUCTION

We adopt a multi-scale scheme based on a Gaussian pyramid with a scale factor equal to 2 in order to allow our reflection separation algorithm to converge to a solution close to the global minimum.
Each input image \(I_i(x)\) is downsampled to construct the Gaussian image pyramid. At each scale, the mask image and reflection guide map are built. This image is used as the base for the preceding operations. For each input image, we model the effect of reflection by the following equation for each of three color channels:

\[
I_i(x) = \alpha_i(x) \cdot R(x) + B(x),
\]

where \(I_i, R\) and \(B\) are the input image, reflection layer and background layer, respectively, \(x\) is pixel coordinates, \(i\) is an image index and \(\alpha_i\) is a matte that represents the amount of reflection remaining in each of the polarized input images.

**ASSUMPTIONS:**

1. The gradients of the reflection layer and those of the background layer are mutually exclusive.
2. Spatial variation of \(\alpha_i\) within an image is smooth, that is, \(\nabla \alpha_i(x) = 0\). This assumption comes from the fact that we are targeting at planar (smooth) surface reflection for which varies smoothly with the variation of the angle of incidence and other physical quantities.

**B. GUIDE MAP COMPUTATION AND MASK IMAGE COMPUTATION**

Reflection Guide Map [6] can be computed using a formula given below:

\[
\nabla I_i(x) = R(x) \nabla \alpha_i(x) + \alpha_i(x) \nabla R(x) + \nabla B(x),
\]

Where \(\nabla = (\partial / \partial x, \partial / \partial y)^T\) is the gradient operator. Spatial variation of \(\alpha_i\) within an image is smooth, that is, \(\nabla \alpha_i(x) = 0\).

Therefore this equation can be rewrite as

\[
\nabla I_i(x) = \alpha_i(x) \nabla R(x) \text{ or } \nabla B(x), \text{ if } \max_j |\nabla I_j(x)| \geq t
\]

\[
\alpha_i(x) \nabla R(x) + \nabla B(x), \text{ otherwise}
\]

where \(\max_j |\nabla I_j(x)|\) is the maximum magnitude of the gradient among all \(\nabla I_i(x)\) and \(t\) is the threshold for image gradients in the first assumption. The threshold is determined by selecting the top two percentages of pixels which have the largest gradient magnitudes among all pixels in the input images. Note that according to this Equation, the contribution of \(\nabla B(x)\) to \(\nabla I_i(x)\) is fixed for all input images, while that of \(\nabla R(x)\) varies depending on the values of \(\alpha_i(x)\). Hence, if the variance of \(\nabla I_i(x)\) over the input images is large, it is likely that the gradient \(\nabla I_i(x)\) is from the reflection layer. Similarly, if the variance of \(\nabla I_i(x)\) over the input images is small, it is likely that the gradient \(\nabla I_i(x)\) is from the background layer. Therefore, the large gradient pixels, that is, the pixels with \(\max_j |\nabla I_j(x)| \geq t\) can be classified into two layers, depending on their gradient variances over the images.

We construct a mask image \(M(x)\) which identifies the pixels with large gradients: \(M(x) = 1\) if \(\max_j |\nabla I_j(x)| \geq t\), and \(M(x) = 0\) otherwise. The mask image consists of two parts, \(M_R(x)\) and \(M_B(x)\), which indicates the large gradient pixels from the reflection layer and the background layer, respectively. We set

\[
M_R(x) = 1 \text{ if } M(x) = 1 \text{ and the pixel } x \text{ has a large gradient variance over the input images, and } M_R(x) = 0 \text{ otherwise.}
\]

Similarly, we set \(M_B(x) = 1\) if \(M(x) = 1\) and the pixel \(x\) has a small gradient variance over the input images, and \(M_B(x) = 0\) otherwise. Given the mask image \(M(x)\), we can compute \(\alpha_i(x), \nabla R(x)\) and \(\nabla B(x)\) for each pixel \(x\) such that \(M(x) = 1\). We first initialize the values of \(\alpha_i(x), \nabla R(x)\) and \(\nabla B(x)\) to zeros. If \(M_R(x) = 1\), then \(\nabla I_i(x) = \alpha_i(x) \nabla R(x)\) since the gradient is from the reflection layer.

The resulting values of \(\alpha_i(x), \nabla R(x)\) and \(\nabla B(x)\) are stored in the reflection guide map and referred to as \(\alpha'(x), \nabla R'(x)\) and \(\nabla B'(x)\). These values are used as the guiding information for optimization.

**C. OPTIMIZATION FORMULATION**

Figure 3: a, b, c shows the background mask images for our polarized input images.

\(M_R(x) = 1\) if \(M(x) = 1\) and the pixel \(x\) has a large gradient variance over the input images, and \(M_R(x) = 0\) otherwise. Similarly, we set \(M_B(x) = 1\) if \(M(x) = 1\) and the pixel \(x\) has a small gradient variance over the input images, and \(M_B(x) = 0\) otherwise. Given the mask image \(M(x)\), we can compute \(\alpha_i(x), \nabla R(x)\) and \(\nabla B(x)\) for each pixel \(x\) such that \(M(x) = 1\). We first initialize the values of \(\alpha_i(x), \nabla R(x)\) and \(\nabla B(x)\) to zeros. If \(M_R(x) = 1\), then \(\nabla I_i(x) = \alpha_i(x) \nabla R(x)\) since the gradient is from the reflection layer.

The resulting values of \(\alpha_i(x), \nabla R(x)\) and \(\nabla B(x)\) are stored in the reflection guide map and referred to as \(\alpha'(x), \nabla R'(x)\) and \(\nabla B'(x)\). These values are used as the guiding information for optimization.
Our algorithm starts at the coarsest scale and goes down scale by scale toward the finest scale. At the coarsest scale, our algorithm guesses $\alpha_i(x)$ and initiates the iteration to solve for $R(x)$ and $B(x)$. The optimization problem is solved alternatingly for different sets of unknowns. At each scale other than the coarsest, the solutions for $\alpha_i(x)$ at the previous scale are up-sampled together with $R(x)$ and $B(x)$.

Figure 4: a, b, c shows the Reflection mask images for our polarized input images.

Figure 5: a, b, c shows the Reflection Guide Maps for our polarized input images.

VI. CONCLUSION

In this paper, we successfully implemented the reflections from the polarized images taken at different polarizing angles but with the same view. We would like to enhance our work by incorporating the image smoothening process which will yields a better separation results in our future. We cannot apply this to motion objects. Definitely we will enhance our project even with the moving objects.
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AUTOMATIC TEXT SUMMARIZATION BASED ON PRAGMATIC ANALYSIS

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Abstract- The rapid growth of online information has encumbered the user with colossal amount of information. It is difficult to access large amount of data. This problem has increased the research in the field of automatic text summarization. Automatic text summarization is a technique where the text is input to the computer and it returns the clipped and concise extract of the original text and also sustains the overall meaning and main information content. In this paper, text summarization technique is designed for the documents having the fixed format. The proposed system generates the summary of the fixed format documents by analyzing all the different parts of the documents. The system consists of five stages. In first stage each sentence is partitioned into the list of tokens and stop words are removed. In second stage, frequency usage is counted for each word. In third stage, assign POS tag for each weighted term and Word sense disambiguation is done. In the fourth stage, pragmatic analysis is performed. After Pragmatic Analysis, summarized sentences will be store in a database.

Index Terms- POS tagging, Pragmatic Analysis Text Summarization, Wordnet

I. INTRODUCTION

Internet has developed the lives of many enthusiastic discoverers and researchers. Now-a-days, with the increasing demand of the internet huge volumes of information are arising continuously [1]. Users finds it thorny to find the anticipated information swiftly and precisely [10]. It is useful for the users to extract the main content from the original document instead of the original document. Automatic Text Summarization automatically extracts the main content from the original document correctly and comprehensively. The language of the summary extracted should be consistent and efficient. Automatic Text summarization can be categorized into two- extraction and abstraction [11]. Extraction means to select the phrases or sentences having the highest score from the original text and combined to obtain the new shorter text without changing the source text. Abstraction means to probe and interpret the text by using linguistic methods. Mostly, extraction method is used to produce the summary in automated text summarization system. During the last twenty years, several researchers addressed that the automated part of speech tagging is a well known problem. Part of speech tagging is a technique for elucidation of the lexical categories. In POS tagging, a felicitous tag is assign to each word of the sentence. POS tagging is broadly used for lexical text analysis. POS tagging is an important task for the activities in natural language processing [7]. In POS tagging, it takes a sentence as input and assigns a unique tag to each word in the sentence. It is a firm conjecture that when it comes to index term extraction, the nouns carry most of the sentence meaning. Index term is a term that catches the essence of the sentence. In an ideal case, index terms should give excellent semantic representation. A subtask of POS Tagging is noun extraction in which every noun either proper or common is identifying in a document. Nouns are used as a most important feature to express the meaning of the text in natural language processing applications like text summarization, information retrieval, information extraction etc.

POS Tagging has a variety of techniques. It has two approaches- Supervised POS tagging and Unsupervised POS Tagging [4]. A pre tagged corpora is needed for Supervised Tagging Technique while it is not required in Unsupervised Tagging Technique. Both techniques can be of two types: - Stochastic and Rule Based. Rule Based Technique requires a context rule for POS Tagging [5]. In rule based approaches, tags are assigned to the ambiguous and unknown words by using the contextual information. Stochastic Technique uses a Hidden Markov Model[9]. The states mostly symbolize the POS Tags. The contingencies are calculated from the tagged corpus and the untagged corpus in order to calculate the most likely POS tags for the word of the sentence. Stochastic Training techniques can be categorized into Supervised and Unsupervised Stochastic Technique. Supervised stochastic technique requires only the pre tagged data in a huge volume to achieve high level of accuracy. On the other hand, Unsupervised stochastic technique does not need pre tagged data and it uses the computational methods to do the automatic word groupings or make tag sets and based on these groupings, estimate the probabilistic values required by stochastic taggers.

II. PROPOSED METHODOLOGY

The following figure represents the diagram of the propose system. Proposed model has the following stages:-

A. Database:
Firstly make a repository that will act as a source of the system. This repository contains the files on which text summarization
can be done. From this repository, one paper at a time is taken on which apply our first step i.e. tokenization.

**B. Tokenization:**
Each sentence is partitioned into the list of tokens. It is a part of the lexical analysis.

**C. Stop Word Removal:**
Some words are insignificant that are highly used in the English sentences. They exist in superiority in the documents. Therefore, they do not provide the actual idea about the theme of the text. While scoring the sentences, these words can be discarded. For example- articles like ‘a’, ‘an’, ‘the’; ‘by’ come into sight mostly in all the text but does not include much semantic information. As we already generated the list of tokens, now remove the stop words from that list and store these words into a separate file.

**List of some stop words considered are:-**

<table>
<thead>
<tr>
<th>Word</th>
<th>Word</th>
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<tbody>
<tr>
<td>a</td>
<td>about</td>
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<tr>
<td>about</td>
<td>above</td>
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<td>above</td>
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<td>has</td>
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<td>hasn't</td>
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<td>hasn't</td>
<td>have</td>
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<td>have</td>
<td>haven't</td>
</tr>
<tr>
<td>haven't</td>
<td>List 1: Stop Words</td>
</tr>
</tbody>
</table>

![Diagram showing the process from Database to Extracted Summary](image-url)
Figure 2: Proposed Methodology

D. Weighted Term:
Frequency usage of each word is calculated after removal of stop words. The words having the higher frequency are the weighted terms. Frequency can be defined as the number of times term is repeated in the document. For example- a term occurring 10 times in a document is much more relevant than the term occurring 2 times.

E. POS Tagging:
It is a process of assigning a felicitous tag to each word of the sentence[8]. A large lexical database for English language named “Wordnet” can be used for POS tagging[6]. Wordnet consists of most English nouns, verbs, adverbs and adjectives which are grouped into sets of cognitivesynsets, each showing a distinct concept. Wordnet is systematized by meaning that means the words are semantic similar which are in close propinquity[2].

F. Word Sense Disambiguation:
It is a process of choosing pertinent senses of the word in a given context[3]. It removes the ambiguity of the word. It is important for NLP applications like information retrieval, machine translation, part of speech tagging and Text processing.

Word sense disambiguation consists of 2 steps:-
1. Identify all the different senses for each word congnrent to the text.
2. It involves assigning relevant sense for each word in context.

Word Sense Disambiguation can be reached by 2 approaches- Shallow approaches and Deep approaches. Access to the comprehensive body of world knowledge is assumed in Deep Approach. But these approaches are not favorable in practice because access to body of knowledge is possible in very limited domains. If knowledge exists, then this approach is better than the shallow approaches.

Shallow approaches consider the surrounding words and not even try to understand the text. These are not as strong as Deep approaches but gives better results in practice because of limited knowledge domain[12].

G. Pragmatic Analysis:
Pragmatics can be defined as the study of the meaning in context. It is an effort to get the intended meaning of the text[13]. Pragmatic Analysis is only performed on scientific or fixed format articles[14]. After POS tagging, pragmatic analysis is performed which analyzes the weighted terms.

This analysis gives a fixed format to the files and the sentences containing the weighted terms will be stored in a database. These are the summarized sentences. Any format file is converted into a fixed format by pragmatic analysis. Thus, the main content of the document can be identified to compose the summary by analyzing the pragmatic function.

H. Extracted Summary
After pragmatic analysis, the summarized sentences get stored in a database. This summary is the result of text summarization. Hence, the file taken at the first stage is summarized into meaningful text through this process.

III. RESULTS
The system break up the given text into tokens as shown in tableI, then stop words are removed from the list of tokens, shown in tableII. Word Frequency of each word is calculated after stop word removal, shown in fig3. Then, POS tag is assigned to the weighted terms by using Wordnet as shown in fig4. Word Sense Disambiguation is performed while doing the Pragmatic Analysis. During Pragmatic Analysis, maincontent of the document is identified to compose the summary.

Table I: Tokenization

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
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</thead>
<tbody>
<tr>
<td>I.</td>
<td>hi</td>
</tr>
<tr>
<td>II.</td>
<td>How</td>
</tr>
<tr>
<td>III.</td>
<td>Are</td>
</tr>
<tr>
<td>IV.</td>
<td>You</td>
</tr>
<tr>
<td>V.</td>
<td>Dear</td>
</tr>
<tr>
<td>VI.</td>
<td>You</td>
</tr>
<tr>
<td>VII.</td>
<td>Are</td>
</tr>
<tr>
<td>VIII.</td>
<td>looking</td>
</tr>
<tr>
<td>IX.</td>
<td>good</td>
</tr>
<tr>
<td>X.</td>
<td>you</td>
</tr>
<tr>
<td>XI.</td>
<td>are</td>
</tr>
<tr>
<td>XII.</td>
<td>comfortable</td>
</tr>
<tr>
<td>XIII.</td>
<td>this</td>
</tr>
<tr>
<td>XIV.</td>
<td>kind</td>
</tr>
<tr>
<td>XV.</td>
<td>of</td>
</tr>
<tr>
<td>XVI.</td>
<td>environment</td>
</tr>
<tr>
<td>XVII.</td>
<td>are</td>
</tr>
<tr>
<td>XVIII.</td>
<td>you</td>
</tr>
<tr>
<td>XIX.</td>
<td>going</td>
</tr>
<tr>
<td>XX.</td>
<td>somewhere</td>
</tr>
<tr>
<td>XXI.</td>
<td>what</td>
</tr>
<tr>
<td>XXII.</td>
<td>you</td>
</tr>
<tr>
<td>XXIII.</td>
<td>want</td>
</tr>
<tr>
<td>XXIV.</td>
<td>dear</td>
</tr>
<tr>
<td>XXV.</td>
<td>The</td>
</tr>
<tr>
<td>XXVI.</td>
<td>person</td>
</tr>
<tr>
<td>XXVII.</td>
<td>you</td>
</tr>
<tr>
<td>XXVIII.</td>
<td>are</td>
</tr>
<tr>
<td>XXIX.</td>
<td>looking</td>
</tr>
</tbody>
</table>

Table II: After Stop word Removal

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>XXX.</td>
<td>Dear</td>
</tr>
<tr>
<td>XXXI.</td>
<td>Good</td>
</tr>
<tr>
<td>XXXII.</td>
<td>Comfortable</td>
</tr>
<tr>
<td>XXXIII.</td>
<td>Kind</td>
</tr>
</tbody>
</table>
XXXIV. Environment

XXXV. Somewhere

XXXVI. Dear

XXXVII. person

XXXVIII. Don’t

XXXIX. Here

XL. Want

XLI. Sir

XLII. Sun

XLIII. Rises

XLIV. east.

XLV. Kind

XLVI. attitude

XLVII. Fine

XLVIII. Dear

IV. CONCLUSION

In this work, we proposed an automatic text summarization approach by pragmatic analysis. We used supervised POS tagging approach and implemented it in Java. By pragmatic analysis, the intended meaning of the text is obtained and the text summary is generated and stored in a database. The systems produced the high quality compressed summary and provide better results than the manual summarization.

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Effective Diagnosis Management System (EDM): An Integrated System to closely monitor and Assist in Patient Diagnosis

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Abstract- In the modern world people suffer from various kinds of diseases. The solution to most of the diseases is the usage of proper medication at regular intervals of time. The main contribution of this paper is to develop an integrated system for effective management of patient diagnosis, monitor patient’s adherence to prescription, maintaining medical history and assisting doctors in performing analysis for effective medication. The system is required to alert patients at regular intervals of time, choose appropriate medicine as prescribed in the prescription. The task will be carried out using micro controllers integrated with a GSM transceiver which controls an instrument having slots for various tablets sorted by name and measure certain parameters like temperature for diagnosis assessment, and allow the physician/doctor to provide appropriate treatment uses the patient's medication history and diagnosis assessment information.

Index Terms- Patient Diagnosis, Adherence to Prescription, GSM Transceiver, Thermal Sensors, Micro-Controller

I. INTRODUCTION

Medication errors and its ineffective management are viral threats in the medical field. Prescription non-adherence, ineffective medication and improper management of medical history are catalysts to drug misuse. Hazardous impacts and sudden deaths can often be attributed to the drug misuse and in most cases the cause would fall under one of the above three categories. The estimated annual cost of patients not taking their medications as prescribed approaches $290 billion. Nearly 1 lakh die each year due to medication errors due to poor medication adherence [1] and 1.3 million people are injured and nearly 1 lakh die each year due to medication errors [2]. Interestingly the bridge of communication between a doctor and a patient is medical history maintenance as quoted by professor form the Institute of Medicine, Tribhuvan University “We cannot undermine the relationship between the doctors of concerned authority and the people requiring medical treatment. Medical record, no doubt, may be regarded as a supportive hand in such matters. It helps doctors as well as patients to get informed of the ailments and plans and procedures adopted in course of conducting treatment. Medical record can also be regarded as such device that might help the governing body, health institution and person concerned in easily and timely availability of required information without any dilly-dally.”[9]

Considering the background, medication is inevitable and a solution to avoid if not control drug misuse is the need of the hour. As Bates and Gawande claim, the application of Information Technology (IT) is the best solution: “Safe [patient] care now requires a degree of individualization that is becoming unimaginable without computerized decision support” [3]. We in this paper present a technical approach that integrates various activities to manage patient prescription, his medical history and assist doctors and hospitals to provide effective medication.

II. LITERATURE REVIEW

The research for this project concentrated in the following areas: Prescription Non-adherence, wrong/ineffective medication and effective management of medical history. A few of the papers and technologies which we reviewed were solely intended to provide support and assistance to deal with some or all of the above stated problems: prescriptions [4], smart pill [5], HIS (Hospital Information System) [6], Free MED (a open source software to manage medical records), E-pill systems. These various systems have been triggered by the rising need for better medication and its proper management. E-prescription is a tool for prescribers to electronically send an accurate, error-free and understandable prescription directly to a pharmacy from the point-of-care [4]. Smart pill on the other hand is intended to assist elder patients who have difficulty in complying with prescription drug regimes and overcome drug misuse [5]. Free MED however, is a practice management and electronic and computer records system. It allows the tracking of medical data, in detail, with preservation not just of the diagnosis but the reasons for medical encounters [7]. On the other hand HIS, whose aim is to help clinicians to prescribe chemotherapies through standardized protocols, to electronically transfer the requests to the central pharmacy, to help the chemist to fill prescriptions and finally to allow correct administration of preparations to patients [6]. Considering these previous implementations the advantages and its impact is indeed bountiful, the special technical concepts ranging from the use of XP (EXTREME PROGRAMMING) to 3-tier server-client architectures have been utilized to achieve the stated cause. In contrast the E-pill devices which concentrate on dealing with the medicine non-adherence problem utilize a
different approach, where in hardware tools with very little software usage serve the purpose of notifying patients at regular intervals. Of all the many technical papers and applications, e-prescription has been noted and its further research carefully followed. Recent market statistics on e-prescription are rather surprising; A former research claims that the healthcare industry's transition from paper-based record to electronic record is witnessing yet another revolution- Electronic Prescription.

Healthcare facilities of all sizes today are employing the advantage that comes with the mobility of wireless technologies. The market for wireless technology is becoming a 'mass market' and is increasingly gaining momentum. With the advent of wireless networking, many organizations are exploring how wireless mobility can change the way they work. The popularity of wireless and handheld devices is increasing in healthcare for its mobility and flexibility. Mobile and wireless healthcare means the mobile access to patient health record, prescription, clinical and pharmacy order entry (CPOE) and management systems and so on. The number of medical accidents due to prescribing errors is increasing, with more than 0.1 million lives being lost every year. Electronic prescribing and computer prescribing are gaining its importance in reducing medication errors and transcription errors in the ambulatory healthcare market by providing unambiguous, clear and timely information and thus saving lives. To take it a step ahead the research on a broader perspective states thus,” The healthcare industry can no longer be complacent towards its technology due to the escalating costs, technology savvy patients, and also due to the healthcare regulations like the Healthcare Information Portability and Accountability Act (HIPAA). The electronic economy is finding itself a new set of opportunities, challenges, and restraints in the healthcare environment, and when it comes to the usage of information systems/information technology (IS/IT) in healthcare management, the healthcare industry is finding itself in a state of turbulence and flux. The rise in healthcare expenditure has lead to the uptake of key healthcare IT solutions such as e-prescription, shared medical records, primary care information systems, triage solutions and management information systems. Pharmacists around the world have long before been facing the challenge to cope with pharmacist storage and dispense a large number of prescriptions, while increasing their practices for more patient care activities. E-Prescription has experienced a phenomenal growth in United States (US). The technology is on course to be accepted by the European healthcare system. With healthcare being the foremost concern for many, demand for faster and efficient service is on a rise. With 0.1 million lives being lost every year owing to medication errors, there is a rising demand for an infallible and dedicated technology which ensures that such errors are kept low”[8].

Generalizing the above, one would clearly understand and appreciate the value of technology and its intervention in the field of healthcare. We through this paper would like to present a different approach to handle the tri-winged problem of drug misuse. The approach involves the use of embedded systems and micro-controller programming using Micro C. The system design and working procedure are explained in the sections to be followed.

III. IMPLEMENTATION PROCEDURE

The implementation procedure is considered at two levels, embedded system implementation and software implementation.

a. Embedded System Implementation:

The role of the Embedded system is to assist and monitor patients adherence to prescription, record medical history and important parameters (like temperature) measured during course of medication, after the course period the system on request provides a rating which indicates the effectiveness of prescribed medicine, the procedure of implementation comprises of four phases.

Note: There are three flow charts shown below, two describing working of Microcontroller A and one for Microcontroller B, fig 3 shows the flowchart for starting the device and fig 1 explains its working, the numbering is in accordance to explanation. They four phases are:

Phase 1

In this phase the input parameters are intialised. In Microcontroller A, the following settings are done. The timer is initialized on the first run to current time and current date. The course period is set, period of medication is initialized. The medicine intervals and time limit for the various periods of the day are set in accordance to the prescription, eg; if as per prescription, medicine A is to be consumed in the morning and evening but not during noon for 3 days, the interval would be 10 intervals(M N E) and notifications for medicine A would be sent during morning and evening for 3 days. Then the morning, noon and evening timings are also specified as to when the notifications need to be sent. The doctors and patient’s mobile no’s are entered. In Microcontroller B, only the temperature threshold value is set.

Note: Default initial course period is set to 30 days and it is complete only when course period becomes 0.

Phase 2

This phase mainly involves Prescription alerts and medicine notifications via sms, alongside choosing appropriate medicines at regular intervals, for example, consider medicine A, medicine B and Medicine C as the medicine being prescribed, they are stored in 3 different drawers and if only A and B are to taken in the morning, then the control unit will choose and open only the drawers containing medicine A, medicine B, and a notification is sent to the patients mobile. The general flow chart which explains both Phase 1 and Phase 2 is shown in fig 2 and fig 3.

Phase 3

Along with prescription management; the system is provided with thermal sensors to check the patient’s body temperature and if it’s high, a notification will be sent to the doctor. This phase is solely carried out by Microcontroller B. The sequence of operations are given below:

1. The patient checks his body temperature
2. Temperature is displayed on LCD
3. Microcontroller B, checks if temperature exceeds threshold and sends signal to Microcontroller A which alerts doctor on high temperature.
Phase 4:

As shown in fig 1, at the end of the medication, the doctor can analyze his prescriptions performance by using the medical history. The function to analyze information can only be performed if the course is complete. This extension to the present software design in our system is to enable the doctor at the end of the course to analyze his prescription’s performance which at present will be displayed as a rating on a scale of ten where a rating of 8 and above indicates a good prescription and from 6-8 as satisfactory and 4-6 as poor but permissible and below 4 as unfit. The analysis will be based on considering certain parameters like temperature, pressure and blood sugar levels which will be recorded and stored in the memory at regular intervals during the course.

Fig 1: Flowchart showing working of micro-controller A (Microcontroller A)

Fig 2: Flow chart shows working of micro-controller B (Microcontroller B)

Fig 3: Flow chart for Analysis of recorded data or to restart the system

B. Software implementation

The application is intended to assist doctors in storing diagnosis details of patients and their medical history and its assessment rating which is obtained from the embedded system.
As the time passes the database gets populated and it is possible to classify the best possible prescriptions for individual diseases. The next time a patient comes to the doctor with a disease for which the doctor has already treated and has also obtained its rating as discussed in the embedded system. The software stores information in two databases, the first database being Patient info, which records patient details, medication prescribed and the diagnosis performance(rating information), the second database is the prescription database which has three entities, first diagnosis entity which holds the best diagnosis for every diseases and its rating so far observed and the second entity the prescription_history entity which holds information on all the prescriptions given to patients for treatment and its effectiveness( rating) the third entity is exceptions entity which holds information on those prescriptions which have variable behavior i.e., has been effective with one patient but ineffective with the other. Once the patients information and the rating is updated into the patient_info Database by Doctor/user, automated loading into prescription_history entity of the prescription database, the details are then compared with the information in the diagnosis entity relating to the same disease, if the rating is high and the prescription is different then the new prescription information is replaced. Fig 4, 5&6 shows flow charts which explain the working procedure. The classification of data in diagnosis entity under exception and non-exception list can be achieved by comparing the ratings of two similar prescriptions and if abnormalities are identified the prescription will be listed under the exception list and the replacing of good prescription in diagnosis entity as explained, is carried out by measuring comparing ratings and if for the same the same disease a different prescription shows a higher rating the new prescription is replaced into diagnosis entity and also its information is stored in the prescription_history entity.
IV. SYSTEM DESIGN

The embedded system contains two micro controllers A and B, a GSM Transceiver, RTC timer, Tablet box, two LCD Displays, two Keyboards (4X4), Thermal sensors and relays which control the boxes. As shown in the fig 7, the microcontrollers are interfaced as follows. Microcontroller A is interfaced with a GSM module, LCD, relays to control opening of drawers, keyboards. Microcontroller B is interfaced with a thermal sensor, LCD and keyboard. In addition to the above there exists a connection between the two microcontrollers to allow communication.

V. RESULTS AND DISCUSSION

The proposed system was successfully designed and implemented. The stated implementation steps proved to be effective in both Microcontroller A and Microcontroller B, in Microcontroller A medicine alerts were sent to patient’s mobile at correct time intervals, also the use of internal memory to store initial settings was useful as the device did not have to be initialized all over again due to power failure. In Microcontroller B the temperature of patient was measured regularly and temperature was displayed on LCD screen, the doctor was notified when the temperature measured exceed the initially set threshold value and alert displayed on LCD screen. As discussed in the implementation method, the alert sent to the doctors were a result of successful communication between the Microcontroller B with Microcontroller A and the further communication between Microcontroller A and the GSM transceiver. Also the treatment details and temperature measurements were stored in the internal memory of Microcontroller A and analysis of the prescription’s performance was conducted at the end of the course period. The result of the analysis was utilized to predict the prescription’s effectiveness (rating is as described in the implementation methods). A small working module of the software application as discussed was implemented by considering a sample of patients belonging to two specific categories of diseases and sample ratings to test its implementation, one specific case where two patients treated for the same disease were also taken into account and this was identified by the module and grouped as exceptions. The implementation successfully predicted the best possible prescription as expected and if chosen the same was updated in
the patient database and if the former was not chosen the module allowed the user to enter a new prescription.

VI. CONCLUSION AND FUTURE WORK

Certain modules of the system were implemented effectively. Yet there are a few limitations, the analysis in the embedded system was done using temperature readings which reduces effective analysis in a broader perspective due to the presence of other equally important parameters like blood pressure readings and blood sugar readings together when considered give an effective analysis in diagnosis of a variety of diseases further interfacing with blood pressure sensors and blood sugar level sensors may serve the purpose. Also if patient requires more medicines or if the medicines in the patients tablet box are empty alerting pharmacy for refill would be useful. Audio input and output facility could be provided to illiterate patients and further integration of software application and use of higher classification algorithms could prove useful in complex analysis.

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Abstract- Wireless networks are generally referred to as computer networks that are not connected by using cables. Wireless telecommunication takes place by a transmission system called radio waves. Spread spectrum concept is used as the modulation technique in the physical layer data transmission. The transmitter and receiver use spreading codes in order to encode and decode the data. Since radio frequency is essentially an open medium, jamming can be a huge problem for wireless networks. The jamming attack is often attempt to inject a high level of noise, thereby lowering signal-to-noise ratio by which it can significantly reduce the achievable rate of communication. To overcome the jamming attack, we introduce neighbour node technique in this paper. By generating neighbour node discovery protocol, one fully received data by anyone of the receivers will be shared among the group of receivers thereby we mitigate jamming attack. Finally we demonstrate our scheme approach by using ns-2, discrete event network stimulator that generate best possible performance.

Index Terms- Broadcast Networks, Jamming Attack, Spreading Code

I. INTRODUCTION

Wireless Broadcast Networks are computer networks that form the communication medium without the usage of cables. They are generally formed by the transmission system named radio waves. These radio frequencies are used in the transmission of data in the physical layer. Since radio frequency is an open medium it is easily subjected to jamming attack by the adversaries. In this jamming attack, the jammer injects high level of noise to the radio signal by lowering signal-to-noise ratio. This indeed reduces the rate of communication in the wireless networks. The effective countermeasure is to increase the bandwidth, where the spread spectrum concept is used as the part of modulation technique. The spread spectrum system uses the increasing modulation concept, by which the transmitter and receiver use the spreading code for encoding and decoding respectively.

In spread spectrum, the code used is thus symmetric in nature, where the transmitter and the receiver use the same information for encoding and decoding. Generally jamming appears noise like unintended signal upon decoding, and these signals are blindly filtered at the receiver end until the jammer does not discover the usage of spreading code. But if a jammer compromises anyone receiver and detects the code then the benefit of using spread spectrum against jamming is lost. In case of point-point communication the modulation concept works well since the single transmitter transmits the data to single receiver whereas in broadcast networks the single transmitter broadcasts data to multiple receivers so it is difficult to prevent jamming attack.

However, we introduce the spreading code concept in order to provide secure communication. The generation of code used by the transmitter and receiver is generally increased. Initially the transmission of data taken place in j+1 code simultaneously the it is optimized to form 2j+1 code generation. Here, j refers to number of jammers where each transmission is sent on at most 2j+1 code simultaneously. The usage of codes is generally symmetric. Thus the keying scheme provides the considerable amount of transmission rate. In case if the transmission takes place with more number of spreading codes then the transmission rate is divided among the codes so in order to reduce this, tree remerging technique is introduced. By using this technique the benign users are grouped together and share the same spreading code thereby providing satisfactory amount of quality of service. The QPSK modulation of transmitting bits by selecting any one of the possible carrier phase shifts. In this paper we consider our network formation as the tree scheme. In the tree approach, we generally categorize root node and leaf nodes. In case if any new node enters into the networks, it should be authenticated by the root node which is meant as the transmitter. By authenticating, the newly generated node should will be recognized by all the other nodes that are already present in the network by sending the acknowledgement. Again the new code should be generated by the root node and transmitted to all the receivers in the network. Here, the leaf code works in the communication among the nodes at the receiver end thereby authenticating and communicating with the newly generated node.

We optimize this scheme by introducing our proposed concept of neighbour node (NN) technique for secure data transmission. The transmitter need not retransmit the lost data to the particular receiver again. Instead, one fully received data can be shared among the receivers in the network. We present all necessary background of the paper in Section II, we elaborate the modulation concept used and our system design. We then examine the keying scheme used in the broadcast networks in Section III. The jamming mitigation by our proposed system will be illustrated and simulated by presenting the results in Section IV and conclude in Section V.
II. SYSTEM DESIGN

In this proposed system, we used modulation technique to elaborate the communication channel. The spread spectrum concepts revolve around two modulation techniques namely: direct sequence- code division multiple access (DS-CDMA) and fast frequency hopping – code division multiple access (FFH-CDMA). The telecommunication takes place with spread spectrum technologies of using more bandwidth than the information signal that is being modulated.

A. Fast Frequency Hopping Spread Spectrum

The FHSS modulation technique uses the available channels to transmit and receive data, but rather than staying on any one channel, it rapidly switches between channels using a pseudorandom pattern that is based on an initial key; this key is made larger by employing a longer PN sequence and more pseudorandom sequence of 1 and −1 values, at a frequency much higher than that of the original signal. The resulting signal resembles white noise, like an audio recording of "static". However, this noise-like signal can be used to exactly reconstruct the original data at the receiving end, by multiplying it by the same pseudorandom sequence (because 1 × 1 = 1, and −1 × −1 = 1). This process, known as "de-spreading", mathematically constitutes a correlation of the transmitted PN (pseudo noise) sequence with the PN sequence that the receiver believes the transmitter is using. The resulting effect of enhancing signal to noise ratio on the channel is called processing gain. This effect can be made larger by employing a longer PN sequence and more chips per bit, but physical devices used to generate the PN sequence impose practical limits on attainable processing gain. If an undesired transmitter transmits on the same channel but with a different PN sequence (or no sequence at all), the despreading process results in no processing gain for that signal. This effect is the basis for the code division multiple access (CDMA) property of DS-SSS, which allows multiple transmitters to share the same channel within the limits of the cross-correlation properties of their PN sequences. The node senses its neighbourhood knowledge with the help of neighbour discovery protocol. This protocol provides the identification of which node is present nearby in the network by communicating via neighbour discovery protocol. This protocol takes place in three different phases by which they rely on. They consist of three messages in order to verify which node is present nearby. Those three types of messages are: leave, join, and join-reply. When a node is about to move into a new region, it broadcasts a leave message some time before leaving. This message indicates to its neighbouring nodes that they should begin tearing down the corresponding link if appropriate. When a node enters a new region and determines that it is going to remain there for sufficiently long, it broadcasts a join message. This message indicates to the neighbours that they should start setting up the corresponding link if they don’t have one already.

C. Neighbouring Discovery Process

It also serves as a request to learn the ids of neighbours. Nodes that receive a join message send a join reply message in response so that the original node can learn their ids. The timing of these messages ensures that the proper semantics of the corresponding links are maintained. This means that the overhead for setting up and tearing down links is taken into account, and reliable message delivery is guaranteed when a link in the Up state is torn down. A node broadcasts a join message upon entering a new region only if it is going to remain there for at least the amount of time required to set up and tear it down. Thus a node broadcasts a join message if it is going to remain in its new region for at least ΔLU + ΔLD + L time in the future where L<=0 is an application provided parameter.

III. KEYING SCHEME

Asymmetric cryptography such as RSA algorithms and Diffie – Hellman rely on the alleged asymmetry of certain computational functions to achieve public-key cryptography and digital signatures. Our work differs in that it overloads an inherently symmetric operation: wireless transmission.

KEY GENERATION ALGORITHM:

To generate the encryption and decryption keys, we can proceed as follows.

1. Generate randomly two “large” primes p and q.
2. Compute n = pq and _ = (p − 1)(q − 1).
3. Choose a number e so that gcd(e, _) = 1.
4. Find the multiplicative inverse of e modulo _, i.e., find d so that
   ed _ 1 (mod _).
   This can be done efficiently using Euclid’s Extended Algorithm.
   The encryption public key is KE = (n, e) and the decryption private key is KD = (n, d).
   The encryption function is
   E(M) = Me mod n.
   The decryption function is
   D(M) = Md mod n.
   These functions satisfy
   D(E(M)) = M and E(D(M)) = M
   for any 0 _ M < n.

Let’s look at a numerical example.
1. Let p = 7 and q = 13 be the two primes.
2. n = pq = 91 and _ = (p − 1)(q − 1) = 72.
3. Choose e. Let’s look among the primes.
   • Try e = 2. gcd(2, 72) = 2 (does not work)
   • Try e = 3. gcd(3, 72) = 3 (does not work)
• Try e = 5. gcd(5, 72) = 1 (it works)

We choose e = 5.

4. Let’s find d. We want to find d such that

\[ ed \equiv 1 \pmod{\phi(n)} \]

which is equivalent to find d such that

\[ ed + k \phi(n) = 1 \]

for some integer k. Recall that gcd(e, \phi(n)) = 1.

We can use the Extended Euclid’s Algorithm to find integers x and y such that

\[ ex + \phi(n)y = \gcd(e, \phi(n)) \]

If e = 5 and \phi(n) = 72, we find x = 29 and y = -2.

Indeed, \(5(29) + 72(-2) = \gcd(5, 72) = 1\). Then, d = 29.

In general, we use d = x mod \phi(n).

5. The encryption function is

\[ E(M) = M^e \mod n = M^5 \mod 91. \]

The decryption function is

\[ D(M) = M^d \mod n = M^{29} \mod 91. \]

6. Suppose the message is M = 10.

\[ E(M) = E(10) = 10^5 \mod 91 = 82 \]

\[ D(E(M)) = D(82) = 82^{29} \mod 91 = 10 \]

7. Let’s see how to compute efficiently \(82^{29} \mod 91\) using the square-and-multiply algorithm.

\[
\begin{align*}
(82)^1 & \equiv 82 \pmod{91} \\
(82)^2 & \equiv 81 \pmod{91} \\
(82)^4 & \equiv (81)^2 \equiv 9 \pmod{91} \\
(82)^8 & \equiv (9)^2 \equiv 81 \pmod{91} \\
(82)^{16} & \equiv (81)^2 \equiv 9 \pmod{91} \\
(82)^{29} & \equiv (82)^{16}(82)^8(82)^4(82)^1 \equiv (9)(9)(9)(82) \pmod{91} \\
& \equiv 10 \pmod{91}
\end{align*}
\]

We conclude that \(82^{29} \mod 91 = 10\).

The effectiveness of jamming and the difficulty of differentiating jamming from congestion have previously been discussed, but no solutions were proposed to traverse the jammed area jammed regions.

A. Spreading Codes

The current use of spreading codes in a spread-spectrum system is analogous to a symmetric-key cryptosystem, in which an encryption code and the corresponding decryption code are easily derivable from each other. For example, in the FH-CDMA system, encoding and decoding both use the same hopping pattern. By keeping each hopping pattern a secret between the transmitter and receiver, the hopping pattern effectively serves as a cryptographic key for both encryption and decryption. In particular, without the knowledge of the hopping pattern in use, a jammer at each time slot must randomly choose a set of frequency bands on which to emit power. If the jammer selects too many bands, then its effective power in each band is substantially reduced. On the other hand, if the jammer fails to jam most of the frequency bands specified in the hopping pattern, then the legitimate receiver. A spreading code can thus be viewed as a secret key signal which will likely have a higher received power level than the jamming signal after decoding and is likely to be successfully between the sender and the receiver, such that a jammer without the key is unable to effectively jam a message sent using that code. This symmetry presents significant challenges to the design of a broadcast system: A symmetric key should not be shared; otherwise a single compromised user can jam in a way that cannot be rejected by using spread spectrum alone. We present a protocol in which a broadcast transmitter possesses more knowledge than any proper subset of receivers, thereby creating an asymmetric system that allows detection and isolation of jammers.

IV. JAMMING DETECTION AND MITIGATION

A. Tree Scheme Approach

Each broadcast transmitter uses a structure similar to the multicast key tree. Each transmitter builds a balanced binary tree of randomly generated spreading codes. The transmitter associates each legitimate receiver with a unique leaf in this binary tree and gives this receiver the spreading codes corresponding to that leaf and all ancestors of that leaf in the tree.

For example, in the Fig.1, user 31 would have access to spreading codes 28 and 41. In the initial phase of our protocol, a transmitter transmits to all receivers on a single spreading code; specifically, it would choose the spreading code corresponding to the root of the tree and gives this receiver the spreading codes corresponding to that leaf and all ancestors of that leaf in the tree.
the test spreading code. We call this ancestor code the detectable spreading code.

If no jammers are present, each receiver should get either one or two identical messages; the first encoded using one of the codes from the cover, and possibly a second encoded using the test code. If any receiver receives the second message without receiving the first, then he should suspect jamming on the detectable code. Any receiver detecting jamming in this manner should report that finding to the transmitter, for example by transmitting a JAMMING DETECTED message using the leaf code shared between the transmitter and the detecting receiver (because no jammer knows that leaf code). The transmitter can then spend a short time period listening for these jamming reports on the leaf codes corresponding to the set of receivers that can receive the test message. For example, if a parent code of two leaf codes was chosen as the test code, the transmitter listens on the two children leaf codes for any jamming report for some time after testing. In some instances, jamming on the detectable code will not be detected. This can happen either when the message is also lost on the test code or when all benign users who hold the test code are absent.

B. Code Tree Merging

We describe a tree remerging scheme that is equivalent to reassigning codes in order to merge two groups of receivers, where each group represents a subtree of the original code tree. Our tree remerging scheme allows a transmitter to split and reform code tree to reduce the number of codes in the cover. Our remerging scheme is crucial in conserving the number of codes on which a transmitter must transmit simultaneously. When new tree nodes are created, new codes are also created. To disseminate these codes, the transmitter periodically broadcasts new ancestor codes on codes that were part of the original tree. For example, if was a code on the original tree, and the main tree has new ancestors for , the transmitter will broadcast the codes of those new ancestors using the code , so that all receivers with code can learn the new ancestor codes. Because of mobility and varying wireless propagation conditions, these broadcasts may need to be repeated periodically. Another approach is to disseminate the current cover using the testing mechanism. When the base station transmits on a test code, the message includes all ancestor codes of that particular test code.

Thus, whenever a code known to a receiver is selected for testing, that receiver is able to update the ancestor codes to which he has access. This dissemination technique is desirable since some receivers might not know the current cover and would redundantly report jamming detection when tested. All our algorithms will require the tree to start this way and will return the tree to this condition when complete. Our tree operations may change the ancestors of some tree nodes; in this case, we randomly generate new codes for all affected ancestor nodes and disseminate the new codes as described later in this section. When new tree nodes are created, new codes are also created. To disseminate these codes, the transmitter periodically broadcasts new ancestor codes on codes that were part of the original tree. This process is illustrated by representing the nodes in the below figure in the tree structure. The following example is based on the empty nodes and the height of the tree. Upon these attributes the ancestor code is generated.

C. Neighbouring Node Technique

Initially, all receivers should be at the transmission range to overcome jamming. Usually the data transmission is done with the help of spreading codes. These codes are used at the encoding and decoding ends in order to receive secure data without the loss of packet. In our proposed system, we introduce neighbour node technique. This technique involves in avoiding jamming attack in wireless networks. We introduce this concept that tends to deliver secure data to the receiver. The brief illustration will be given by the following figure for this technique. This can be explained using a tree pattern in which each node is considered to be neither receiver nor transmitter. We just represent the nodes in the tree assumption.

In Fig.3, the jammed node is represented as C3, when jamming is detected then the root node has to resend the data through alternate path. Consider the transmitter has to choose C2 as the alternate path and use other possible spreading code and transmit the data. In our proposed system, in order to avoid time delay and high data efficiency rate the NN technique is used. In this concept, one fully received data by anyone of the receiver will be shared and sent to the other receiver that does not receive the accurate data. By using this concept, the data is received without any damage and data efficiency is also improved.
V. CONCLUSION

The proposed system provides the secure data communication. The utilization of spreading codes used for encoding and decoding enables the communication to authenticate users, thereby unauthorized users cannot access the data. The implementation of neighbouring node technique provides data accuracy and efficiency. This emphasize on sharing the data among the receivers, added with reduction of time delay in receiving the data. The fully received data by anyone of the receiver will be shared and thereby providing less time consumption in receiving the accurate data. This also leads to conserve usage of spreading codes during data communication. We simulate our proposed system by using ns2 simulator that provide best possible results and performance that improve the high data transmission rate and to avoid jamming attack.

VI. EXPERIMENTAL RESULTS

Ns or the Network simulator (also popularly called ns-2) is a discrete event network simulator. It is popular in academic for its extensibility (due to its open source model) and plentiful online documentation. Ns is popularly used in the simulation of routing and multicast protocols, among others, and is heavily used in ad-hoc networking research. Ns supports an array of popular network protocols, offering simulation results for wired and wireless networks alike. It can be also used as limited – functionality network emulator. Ns is licensed for use under version 2 of the GNU General Public License. Ns or the Network simulator (also popularly called ns-2) is a discrete event network simulator. It is popular in academic for its extensibility (due to its open source model) and plentiful online documentation.

This simulator is used in our project implementation. According to the neighbouring node technique, the software initially creates network with node formation. Originally, the data is transmitted to the series of receivers through varies nodes, in case of any jamming cause, then the receivers requests the neighbour node and receive the data in secured manner. This process is illustrated clearly using network simulator. Following are our implementation screenshots of our project.

EXECUTION SCREENSHOTS:

Formation of Possible Paths from Transmitter to Particular Receiver
Transmission of data
Detection of Jammed Node

Transmission of Data from Neighbour Node after Jamming Takes Place
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Abstract - The next generation protocol (Ipv6) also called Iping which should replace the current generation of Internet protocol (Ipv4), brings many enhancements over Ipv4. As for increasing demand on Internet and global IP mobility, IPv6 (Internet Protocol version 6) is designed as the next generation Internet protocol to replace the currently used IPv4 protocol. In general, all the options fields of the IPv6 header are not present in the main IPv6 header and flexible extension headers that are placed in between the IPv6 header and the transport layer header were created instead. These extension headers provide support in IPv6 for features, such as security (in the form of IPSec), source routing, network management and fragmentation. In this paper, key extension header of IPv6 including routing header, fragmentation, destination option, authentication are summarized.

Index Terms - Ipv4, Ipv6, network security, Ipv6 packet filtering.

I. INTRODUCTION

IPv6 provides an improved version of the Internet Protocol and is intended to replace the current IPv4 specification. IPv4 has proven to be robust, interoperable and easily implemented. However there are some problems with ipv4 like too large routing tables, limited address space and lack of security which does not fulfill the requirement of the exponential growth of internet. To eliminate some of the mention imperfection above in IPv4, Network working group of the Internet engineering task force (IETF) proposed a new suite of protocols called the Internet protocol version (Ipv6)[1]. IPv6 is the next-generation Internet Protocol designed by the Internet Engineering Task Force (IETF) to replace the current IP Version 4 (IPv4) protocol used predominately on the global Internet today. IPv6 is necessitated by the inherent limitations of the current IPv4 protocol, as well as numerous economic, geopolitical, and technological requirements. IPv6 will soon be implemented on most private and public networks, typically as IPv4/IPv6 dual-stack deployments, and that an increasing number of data, voice, video applications will support and rely on the IPv6 network layer [2].

Ipv6 protocol has many features or advantages as compared to Ipv4 protocol such as follows. The address size of IPv6 is increased to 128-bit. The increased address size can solve the problem of lack of space of Ipv4 and can offer a deeper addressing hierarchy and simpler configuration. IPv6 header format is simplified by fixing the length of the header and simplified header can be handled faster with lower processing costs. IPv6 options are handled as extension headers and these headers can give the flexibility to the IPv6 packet configuration. By some special extension header, it can be provided that authentication of packet generation, data confidentiality and integrity. High quality of service will be provided by flow labeling capability[3][4]

All the options fields of the IPv4 header are not present in the main IPv6 header and flexible extension headers that are placed in between the IPv6 header and the transport layer header were created instead. These extension headers provide support in IPv6 for features, such as security (in the form of IPSec), source routing, network management and fragmentation. There are six Extension Headers: Hop-by-Hop option, Destination option, Routing, Fragment, Authentication and Encapsulation Security Payload. Different extension headers can be chained together in a packet. Each extension header also has a Next Header field, which is used to identify the header following it. Extension headers should always be chained together in the order they are listed below. This is to facilitate the processing of these headers at the destination [5].

Although study on IPv6 has been under way for several years, there are still some debates, more research and study are desirable. This article presents the description of various extension headers of IPv6 and focusing primarily on the routing header.

II. TYPE 0 ROUTING HEADER

A. Routing Header

Presently, there is only one type of routing header defined for IPv6, type 0, which is similar to the Loose Source Routing option of IPv4. The security problems experienced with source routing in IPv4 have not transferred to IPv6 because there is no requirement that the destination host uses the inverse route in the source routing header to send the return packets. It can just send the packets directly to the source of the packet, so if the original packet was from a spoofed address the legitimate host will just reset the connection [5].

Routing header is a kind of extension headers of IPv6 and is used by an IPv6 source to list one or more intermediate nodes to be visited on the way to a packet's destination. When routing header is used, destination header in IPv6 header is not the final node but just the next node[6]. Different “types” of routing headers may be used. The “type 0” routing header is similar to IPv4’s loose source routing option. Its header comprises of a next header field, which identifies the header following it (as before); the Hdr Extn Length, which gives the length of the routing header (in the type 0 case, the Hdr Extn Length is twice the number of addresses given in the header); the routing header type; the Segments Left field, which identifies how many nodes must still be visited by the packet; a 32-bit reserved field that is to be ignored; and finally the addresses that must be visited enroute by the packet.
B. Format of Routing Header[6][7]

The Routing header is used by an IPv6 source to list one or more intermediate nodes to be "visited" on the way to a packet's destination. This function is very similar to IPv4's Loose Source and Record Route option. The Routing header is identified by a Next Header value of 43 in the immediately preceding header. Below is the format of type 0 routing header:

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Next Header</td>
<td>8-bit selector. Identifies the type of header immediately following the Routing Header.</td>
</tr>
<tr>
<td>Hdr Ext Len</td>
<td>8-bit unsigned integer. Length of the routing header in 8-octet units, not including the first 8 octets.</td>
</tr>
<tr>
<td>Routing Type</td>
<td>8-bit identifier of a particular Routing Header variant.</td>
</tr>
<tr>
<td>Segments Left</td>
<td>8-bit unsigned integer. Number of route segments remaining.</td>
</tr>
<tr>
<td>Reserved</td>
<td>32-bit reserved field which is initialized to zero for transmission and ignored on reception.</td>
</tr>
<tr>
<td>Address</td>
<td>[1..n] Vector of 128-bit addresses which numbered from 1 to n.</td>
</tr>
</tbody>
</table>

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Remote Client Authentication using Mobile phone generated OTP

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Abstract- In today's world of distributed data sources and Web services, remote client authentication is very important to protect customer's sensitive data over Internet. Common example of remote client authentication is the service like Internet banking. Passwords are most common type of solution used today to authenticate a User. Weak password and bad password habits represent security threats to online services. Some solutions provide two factors to authenticate a User before giving access to the service. This two factor authentication provides improved protection, since Users are prompted to provide something they know and something they have. This second factor may be a hardware device (token) or the specific software loaded device like mobile phone. But for hardware token it does have its own disadvantages like cost, maintenance of hardware device. In case of time-synchronized OTP on mobile phone, for successful login, both server and User mobile phone must be time synchronized. Due to the general nature of mobile phones (e.g. out of network / manual settings etc.), such synchronization cannot be guaranteed. Many banking systems have satisfied the 2FA requirements by sending a One Time Password (OTP), something possessed, through an SMS to the User's phone device. Unfortunately, international roaming and SMS costs and delays put restrictions on this system reliability.

This paper presents a one factor authentication scheme where one time password is generated on User's mobile phone. Client and Server side OTP algorithms use User's attempt number and credentials to generate OTP. Client side attempt number is the number of time User is generating OTP on mobile device. And server side attempt number is User's attempt number to login onto the website. Server then validates the User based on OTP entered. This method neither requires synchronization between mobile device and server nor sending SMS-based OTP to Users. This method is more secured as strong passwords are generated using strong hash functions.

Index Terms- Authentication, J2ME, OTP, IMEI

I. INTRODUCTION

Authentication: By definition, authentication is the use of one or more mechanisms to prove that you are who you claim to be. Once the identity of the human or machine is validated, access is granted. Three universally recognized authentication factors exist today: what you know (e.g. passwords), what you have (e.g. ATM card or tokens), and what you are (e.g. biometrics). Remote authentication means any infrastructure in which client and server are connected via some potentially insecure network such as Internet. Remote authentication where User's sensitive data like transaction data, financial data is handled needs strong protection. Internet banking is the good example where strong remote authentication is needed.

So far, researchers have proposed many remote authentication methods, including simple passwords, one time passwords either SMS-based or time synchronized, public-key infrastructures (PKIs), biometrics running on desktop PCs. Each method has reason to exist, based on design criteria for the overall usage scheme.

Static passwords: These come with major management security concerns. Users tend to use easy-to-guess passwords, use the same password in multiple accounts, write the passwords or store them on their machines, etc. Furthermore, hackers have the option of using many techniques to steal passwords such as shoulder surfing, snooping, sniffing, guessing, etc.

One time passwords: These can also be referred as variable passwords and valid for one use only. The idea of OTP (One-Time Password) was first suggested by American scientist Leslie Lamport [1] in early 1980s of the 20th century. The principle of OTP is adding some uncertain factors in the procedure of authorization. Every time User logsins, the information transmitted on network is different, thus the security is improved [3].

Every time User gets a new password. This password generation is done using a hardware device which is provided by service provider to User. This provides strong OTP for getting access to service but again it needs cost of purchase, distribution and maintenance at service provider side. At User side, User has to maintain multiple hardware devices for multiple login and protect them from theft or damage.

There are different OTP generations methods are available. Some of the methods are listed below:

A. The S/Key™ OTP System

The S/KEY™ [5] one-time password authentication system uses a computation to generate a finite sequence of single-use passwords from a single secret "seed." This involves applying hash function h for N times to a seed "s" to form a hash chain of length N. This scheme is constrained to a certain number of authentications N, so that after reaching N authentications, a process restart is required.

B. Bicakciet al.'s Scheme

The infinite length hash chains (ILHC) proposed by [6] use a public-key algorithm, A, to produce a forward and infinite one-way function (OWF). It has increased computational complexity,
making this algorithm very difficult to implement in limited computation devices e.g., mobile phones.

C. RSA SecurID Authenticator

RSA SecurID® utilizes a token [7], which could be hardware or software, with a main server synchronized internal clock. Due to the general nature of mobile phones, such synchronization cannot typically be guaranteed.

Mobile phone as software token: Advances in mobile technology, the overall stability of mobile communication technologies, allowed using mobile phones in variety of services. Security and convenience are the two main motivations for using these devices in number of applications. These days there is almost nothing more common than a mobile in the enterprise: everyone has one. Now a day some service providers are using Users mobile phone to generate OTP or to send OTP before giving access to the service. Major advantage of involving a mobile phone is that most Users already have mobile phones, and therefore no extra hardware token needs to be bought, deployed, or supported only the needed application has to be loaded on mobile phone (e.g OTP program). The traditional system [1] works by sending an OTP over an SMS to a User who wants to make an online transaction. However, this authentication system suffers from the following shortcomings:

A. SMS Cost

During every login request or transaction process, it is necessary to send an SMS-OTP from the bank to the User. This, in turn, will be costly to the bank with the consideration of statistics of bank's transactions [2], [3].

B. SMS Latency

The SMS transmission delay represents one of the major limitations of the traditional system [3].

C. International Roaming

Travelling overseas creates restrictions on the SMS services. Turning off the roaming service will prevent the bank from sending the SMS-OTP, which in turn, stops the User from resuming any further processes.

D. SMS Security

It can be said that while designing the GSM system, it had all security measures in mind, but as time passed and algorithms were cracked by the hackers [4], SMS-OTP based systems were not kept secure.

In case of time-synchronized OTP systems, which are typically based on an internal clock synchronized with a main server, are not applicable for mobile phones. In addition, due to the general nature of mobile phones (e.g., out of network, etc.); such synchronization cannot typically be guaranteed.

After analysing different methods of OTP generation and understanding use of mobile phone in authentication we have proposed a scheme of using User's mobile phone in remote client authentication. Our proposed method tries to overcome above mentioned limitations. Here a separate OTP generation algorithm is discussed which can be easily implemented for devices with limited resources like mobile phone. Our OTP algorithm uses strong hash functions making generated OTP strong and more secure. Mobile generated OTP is used by User for authentication thereby we are trying to overcome limitations specified above for SMS based OTP. In our method it is not required to have time synchronization between User's mobile phone and service provider's server for authentication purpose.

The rest of the paper is organized as follows:

Section II discusses proposed method of remote client authentication. Section III includes Design of Proposed Solution and its’ implementation. And finally Section IV gives performance analysis and concludes the paper.

II. PROPOSED SOLUTION OF REMOTE AUTHENTICATION

In our approach User's mobile phone acts as a software token and uses certain factors unique to it among other factors to generate a one-time password locally. The server will have all the required factors including the ones unique to each mobile phone in order to generate the same password at the server side and compare it to the password submitted by the client.

Following diagram gives brief overview of the proposed system.

![Proposed System Overview](image)

Figure 1: Proposed System Overview

A. OTP Algorithm

In order to secure the system, the generated OTP must be hard to guess, retrieve, or trace by hackers. Therefore, it's very important to develop a secure OTP generating algorithm. The following factors are selected in OTP computation:

- IMEI number: The term stands for International Mobile Equipment Identity which is unique to each mobile phone.
- Username: In our system Username is a unique name.
- PIN: This is the password or lock which is given by the User to his OTP module to protect it from being executed by other person.
- Attempt Number: Mobile Attempt Number(MAN) and Server Attempt Number (SAN)

While computing OTP at User's end we are checking the User's attempt number to run OTP algorithm on his mobile phone (MAN) along with User credentials. Using the OTP generated on mobile device, User logsins to the login page. At server end, server keeps track of User's login attempt number (SAN). Server then uses this attempt number in computing OTP along with User's credentials stored in the database. After every successful login, this attempt number is updated automatically at both ends.

Steps of OTP algorithm:

1. Algorithm first concatenates all above mentioned fields (except MAN/SAN). SHA256 encryption algorithm is applied on concatenated string.
2. A strong hash function (like SHA256 or MD5) is applied to attempt number to get hash value of MAN and SAN. This value can be used as salt while applying SHA256 on concatenated string formed in step 1. The result will be 256 bit length string.
3. The result is then divided into two halves and XORed.
4. Step 3 is repeated till we get some small size result which is our OTP.
5. MAN and SAN are then updated by some unique logic at both the ends so that this updated number can be used in next authentication process.

B. Synchronization
If the User has generated numerous OTPs without using them, MAN becomes different than SAN. Which means if User-OTP value is different than server's OTP then server will generate next three OTP values including server's OTP value for current SAN to do validation. If User's OTP value does not match with these three OTP values then User's account will be locked and User will be shown the message accordingly. Then User has to contact to the enterprise to synchronize MAN and SAN. In this process, User gets some value which he has to feed in Synchronize module of his mobile device. Enterprise then updates SAN for this User in the database.

Below is the process flow: (refer figure: 1)

1. Registration of User mobile device with service provider. During this registration, the MAN and SAN will be synchronized and stored.
2. The User opens the service provider's website (flow number 1).
3. User then request for OTP from his mobile phone (flow number 2).
4. Mobile phone returns generated OTP to User. (flow number 3A)
5. Mobile OTP application updates MAN. (flow number 3B)
6. He enters unique User name and OTP generated on his mobile phone to get access into the Website. (flow number 4)
7. Website sends entered OTP to server for authentication. (flow number 5)
8. Server then generates OTP for this unique User. (flow number 6)
9. If both these OTP values match, User gets access to the website. (flow number 7A) and server updates SAN (flow number 7B)
10. But if these OTP values are not same then server uses next three SAN and generated three OTP values. If the math found then server allows User to login and updates SAN else locks User's account and sends the message accordingly. To unlock the account User has to contact enterprise. Then the MAN and SAN will be re-synchronized.
11. During this synchronization, administrator gives User some code using which the mobile's synchronization module updates MAN. Similarly SAN will be updated in the database.

III. DESIGN OF PROPOSED SOLUTION AND ITS IMPLEMENTATION

In this proposed method of remote client authentication using mobile phone, a mobile phone should have the following minimal set of features.
1. Ability to install the applications (typically applications which use MIDP).
2. Moderate graphical interface.
   A. Client Design

Selected application Enter PIN to use Selecting option

Selected application Enter PIN to use Selecting option

Figure 2: Mobile Sample screen

A program can be developed and installed on any programmable mobile phone to generate the OTP. The OTP program has the option of (1) generating the OTP using the mobile credentials, e.g. IMEI, PIN numbers, or (2) Synchronization (to synchronize MAN). In order to execute the OTP program, the User must enter the PIN and select the OTP generation method. The Username generated OTP are never stored on the mobile phone.

B. Server Design
A database at enterprise will store all required data to generate OTP such as the unique Username, PIN, IMEI number, and the mobile number.

IV. PERFORMANCE ASSESSMENT AND CONCLUSION

The performance evaluation considers the computational cost from the User side. The algorithm discussed can be easily implemented on mobile device considering its resource limitations. Discussed OTP algorithm is simple to understand and generates more secure and strong OTP for authentication purpose. Time based algorithms have to guarantee a main server synchronized internal clock and SMS based OTP approach involves SMS cost. But our approach doesn't involve public key techniques, and has no need of utilizing time synchronization.

Thus we have discussed a strong remote client authentication method using OTP generated on User's mobile phone which works effectively without any restrictions.

REFERENCES

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Abstract- The differential counting of white blood cell provides invaluable information to doctors for diagnosis and treatment of many diseases. Manually counting of white blood cell is a tiresome, time-consuming and susceptible to error procedure due to the tedious nature of this process, an automatic system is preferable. In this automatic process, segmentation and classification of white blood cell are the most important stages. An automatic segmentation technique for microscopic bone marrow white blood cell images is proposed in this paper. The segmentation technique segments each cell image into three regions, i.e., nucleus, cytoplasm, and background. In this paper, we investigate whether information about the nucleus alone is adequate to classify white blood cells. This is important because segmentation of nucleus is much easier than the segmentation of the entire cell, especially in the bone marrow where the white blood cell density is very high. Even though the boundaries between cell classes are not well-defined and there are classification variations among experts, we achieve a promising classification performance using neural networks with fivefold cross validation in which Bayes' classifiers and artificial neural networks are applied as classifiers. The classification performances are evaluated by two evaluation measures: traditional and classwise classification rates. We compare our results with other classifiers and previously proposed nucleus-based features. The results show that the features using nucleus alone can be utilized to achieve a classification rate of 77% on the test sets. Moreover, the classification performance is better in the class wise sense when the a priori information is suppressed in both the classifiers.

Index Terms- Automatic white blood cell classification, granulometric moments, mathematical morphology, pattern spectrum, white blood cell differential counts.

I. INTRODUCTION

In the traditional process, doctors analyze human blood by microscopy. This manual process is time consuming and susceptible to error procedure thus, an automatic system seems necessary and helpful. The automatic DBC system may require four stages: 1) acquisition, 2) detection, 3) feature extraction, and 4) classification. In the first stage, the blood smear is magnified to a suitable scale under the microscope, and then transformed to a digital image. In the second stage, cell segmentation is used to produce a number of single-cell images. Then each single-cell image is segmented into three regions: 1) nucleus, 2) cytoplasm, and 3) background.
are normally seen only in the bone marrow which, thus, makes cell classification in bone marrow a more difficult and also a complex problem. Sanei and Lee achieved classification rates of more than 95% for mature cells in normal blood, more than 85% for immature cells in the blood, but only just over 70% for immature cells in bone marrow.

Most of the proposed automatic techniques follow the traditional manual process of detecting a cell, extracting its features, classifying the cell, and then updating the counts. There are three types of cells in normal human blood: red cells, leukocytes or white cells and blood platelets. Generally, red cells are simple and similar. While white cells contain nucleus and cytoplasm and there are different types of them. In our paper we are considering only the nucleus. In blood smear, number of red cells is many more than white cells. For example, an image may contain up to 100 red cells and only 1 to 3 white cells. In laboratories, haematologists analyse human blood by microscope. Their main tasks in this area are: red cell count, white cell count and blood disorder detection. It is tedious task to locate, identify and count these classes of cells. Due to the importance of these processes, an automated system seems necessary and helpful. White cells are clinically more important than red cells and many of blood disorders are related to them. Thus, accurate segmentation of these cells is very important. White blood cells count is used to determine the presence of an infection in the human body. The segmentation step is very crucial because the accuracy of the subsequent feature extraction and classification depends on the correct segmentation of white blood cells. It is also a difficult and challenging problem due to the complex nature of the cells and uncertainty in the microscopic image. Therefore, this step is the most important challenge in many literatures and improvement of cell segmentation has been the most common effort in many research works. Most of the proposed automatic techniques follow the traditional manual process of detecting a cell, extracting its features, classifying the cell, and then updating the counts.

Our previous research concentrated on the counting of white blood cells specifically in bone marrow. We developed the mixing theories of mathematical morphology, and applied them to the counting problem without classification. We also developed a new training algorithm for neural networks in order to count the number of different cell classes without classification. In this paper, we propose a method for the classification of white blood cells using only their nucleus information. This idea is very useful in practice because one of the difficulties in the differential counting in bone marrow is how to deal with the cells that touch each other. This problem occurs frequently in cells of the bone marrow because there the white blood are very dense. If the cell classification is based only on the information about the nucleus, then we do not need to segment the entire cell, and only nucleus segmentation is adequate. Although many techniques have been applied to cell segmentation, this problem is not solved, especially in touching cells. To decouple the effects of segmentation errors, we extract features from manually segmented nucleus of a white blood cell based on morphological granulometries. We apply Bayes classifiers and artificial neural networks to the problem of white blood cell classification of single-cell images and compare their results to those obtained by an expert. We also compare the results to other classifiers and other previously proposed features. In this paper, we also propose an algorithm that keeps the original shape of the blood cell and uses information of this shape to split the overlapped regions by drawing a conical curve.

II. METHODOLOGY

In this research, we use artificial neural networks as our classifiers in the six-class problem. The input features are mainly extracted from pattern spectra of nucleus. To be more specific, we use six features – two are area-based, the remaining four are morphology-based.

1. Mathematical Morphology

Mathematical morphology is a branch of nonlinear image processing and analysis. Morphological methods are used in many ways in image processing, for example, enhancement, segmentation, restoration, edge detection, texture analysis, shape analysis, etc. It is also applied to several research areas, such as, medical imaging, remote sensing, military applications, etc.

2. Morphological Operations

Morphological operations are non-linear, translation invariant transformations. We describe binary morphological operations only. Binary images can be considered as functions on two dimensional grids with values of 0 or 1 or, equivalently, as characteristic functions of subsets of the two-dimensional plane. The concept of structuring element is fundamental in morphology; it is the analogue of a convolution mask in linear image processing. The basic morphological operations involving an image $S$ and a structuring element $E$ are:

- **erosion**: $S \ominus E = \cap \{S - e: e \in E\}$
- **dilation**: $S \circ E = \cup \{E + s: s \in S\}$,

where $\cap$ and $\cup$ denote the set intersection and union, respectively. $A + x$ denotes the translation of a set $A$ by a point $x$, i.e.

$$A + x = \{a + x: a \in A\}.$$  

The closing and opening operations, derived from the erosion and dilation, are defined by:

- **closing**: $S \oplus E = (S \ominus (-E)) \ominus (-E)$
- **opening**: $S \ominus E = (S \ominus E) \ominus E$

where $-E = \{-e: e \in E\}$ denotes the 180° rotation of $E$ about the origin.

![Fig. 2](https://example.com/fig2.png)  

**Fig. 2.** Samples of an image $S$, structuring element $E$, and outputs of the erosion, dilation, closing and opening operators.

3. Pattern Spectrum

We successively apply the opening operation to an image and increase the size of structuring element in order to diminish the
image. Let $\Omega(t)$ be area of $S\{E \mid t\}$ where $t$ is a real number and $\Omega(0)$ is area of $S$. $\Omega(t)$ is called a size distribution.

The normalized size distribution $\Phi(t) = 1 - \Omega(t)/\Omega(0)$, and $d\Phi(t)/dt$ are called granulometric size distribution or pattern spectrum of $S$.

4. Feature Extraction

We focus our feature extraction on themorphy-based features. Hence, we will introduce their derivations here. For a random set $S$, $\Omega(t)$ is a random function. The normalized size distribution $\Phi(t) = 1 - \Omega(t)/\Omega(0)$, the so-called pattern spectrum of $S$, is a probability distribution function. Its moments, $\mu(1)(S)$, $\mu(2)(S)$,.., are therefore random variables namely granulometric moments. In this research, we consider nuclei as an object of interest. We calculate a pattern spectrum of each cell’s nuclei and calculate the first and second granulometric moments of the pattern spectrum to achieve our features. We also extract two other features from each nucleus, i.e., the area of the nucleus and the location of its pattern spectrum’s peak. We, therefore, determine four feature values for each cell image. To form an input feature vector to a neural network, we extract six features from each cell, i.e.,

- the area of cell,
- the nuclei-to-cytoplasm ratio,
- the maximum value of a pattern spectrum,
- the location where the maximum value of a pattern spectrum occurs,
- the first granulometric moments and
- the second granulometric moments.

We select a small digital disc as the structuring element in our experiments. The structuring element is shown in Figure 3.

![Fig. 3: Structuring element used in the experiments.](image)

5. Bayes Classifier

Bayes classifier is a traditional statistical-based classifier that analyzes discriminant functions by using Bayes’ theorem. Consider a classifier, we assign an input vector $x$ to class $C_k$ if $y_k(x) > y_j(x)$ for all $j \neq k$. By choosing $y_k(x) = P(C_k|x)$, this posterior probability is the probability of pattern belonging to class $C_k$ when we observe the input vector $x$. Bayes’ theorem yields $y_k(x) = P(C_k|x) = P(x|C_k)P(C_k)\ p(x)$, (9) where $p(x)$ is the unconditional density and $P(C_k)$ is the prior probability of the $k$th class. Assuming the conditional probability density is normal, i.e.,

$$p(x|C_k) = \frac{1}{(2\pi)^{d/2} \sum_k |\mu_k|^{d/2}} \exp\left(-\frac{1}{2} (x - \mu_k)^T \sum_k^{-1} (x - \mu_k)\right). \quad (10)$$

$$y_k(x) = P(C_k|x) = \frac{p(x|C_k)P(C_k)}{p(x)},$$

A theorem describing how the conditional probability of a set of possible causes for a given observed event can be computed from knowledge of the probability of each cause and the conditional probability of the outcome of each cause

$$\text{Posterior} = \frac{\text{likelihood} \times \text{prior}}{\text{normalizing constant}}$$

Fig. 4: Objects classified as RED and GREEN

Here the objects can be classified as either GREEN or RED. Our task is to classify new cases as they arrive, i.e., decide to which class label they belong, based on the currently existing objects. Since there are twice as many GREEN objects as RED, it is reasonable to believe that a new case (which hasn’t been observed yet) is twice as likely to have membership GREEN rather than RED. In the Bayesian analysis, this belief is known as the prior probability. Prior probabilities are based on previous experience, in this case the percentage of GREEN and RED objects, and often used to predict outcomes before they actually happen.

Thus, we can write:

Prior probability for GREEN $\alpha \frac{\text{Number of GREEN objects}}{\text{Total number of objects}}$

Prior probability for RED $\alpha \frac{\text{Number of RED objects}}{\text{Total number of objects}}$

Since there is a total of 60 objects, 40 of which are GREEN and 20 RED, our prior probabilities for class membership are:

Prior probability for GREEN $\alpha 40/60$

Prior probability for RED $\alpha 20/60$

Having formulated our prior probability, we are now ready to classify a new object (WHITE circle). Since the objects are well clustered, it is reasonable to assume that the more GREEN (or RED) objects in the vicinity of X, the more likely that the new
cases belong to that particular color. To measure this likelihood, we draw a circle around X which encompasses a number (to be chosen a priori) of points irrespective of their class labels. Then we calculate the number of points in the circle belonging to each class label. From this we calculate the likelihood:

\[
\text{Likelihood of } X \text{ given GREEN } \propto \frac{\text{Number of GREEN in Vicinity of } X}{\text{Total number of GREEN cases}}
\]

\[
\text{Likelihood of } X \text{ given RED } \propto \frac{\text{Number of RED in Vicinity of } X}{\text{Total number of RED cases}}
\]

6. Morphological Separation
Overlapped and cluttered cells are an inevitable, unsolved, and usually ignored problem in blood slide analysis. It is up to the technician to chose an ideal work area in the smear where the cells are neither too cluttered nor to disperse. In the more disperse area the cells extend due to the lack of pressure and lose characteristic morphology and in the cluttered area they are indistinguishable one from the other. have proposed automated criteria for the choosing of an ideal area. Our approach has been to use the morphology of the background-cell border as an initial approach to the cells forms, using a priori knowledge of the cell. We later make use of local information, such as edges or grey scale connectivity, in a top down segmentation scheme to refine the classifying and find cells deeper down the cluster. The watershed algorithm has been widely used as it subdivides the image in catchment basins and clusters together pixels based on spatial proximity and similarity of the gradient.

7. Separation of overlapped blood cells
Figure 4 summarizes the process of cell separation once the overlapped region is identified. in order to split the overlapped regions we obtain the edges of the region an its centroid and we provide some concave points as points of separation. Then we transform edges from a Cartesian to a polar space, and we interpolate discontinuous points using a linear interpolation this allows completing cell borers with a conical shape. Finally we join some edges discontinuities by applying morphological operations.

![Cell Separation Procedure](image)

III. DATA DESCRIPTION

We used the gray-scale bone marrow images. The images were taken from a slide of a patient’s bone marrow smear, without any information about his/her health condition, by an Olympus BX50 microscope, a Sony B/W charge-coupled device (CCD) camera, and an 8-bit digitizer (PDI IMAXX.) Magnification of 600× was used without any special filters. Each white blood cell image was cropped manually to form a single-cell image. Then, a single-cell image was segmented manually into nucleus, cytoplasm, and background region. The data set consists of six classes of white blood cells—myeloblast, promyelocyte, myelocyte, metamyelocyte, band, and PMN.

IV. EXPERIMENTAL FRAMEWORK

Four features are extracted from each cell’s nucleus. The features are used as the inputs to two types of classifiers, i.e., a Bayes classifier and an artificial neural network classifier. A fivefold cross validation is applied to let us perform the training and testing on the data set. The classification results are evaluated in terms of the traditional classification rate and the classwise classification rate. In this section, we describe the nucleus feature extraction, the classification performance evaluation, and the experimental results and analysis.

A. Classwise Classification Rates
In a classification problem, we generally evaluate a classifier’s performance using the traditional classification rate, which is the ratio of the total correct classifications to the total number of samples classified. In addition to the traditional classification rate calculation, we consider another rate called the classwise classification rate. Basically, the classwise classification rate is the average of the classification rates of all classes, i.e.,

\[
\text{classwise classification rate} = \frac{1}{C} \sum_{i=1}^{C} \frac{\text{number of correct classification in class } i}{\text{total number of samples in class } i}
\]

Where C is the number of classes. The basic idea of the classwise rate is to take out the effects of the number of samples in the training. While the traditional classification rate may be high if a large number of correct classifications occur in a class consisting of a large number of samples, the classwise rate is high only if all the classes have large numbers of correct classifications compared to their corresponding total number of samples. Therefore, we prefer to have a classifier that provides good classification performance in both the traditional and class wise senses.

B. Experimental Methods
Both the Bayes classifier and artificial neural network classifier require supervised learning, i.e., training and testing with known classified samples. From the data description, the available data set is not divided into training and test sets; however, we need to have training and test sets to train and test our classifiers to evaluate their generalization properties. We, therefore, apply the cross validation method, which is a standard solution of the aforementioned limitation. The experiments are performed using the fivefold cross validation method.

1) Bayes’ Classifiers: We initially performed the cell classification using Bayes classifiers due to their simplicity. It is assumed that the conditional probability density is normal. There are two parts in the experiments of evaluating our features using Bayes’ classifiers. First, the a priori class probabilities \( P(Ck) \) are calculated from the proportion of the numbers of cells in the training set and second, all the six cell classes are assumed equally likely, i.e., \( P(Ck) = 1/6, k = 1, 2, \ldots, 6 \).

2) Neural Networks: We chose a feedforward neural network consisting of one hidden layer of five hidden neurons. The desired output was set to 0.9 for the output neuron corresponding...
to the labeled class, and 0.1 for the other output neurons. The networks were trained using the LM algorithm. The training stops when the maximum number of epochs reaches 100 or the mean square error is less than 10−6. From the results obtained for the Bayes classifiers, we guessed that the same generalization problem would also happen for neural networks. To cope with the problem, we changed the desired output value such that it was smaller for a class that contains a larger number of samples. We achieved that by setting the desired output of the labeled class to

\[ d = 1 - \frac{\text{number of training samples in labeled class}}{\text{total number of training samples}} \]  

(2)

and setting \( d \) equal to zero for all other classes. For each setting of the desired outputs, we performed a fivefold cross validation procedure 50 times in order to analyze the effects of randomness from the sample selection in the cross validation and the neural networks’ initializations. Hence, we trained and tested (two settings) \( \times \) (fivefolds) \( \times 50 = 500 \) networks in total.

3) Subsets of the Proposed Nucleus-Based Features:
To analyze the correlation among the proposed features, we performed the classification on all possible combinations of these features. From the four features, we ended up with 15 possible combinations.

We denote the area, peak location, and the first and second granulometric moments by \( f_1, f_2, f_3, \) and \( f_4 \), respectively. We trained and tested neural network classifiers with fivefold cross validation and the parameters mentioned in Section IV-C2.

4) Comparison to Other Nucleus-Based Features:
To compare our proposed features to other previously proposed nucleus-based features, we trained and tested Bayes classifiers and neural networks with fivefold cross validation on our defined data set.

5) Comparison to Other Classifiers:
We further investigated the use of our proposed nucleus-based features on two other classifiers—the naive Bayes classifier and the C4.5 decision tree—with fivefold cross validation. These classifiers were implemented using the Waikato Environment for Knowledge Analysis (WEKA), which is a collection of machine learning Algorithms.

Table I Classification Results of Bayes Classifiers

<table>
<thead>
<tr>
<th>Training Bias</th>
<th>Classification Rate</th>
<th>Traditional</th>
<th>Train</th>
<th>Train</th>
<th>Test</th>
<th>Test</th>
</tr>
</thead>
<tbody>
<tr>
<td>( P(C) ) is in proportion to no. of training samples</td>
<td>81.15</td>
<td>77.49</td>
<td>73.25</td>
<td>63.39</td>
<td></td>
<td></td>
</tr>
<tr>
<td>( P(C) = 1/6 )</td>
<td>73.90</td>
<td>69.37</td>
<td>82.17</td>
<td>68.08</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table II Classification Results of Neural Networks

<table>
<thead>
<tr>
<th>Desired output setting</th>
<th>Classification Rate (mean \pm standard deviation)</th>
<th>Traditional</th>
<th>Train</th>
<th>Train</th>
<th>Test</th>
<th>Test</th>
</tr>
</thead>
<tbody>
<tr>
<td>( d=0.9 ) for the labeled class</td>
<td>80.63 \pm 7.05</td>
<td>59.34 \pm 6.54</td>
<td>84.80</td>
<td>0.36</td>
<td>0.87</td>
<td>1.17</td>
</tr>
<tr>
<td>( d=0.1 ) for others</td>
<td>83.38</td>
<td>76.55</td>
<td>74.34</td>
<td>61.03</td>
<td>0.72</td>
<td>1.15</td>
</tr>
</tbody>
</table>

A. Results for Bayes’ Classifiers
Table I shows the classifier’s performance. When \( a \ priori \) class probabilities are calculated from the numbers of cells in the training sets, we can see that the traditional classification rates of the classifiers on the training and test sets are 81% and 77%, respectively, and for the classwise classification, 73% and 63%, respectively. Most of the training and test cells are classified as myelocyte or PMN. This is because the \( a \ priori \) probabilities of these two classes are much larger than the others. On the other hand, the classwise classification rates are not that high. It should be noted that, in practice, the \( a \ priori \) probabilities of cell occurrences are not known in advance. Therefore, using Bayes classifiers with \( a \ priori \) probabilities in proportion to the numbers of training cells may not be a feasible approach.

When we make the classification “fair” by setting the \( a \ priori \) probabilities of all the six classes to 1/6, there are less correct classifications in the two big classes, but more correct classifications in the classes with small numbers of samples. In this case, even though the traditional classification rates drop in the training and test sets, the classwise classification rates increase. In a real-world situation, it makes sense to use the classwise classification measure because it gives equal importance to each cell class, and we do not usually know the exact proportion of cell classes in advance.

B. Results for Neural Networks
The average classification rates are shown in Table II. The networks trained regularly achieved the traditional classification rates of 81% and 77% on the training and test sets, respectively. However, the classwise classification rates were very low at 59% and 55%, respectively.

Table III Classification Results of Subsets of the Proposed Feature

The networks trained by setting the desired outputs as in (2) accomplished similar performance to that with the first setting when evaluated by the traditional classification rate, i.e., 83% and 77% on the training and test sets, respectively. However, it yielded the better classwise classification rates of 74% and 61%, respectively. The numbers of correct classifications of the classifiers trained using two different desired output settings in the big classes are similar. However, the classifiers trained using the desired outputs as in yielded much better classification in the small classes such as promyelocyte and metamyelocyte. As a result, similar classification performances were achieved by the two settings in the traditional sense, but the setting as in yielded much better performance in the classwise sense. Similar results occurred in the testing. There were more correct classifications in the small classes. The traditional classification rates of both settings were similar. However, the classifiers trained with the desired output set as in (2) yielded the better classwise
classification rate compared to that achieved by the classifiers trained regularly.

For both classifiers, most misclassified cells are in adjacent classes. This is not surprising because of similarities between adjacent classes. An expert would also have to classify each of them to a class or its corresponding adjacent class. One more observation from our experiments is that the classifiers are biased toward the classes with larger numbers of training samples, which is a way to achieve high traditional classification Rate. The classwise classification rate provides more information in this case. Our results suggest that the classwise classification rate increases when we suppress the bias by the numbers of training samples. In Bayes classifiers, when the bias suppression is applied, the classwise classification rates increase, but unfortunately, the traditional classification rates drop. More interesting results can be seen in the experiments using neural networks.

The bias suppression using (2) does not decrease the traditional classification rates. However, it does increase the classwise classification rates. Therefore, the neural network classifier using the bias suppression of (2) is the favorite choice because it yielded better classification performances in both traditional and classwise senses.

C. Analysis of the Subsets of the Proposed Nucleus-Based Features

The traditional classification rates on the test sets using each combination of these features are shown in Table III. We can see that the highest classification rate is achieved when all four features are employed as expected.

Table IV Classification Results Using Nucleus-Based Features

D. Results for the Comparison to other Nucleus-Based Features

The classification rates are shown in Table IV that summarizes the overall results. Comparing classification results in Table IV to those in Tables I and II, we can see that our nucleus-based features yield better classification performances when using the Bayes classifier. For the neural network case, even though the performances on the training sets are similar, the rates achieved by using our proposed nucleus-based features are higher than those achieved by the other features proposed previously.

VI. CONCLUSION

We analyzed the white blood cell classification using only features extracted from the image of the nucleus. Specifically, the six-class classification problem of white blood cells in myelocytic series was considered. We performed the experiments on the white blood cell images taken from different areas in one slide. Features based on the morphological granulometries were extracted from each manually segmented blood cell’s nucleus. It should be noted that manual segmentation was performed only in this investigation step. In a real automatic system, the nucleus segmentation will be performed automatically. From our experiments, it was shown that using only the nucleus-based features produced promising results. In addition to the traditional classification rate, we considered the classwise classification rate, where the classification rate of each class is calculated separately and averaged over all classes at the end. Consider the Bayes classifiers trained by calculating the a priori class probabilities from the proportion of the numbers of cells in the training set, they may not be feasible because the number of cells in each class is not practically known in advance. From our results, the Bayes and the neural network classifiers are biased toward the classes with large numbers of training samples. The classwise classification rate is improved when all classes are assumed equally likely. Extensive experiments were performed on neural networks. We initially trained neural networks by setting the desired output to 0.9 for the labeled class and 0.1 for the other classes. Good traditional classification rates were achieved. Meanwhile, the classwise classification in rates were low. To suppress the effects of the number of training samples in a class, we set the desired output for the labeled class and 0 for the other classes. With that setting, good traditional and classwise classification rates were accomplished. In practice, the neural networks trained with bias suppression will be selected because they yield good classification rates in both traditional and classwise senses. We analyzed feature subsets to show that all the four proposed features are important. We also compared the classification performances based on our proposed features to those of other previously proposed nucleus-based features using the same cell data set. The results showed that classifiers using our proposed features yielded better classification performances. Classification using the naive Bayes classifier and the C4.5 decision tree were also performed using our proposed features. The classification performances of these two classifiers were shown to be not as good as those of the Bayes classifiers and neural network classifiers. It was seen that most of the misclassifications occurred in adjacent classes. These misclassified cells may be those which give feature vectors close to the decision boundary between the adjacent classes. This classification disagreement for cells at the boundary also occurs in expert classification. We have shown that the application of only nucleus-based features to the problem of automatic bone marrow white blood cell classification is very promising. Segmentation in an automatic cell classification system can be down-scaled to just segmenting nuclei, which is much easier than the segmentation of both the nucleus and cytoplasm.

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Efficient In-Vitro Regeneration from Mature Leaf Explants of Mentha viridis L. Via Direct Organogenesis

Senthil K* and Kamaraj M**

Abstract— A plant regeneration protocol was established via multiple-shoot induction using leaf explants from field-grown mature plants of Mentha viridis L. (Labiataeae), an medicinal plant. Explants were cultured on Murashige and Skoog (MS) medium with different concentrations of 6-benzylaminopurine (BAP, 1.5 to 3.5 mg/l) in combination with (2, 4-D, 1 mg/l) or kinetin (KIN, 1.5 to 3.5 mg/l). The maximum number of shoots 3+1 mg/l of BAP+2, 4-D, (85% of and mean shoots 24.33±2.15) were obtained directly (with out intercalving callus phase). For root induction, the elongated shoots were separated and transferred onto MS medium supplemented with indole-3-butyric acid (IBA, 1.5 mg/l). Rooted plantlets (96%) were successfully transferred to soil in the plastic cup with an 85% survival rate.

Index Terms— MS Medium, 2, 4 –D, KIN, IBA, leaf, explants Mentha viridis.

I. INTRODUCTION

There are several species of common mint in Egypt such as Spearmint Mentha viridis L., Japanese mint Mentha arvensis L. and Peppermint Mentha piperita L. Mentha, is a medicinal and aromatic perennial herb, belongs to family Lamiaceae (Labiataeae) which includes about 25 species. (Pandy, 1982 and Bown, 1995). Spearmint herb and its volatile oil are used as flavoring agents for many kinds of food products and beverages, carminative, mouth preparations, gargles, tooth pastes and pharmaceuticals. The oil is used as flavouring agent in foods and pharmaceuticals especially in massage lotions for aching muscles and rheumatic joints. It is mildly anesthetic, giving the cooling, numbing sensation experienced when smelling or tasting (Balbba et al., 1976, Bown, 1996, Roth, 2004, Kashyap and Sharma 2005).

Medicinal plants have been the subject of man’s curiosity and purpose since time immemorial. The importance of medicinal plants in the treatment of chronic disease needs no elaboration. In fact, even with the tremendous advancement in the field of synthetic chemistry, almost 50% of the commercial drugs available in the market remain of plant origin. The herbal system was, however, pushed to the background with the advent of allopathic system. It is now back with a vengeance and the age-old system of herbal medicine is being revived due to its long lasting curative effect, easy availability, natural way of healing and rare or no reported side effects. Due to growing world population, increased anthropogenic activities, rapidly eroding natural ecosystem etc., the natural habitat for a great number of plants are dwindling and many of them are facing extinction. New strategies are formulated for rapid multiplication and conversation of medicinal plants. Among these Strategies, the regeneration of plants from the plant tissue culture technology.

Therefore the immediate need is to propagate the plant for its conservation. Efforts are also needed to propagate this species on commercial scale to meet increasing demands of pharmaceutical firms for its medicinal importance. In vitro propagation can be used as an effective strategy for germplasm conservation and multiplication of this plant species that will also enable further investigation of its medicinally active constituents.

II. MATERIALS AND METHODS

M. viridis (L.) plants were obtained from Mannuthi Agricultural University, Kerala. Leaf explants (1 cm long), excised from healthy plants, were pretreated with Teepol (5% v/v) for 5 min, surface sterilized with 0.1% mercuric chloride for 2-3 min and finally rinsed with 3-4 times in a sterile double distilled water to remove traces of mercuric chloride. The leaf explants were inoculated to the MS Medium supplemented with (1.5 to 3.5 mg/l BAP, 2,4-D 1mg/l) or (KIN 1.5-3.5 mg/l, 2,4-D 1 mg/l) to induce multiple shoots. The medium contained 3% (w/v) sucrose and silificied with 0.8% (w/v) agar. It was adjusted to pH 5.6 and autoclaved at 121°C, 15 lb pressure for 15 min. The cultures were maintained at 25±2°C under light intensity 3000 lux provided by cool-white fluorescent lamps.

In vitro initiated shoots from leaf explants were excised after 30 days and cultured on MS medium. The shoots (5-6 cm long) bearing at least 4-5 internodes were excised from the mass of proliferated shoots and transferred to rooting medium containing 0.5 to 2 mg/l (IBA). Rooted plantlets were transferred to plastic cups containing sterile Sand, Red soil and manure (1:1:1) and covered with plastic bag to maintain 85-90% humidity. Subsequently, the plantlets were transferred to greenhouse after one month and planted in the soil.

III. RESULTS AND DISCUSSION

Emergence of multiple shoot buds from leaf explants on MS medium supplemented with BAP + 2, 4-D or Kin + 2, 4-D was observed without and intervening callus phase. Shoot buds emerged on 10th and 14th day of culture from leaf (Fig.1a.). However, shoot started proliferating (Fig.1b.) after 15-20 days. The leaf explants elicited more numbers of multiple shoots in medium containing BAP, 2, 4-D (Table.1).

After sufficient elongation of shoots, (Direct organogenesis) which required 3 sub culturing in 40 to 50 days shoots were transferred to rooting medium which is made of MS medium supplemented with IAA or BPA. IBA and IAA were used...
individually in the range of 0.5 to 2.0 mg/l. The roots were initiated in about 25 days after planting the shoots in the rooting medium. After 25 days the root growth was profuse and white in colour. Maximum response for root induction was observed in 1.5mg/l IBA and 2 Mg/l IAA. The response of shoots in IAA and IBA are given in (Table-2). The root induction and root development in shoots are shown in (Fig.1c&1d). Anwar Shahzad and Siddiqui (2000) reported the In vitro rooting in *Ocimum sanctum* on MS medium containing 2, 4FD, NAA (0.2mg/l), BA (5mg/l), glutamic acid (50mg/l), Ads (5mg/l) and IAA (0.5mg/l). The combination of 0.2mg/l IBA and 0.2mg/l NAA could produce rooting in *Rauwolfia serpentinea* (Shahrear Ahmed et al., 2002). IBA is the hormone most commonly used to induce rooting in *Ocimum amaricannum* (Pathnaik & Chand, 1996), *Tylophora asthmatica* (Usha Mukundan et al., 2002), *Paederia foetida* (Amin et al., 2003) *Cicer arietinum* (Huda et al., 2003), *Solanum surattense* (Rama Samy et al., 2004) and *Datura metal* (Nithiya and Arockiasamy, 2006). IAA induced the rooting in *Houthuynia cordata* (Handique and Pranjal Bora, 1999), *Rotula aquatica* (Delse Sebastian et al., 2002), and *Daucus carota* (Yazhisai et al., 2005).

After sufficient root growth the plantlets were removed from rooting medium, washed thoroughly to remove the medium, dipped in 5% bavistin for about 5 minutes and washed thoroughly with sterile water and transferred to plastic cups containing sterilized substrate made of sand, red soil, and manure in the ratio 1:1:1. The plants were maintained in culture room for about 15 days, brought to room temperature and shady climate for about 10 days. Finally they were transferred and maintained in direct sun light for about 10 days. The survival rate at the end was about 80 to 90%.

**Table 1.** Effect of different Concentrations of BAP, KIN in combination with 2, 4-FD in MS medium for multiple shoot induction from leaf explants of *Mentha viridis* L. 15 explants and culture were maintained in each treatment and data (SE) were recorded up to six weeks of culture.

<table>
<thead>
<tr>
<th>PGR mg/l</th>
<th>Frequency %</th>
<th>No. of Shoots / Explants</th>
<th>Shoot length / Explants (cm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>BAP+2,4-D</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.5+1</td>
<td>20</td>
<td>11.00±1.00</td>
<td>1.50±0.26</td>
</tr>
<tr>
<td>2.0+1</td>
<td>43</td>
<td>13.5±2.59</td>
<td>2.47±0.24</td>
</tr>
<tr>
<td>2.5+1</td>
<td>64</td>
<td>14.88±1.73</td>
<td>3.28±0.47</td>
</tr>
<tr>
<td>3.0+1</td>
<td>85</td>
<td>24.33±2.15</td>
<td>8.60±0.44</td>
</tr>
<tr>
<td>3.5+1</td>
<td>60</td>
<td>12.89±1.54</td>
<td>4.12±1.13</td>
</tr>
<tr>
<td>KIN+2,4-D</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.5+1</td>
<td>35</td>
<td>9.60±1.50</td>
<td>1.63±0.26</td>
</tr>
<tr>
<td>2.0+1</td>
<td>46</td>
<td>11.76±1.19</td>
<td>2.57±0.13</td>
</tr>
<tr>
<td>2.5+1</td>
<td>55</td>
<td>14.41±1.40</td>
<td>3.35±0.42</td>
</tr>
<tr>
<td>3.0+1</td>
<td>75</td>
<td>20.91±0.94</td>
<td>9.5±1.07</td>
</tr>
<tr>
<td>3.5+1</td>
<td>60</td>
<td>9.44±1.01</td>
<td>4.68±0.44</td>
</tr>
</tbody>
</table>

**Table 2.** Effect of different Concentrations of IBA and IAA in MS medium for root induction from shoots of *Mentha viridis* L. 15 cultures were maintained in each treatment and data (SE) were recorded up to four weeks of culture.

<table>
<thead>
<tr>
<th>PGR mg/l</th>
<th>Frequency %</th>
<th>Root length (cm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>IBA</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0.50</td>
<td>76</td>
<td>1.40±0.20</td>
</tr>
<tr>
<td>1.00</td>
<td>86</td>
<td>2.42±0.22</td>
</tr>
<tr>
<td>1.50</td>
<td>96</td>
<td>2.89±0.67</td>
</tr>
<tr>
<td>2.00</td>
<td>80</td>
<td>2.32±0.39</td>
</tr>
<tr>
<td>IAA</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.00</td>
<td>56</td>
<td>1.79±0.08</td>
</tr>
<tr>
<td>1.50</td>
<td>68</td>
<td>2.37±0.21</td>
</tr>
<tr>
<td>2.00</td>
<td>74</td>
<td>2.74±0.56</td>
</tr>
<tr>
<td>2.50</td>
<td>58</td>
<td>2.19±0.33</td>
</tr>
</tbody>
</table>

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Figure-1: Adventitious shooting response of *Mentha viridis*  
(a) Shoot Initiation from Leaf with BAP+ 2,4-D(3.0 + 1.0 mg/l),  
(b) Maximum number of multiple shoot induction, (c) Shoot elongation, (d) Rooted plantlet, (e) Hardened plantlet.

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Literature Survey on Offline Recognition of Handwritten Hindi Curve Script Using ANN Approach

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Abstract- ‘Hindi’ the national language of India (written in Devanagri script) is world’s third most popular language after Chinese and English Hindi handwritten character recognition has got lot of application in different fields like postal address reading, cheque reading electronically. Recognition of handwritten Hindi characters by computer machine is complicated task as compared to typed characters, which can be easily recognized by the computer. English Character Recognition (CR) has been extensively studied in the last half century and progressed to a level, sufficient to produce technology driven applications. But same is not the case for Indian languages which are complicated in terms of structure and computations. Digital document processing is gaining popularity for application to office and library automation, bank, publishing houses communication technology, postal services and many other areas. With ever increasing requirement for office automation, it is necessary to provide practical and effective solutions. Hindi character recognition is becoming more and more important in the modern world. It helps human ease their jobs and solve more complex problems over the few past years, the numbers of companies involved in research on handwritten recognition are increasing continually. Devanagri being the national language of India, spoken by more than 500 million people, should be given special attention so that document retrieval and analysis of rich ancient and modern Indian literature can be effectively done. This article is intended to serve as a guide for the readers, working in the field of handwritten curve script recognition.

Index Terms- Devanagri Character Recognition, Segmentation, Preprocessing, Off-line Handwriting Recognition, Feature Extraction, Image Classification

I. INTRODUCTION

Machine simulation of human functions has been a challenging research field since the advent of digital computers. In some areas, which require certain amount of intelligence, such as card playing or chess playing, tremendous improvements have been achieved. On the other hand, humans still outperform even the most powerful computers in the relatively routine functions such as vision. Machine simulation of human reading is one of these areas, which has been the subject of intensive research for the last three decades, yet it has not achieved full accuracy. This survey investigates the various steps involved in recognition of handwritten characters. Handwritten text recognition can be classified based upon two major criteria: the data acquisition process (on-line or off-line) and the text type (machine-printed or hand-written). For recognition of handwritten Hindi Characters there are five major stages. 1. Preprocessing, 2. Segmentation, 3. Feature Extraction, 4. Recognition, 5. Post processing.[1] The paper is arranged to present a brief literature survey on the OCR for Handwritten Hindi Curve Script methodologies, and important contributions in this area. Handwriting recognition Technology has been improving much under the purview of pattern recognition and image processing since a few decades. Hence various soft computing methods involved in other types of pattern and image recognition can as well be used for OCR for hand written Hindi Curve Script. [1]

II. OPTICAL CHARACTER RECOGNITION

In 1929, Gustav Tauschek obtained a patent on OCR in Germany, followed by Handel who obtained a US Patent on OCR in USA in 1933 (U.S. Patent 1,915,993). In 1935 Tauscher was also granted a US patent on his method (U.S. Patent 2,026,329). In 1950, David Shepard, a cryptanalyst at the Armed Force Security Agency in the United States, with the help of Harvey Cook founded Intelligent Machines Corporation (IMR), which went on to deliver the world’s first several OCR systems used in commercial operation. IBM and others were later licensed on Shepard’s OCR patents. The United States Postal Services has been using OCR machines to sort mail since 1965 based on technology devised primarily by the prolific inventor Jacob Rainbow. In 1965 it began planning an entire banking system, National Giro, using OCR technology, a process that revolutionized the payment systems in the UK. Canada Post has
been using OCR systems since 1971. OCR systems read the name and address of the addresses at the first mechanized sorting centre, and print a routing bar code on the envelope based on the Postal Code. After that the letters need only be sorted at later centres by less expensive sorters which need only read the code.

To avoid interference with the human-readable address field which can be located anywhere on the letter, special ink is used that is clearly visible under ultraviolet light. This ink looks orange in normal lighting conditions. Envelopes marked with the machine readable bar code may then be processed. During these days Handwriting recognition, including recognition of hand printing, cursive handwriting, is still the subject of active research, as is recognition of printed text in other scripts. Recognition of cursive text is an active area of research, with recognition rates even lower than that of hand-printed text. Higher rates of recognition of general cursive script will likely not be possible without the use of contextual or grammatical information. For example, recognizing entire words from a dictionary is easier than trying to parse individual characters from script. Reading the Amount line of a cheque (which is always a written-out number) is an example where using a smaller dictionary can increase recognition rates greatly.

Knowledge of the grammar of the language being scanned can also help determine if a word is likely to be a verb or a noun, for example, allowing greater accuracy. The shapes of individual cursive characters themselves simply do not contain enough information to accurately (greater than 98%) recognize all handwritten cursive script.

The field of Document Analysis and Recognition is vast and it contains many applications. Character recognition is one of the branches of DAR. As shown in Figure 1, the problem of character recognition can be divided into printed and handwritten character recognition. Handwritten character recognition has been further divided into off-line and online handwritten character recognition [6]. Off-line handwriting recognition refers to the process of recognizing words that have been scanned from a surface (such as a sheet of paper) and are stored digitally in grey scale format. After being stored, it is conventional to perform further processing to allow superior recognition. In the on-line case, the handwriting is captured and stored in digital form via different means. Usually, a special pen is used in conjunction with an electronic surface. As the pen moves across the surface, the two dimensional coordinates of successive points are represented as a function of time and are stored in order [6]. It is generally accepted that the on-line method of recognizing handwritten text has achieved better results than its off-line counterpart. This may be attributed to the fact that more information may be captured in the on-line case such as the direction, speed and the order of strokes of the handwriting. On the other side machine-printed character recognition can be on good quality documents or degraded printed documents.

Devanagri script is used to write many Indian languages such as Hindi, Marathi, Rajasthani, Sanskrit and Nepali. The characters of Hindi Language are shown in Seminal and comprehensive work in Handwritten Hindi Curve Script recognition is carried out by R.M.K Sinha and V. Bansal, [7-13]. An excellent overview of document analysis can also be found in [14].

III. HANDWRITTEN DEVANAGRI CHARACTER RECOGNITION

The work on Handwritten Devanagri character recognition started early in 1977. Firstly in 1977, I. K. Sethi and B. Chatterjee [15] presented a system for handwritten Devanagri characters. In this system, sets of very simple primitives were used. Most of the decisions were taken on the basis of the presence/absence or positional relationship of these primitives. A multistage process was used for taking these decisions. By completion of each stage, the options for making decision regarding the class membership of the input token decreases. In 1979, Sinha and Mahabala [16] presented a syntactic pattern analysis system with an embedded picture language for the recognition of handwritten and machine printed Devanagri characters. In this system, mainly feature extraction technique was used. Sethi and Chatterjee [17] also have done some studies on hand-printed Devanagri numerals which is based upon binary decision tree classifier and that binary decision tree was made on the basis of presence or absence of some basic primitives, namely, horizontal line segment, vertical line segment, left and right slant, D-curve, C-curve, etc. and their positions and interconnections. That decision process was also based on multistage process. Brijesh K. Verma [18] presented a system for HCR using Multi-Layer Perceptron (MLP) networks and the Radial Basis Function (RBF) networks in the task of handwritten Hindi Character Recognition (HCR). The error back propagation algorithm was used to train the MLP networks. Some relevant features of Devanagri script from OCR viewpoint Devanagri script have about 13 vowels and 36 consonants. Some of the vowels, fused characters and the consonants are shown in figure-2.
IV. COMPOSITION

4.1 Compositions of characters and symbols for writing word

A horizontal line is drawn on top of all characters of a word that is referred to as the header line or shirorekha. It is convenient to visualize a Devanagri word in terms of three strips: a core strip, a top strip and a bottom strip. The core and top strips are separated by the header line. Figure 3 shows the image of a word that contains five characters, two lower modifiers and a top modifier. The three strips and the header line have been marked in figure 4.

Figure 3: The procedure of Hindi character segmentation

- Step 1: Locate the header line and separate the core-bottom strip which contains the core strip and bottom strip, and a top strip which contains the header line and top modifiers.
- Step 2: Identify core strip and bottom strip from the core-bottom strip, and extract low modifiers.
- Step 3: Separate core strip into characters which may contain conjunct/shadow characters.
- Step 4: Segment conjunct/shadow characters into single characters.
- Step 5: Remove the header line from the top strip and extract top modifiers.
- Step 6: Put header line back to the segmented core character

4.2 Segmentation of the Conjoint Character

The location of the segmentation column contains two steps. First, segmentation is located by examining the right part of the conjunct image. Then second segmentation is located by examining the left part of the conjunct image. The final segmentation is determined by co-relating both segmentations. It can be done by two types i.e. one is by horizontal segmentation and other is vertical segmentation. In vertical segmentation, upper part and lower part of character are recognized. In Devanagri, we recognize the character by segmenting the upper layer of line and lower part of line[20].

V. CLASSIFICATION

5.1 coverage of the region of the core strip

Character set of Devanagri script is divided into three groups based on the coverage of the region of the core strip. The characters which cover most of the core region are referred to as Full box characters. The characters which cover upper region of the core strip are referred to as Upper Half Box characters.
Lower Half Box characters are the characters which cover lower region of the core strip.

5.2 vertical bar feature

The Full Box characters are divided into three groups based on the presence and position of vertical bars, namely: no bar characters, end bar characters and middle bar characters. Some of the characters belonging to each of these classes are shown in figure 5. A vertical bar does not occur at the left end of a character. The position of the vertical bar is the left most column where number of black pixels is 80 percent or more of the character height. Character image is divided into three equal vertical zone and compute a vertical bar does not occur at the left end of a character.

![Character Classification](image)

Figure 5: Classification of Character

Some of the algorithms deal with recognizing characters in isolation. Recently, a system for handwritten numeral recognition of Devanagri characters is proposed [21]. Here the numerals have been represented using two types of features. The first type provides coarse shape classification of the numeral and is relatively insensitive to minor changes in character shapes. The second class of features tries to provide qualitative descriptions of the characters. These descriptions encode intrinsic properties of the characters expected to be invariant across writing styles and fonts. Multilayer perceptron is used for the categorization of the characters consisting of only sixty-four pixels, it is viable to simply loop through the entire character and examine each pixel in turn. If a pixel is on, its eight neighbours are checked. Since each neighbour can also only be on or off, there are merely 256 possible combinations of neighbour. Of these 256, fifty-eight were found to represent significant feature points in a fairly unambiguous way. Exacting feature points thus reduced to calculating a number between zero and 256 to describe a pixel's neighbourhood and then comparing that number against a table of known feature points. While it is true that this method does not always catch every feature point (some can only be seen in a larger context) it catches the majority. Missing feature points is certainly not a limiting factor in the algorithm's accuracy. It also does not suffer from labelling too many uninteresting points as being feature points. It has virtually no false positives. The feature point extractor is thus fast and reliable.

P.B Khanale and B.D Chitnis presented a system for Devanagri Character recognition [23], where they preprocessed and converted the inputted character into 5 * 7 matrix of Boolean values and then each character was further classified into a class based on its unique feature value by artificial neural network. The selected neural network architecture was a two layer feedforward network with 10 neurons each. The transfer function used was log-sigmoid. The training of network was done with back propagation algorithm. The network was trained with back propagation with adaptive learning rate and the performance function used was sum squared error. The goal was set to 0.1 and the network was trained with ideal vectors until it has a 0.1 squared error. They achieved about 96% recognition for most of the characters.

Sandhya Arora [24] presents a two stage classification approach for handwritten Devanagri characters. The first stage is using structural properties like shirorekha, spine in character and second stage exploits some intersection features of characters assigning penalty for a mismatch is incorporated in the search process.

The ability to identify machine printed characters in an automated or a semi-automated manner has obvious applications in numerous fields. Since creating an algorithm with a one hundred percent correct recognition rate is quite probably impossible in our world of noise and different font styles, it is important to design character recognition algorithms with these failures in mind so that when mistakes are inevitably made, they will at least be understandable and predictable to the person working with the program. Eric W.Brown [22] explores one such algorithm and tests it on two different fonts using a third font as a reference. The results are discussed and several improvements are suggested. He describes an algorithm that attempts to work with a subset of the features in a character that a human would typically see for the identification of machine-printed English characters. Its recognition rate is currently not as high as the recognition rates of the older, more developed character recognition algorithms, but it is expected that if it were expanded to work with a larger set of features this problem would be removed. If it were expanded to use more features, it would be made correspondingly slower, with the advent of faster microprocessors this fact is not viewed as a crippling problem. The procedure for extracting these feature points utilized by this algorithm is fairly straightforward. Since an eight by eight character consists of only sixty-four pixels, it is viable to simply loop through the entire character and examine each pixel in turn. If a pixel is on, its eight neighbours are checked. Since each neighbour can also only be on or off, there are merely 256 possible combinations of neighbour. Of these 256, fifty-eight were found to represent significant feature points in a fairly unambiguous way. Extracting feature points thus reduced to calculating a number between zero and 256 to describe a pixel's neighbourhood and then comparing that number against a table of known feature points. While it is true that this method does not always catch every feature point (some can only be seen in a larger context) it catches the majority. Missing feature points is certainly not a limiting factor in the algorithm's accuracy. It also does not suffer from labelling too many uninteresting points as being feature points. It has virtually no false positives. The feature point extractor is thus fast and reliable.
which are fed to a feed forward neural network. Simple histogram based method does not work for finding shirorekha, vertical bar (Spine) in handwritten Devanagri characters. So a new technique, differential distance based technique to find a near straight line for shirorekha and spine. This approach has been tested for 50000 samples and got 89.12% success.

A system for recognizing hand written Indian Devanagri script is presented by K. Y. Rajput and Sangeeta Mishra. The system considers a handwritten image as an input, separates the lines, words and then characters step by step and then recognizes the character using artificial neural network approach, in which Creating a Character Matrix and a corresponding Suitable Network Structure is key. In addition, knowledge of how one is Deriving the Input from a Character Matrix must first be obtained before one may proceed. Afterwards, the Feed Forward Algorithm gives insight into the entire working of a neural network; followed by the Back Propagation Algorithm which compromises Training, Calculation of Error, and Modifying Weights. Once the characters are recognized they can be replaced by the standard fonts to integrate information from diverse sources [25].

VI. ARTIFICIAL NEURAL NETWORKS

Character classification problem is related to heuristic logic as human beings can recognize characters and documents by their learning and experience. Hence neural networks which are more or less heuristic in nature are extremely suitable for this kind of problem. Various types of neural networks are used for OCR classification. A neural network is a computing architecture that consists of massively parallel interconnection of adaptive 'neural' processors. Because of its parallel nature, it can perform computations at a higher rate compared to the classical techniques. Because of its adaptive nature, it can adapt to changes in the data and learn the characteristics of input signal [26]. Output from one node is fed to another one in the network and the final decision depends on the complex interaction of all nodes. Several approaches exist for training of neural networks viz. error correction, Boltzman, Hebbian and competitive learning. They cover binary and continuous valued input, as well as supervised and unsupervised learning. Neural network architectures can be classified as, feed-forward and feedback (recurrent) networks. The most common neural networks used in the OCR systems are the multilayer perceptron (MLP) of the feed forward networks and the Kohonen's Self Organizing Map (SOM) of the feedback networks.

Online handwriting recognition is gaining renewed interest owing to the increase of pen computing applications and new pen input devices. The target of recognition has shifted from regular script to fluent script in order to better meet the requirements of practical applications.

VII. CONCLUSION

With the advent of computer and information technology, there has been a dramatic increase of research in the field of Devanagri OCR since 1990. Different strategies using combination of multiple features, multiple classifiers, and multiple templates have been considered extensively in the state of the art. Only a few works have been reported in the areas of unconstraint Devanagri handwriting recognition. Lexicon-based approaches shall be used for recognizing legal amounts on bank cheques and city names on postal documents. There is a great scope of research in these areas for the future researchers in the area of handwritten Devanagri OCR. Word spotting in handwritten Devanagri documents is also an interesting area of research as it will be helpful in indexing as well as searching the document images of handwritten archives. Holistic approaches shall be employed for the same. Some research is really required to find ideal combinations of classifiers for the purpose of recognition. It is still not clear that how a combination strategy can fully utilize the power of sub classifiers, and to deal with the tradeoff between combination and effectiveness. The information about the classification power of a sub classifier may also help in assigning weights to them. Only a few papers are published on script identification. Generally researchers assume that a given document is written in a specific script. In countries like India, where many languages and scripts exist, the identification of script has to be done prior to the recognition in applications like postal address reader, where address can be written in any Indian script. More research toward this direction on handwritten documents is expected in near future. In India huge volumes of historical documents and books (handwritten or printed in Devanagri script) remain to be digitized for better access, sharing, indexing, etc. This will definitely be helpful for other research communities in India in the areas of social sciences, economics, and linguistics. From the survey, it is noted that the errors in recognizing printed Devanagri characters are mainly due to incorrect character segmentation of touching or broken characters. Because of upper and lower modifiers of Devanagri text, many portions of two consecutive lines may also overlap and proper segmentation of such overlapped portions are needed to get higher accuracy. Many authors suggest that the post processing of classifier outputs by integrating a dictionary with the OCR system can significantly reduce the is classifications in printed as well as handwritten word recognitions. Recently, some efforts have been reported toward building benchmark databases to enhance the quality of OCR-related research in India. It is also observed that special keyboards are required to key-in Devanagri text as the number of characters and modifiers in Devanagri script are more than the number of characters in Latin script. Since the process of typing is tiring and time consuming, digitization of documents and their automatic processing would be easier than keying-in the Devanagri text.

Accordingly, research on Devanagri script is gaining much attention because of its large market potential. Some of the leading institutes in India doing research in Devanagri OCR are Indian Statistical Institute at Kolkata, International Institute of Information Technology at Hyderabad, Indian Institute of Science at Bangalore, and Indian Institute of Technology at New Delhi.
REFERENCES


Correlation of Plasma Apolipoprotein and lipid profiles with different stages of type 2 diabetic nephropathy- A Hospital based study in North Indian Population

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Abstract
Background- The aim of this study was to evaluate the lipid abnormalities associated with different stages of albuminuria and also examine role of ApoB lipoprotein as a predictor of early diabetic nephropathy in type 2 diabetic patients.

Methods and Results- A total 259 diabetic patients (110 men and 149 women) with mean age group 62.5±11.2 years were studied. Normoalbuminuria (n=110), microalbuminuria (n=93) and macroalbuminuria (n=56) were defined as albumin to creatinine ratio of <30, 30-299 and >300µg/micro respectively. Lipid parameters included, total cholesterol, triglyceride (TG), high and low density lipoprotein cholesterol, apolipoproteins A1, and Apo B, Lipoprotein (a). Result showed that Apo B differed significantly (P<0.05) between normoalbuminura and micro and macroalbuminuria. Lp(a) differed between normoalbuminurea/ microalbuminurea and macroalbuminurea. Triglyceride increases progressively with increasing albuminuria. In multivariate logistic regression analysis, only Apo B showed significant odd ratio (95% confidence interval) for microalbuminurea: 1.012 (1.003-1.023); and both TG and Lpa where as significant for macroalbuminuria [(respective odd ratio 1.996) (1.010-3.937) and 1.707 (1.119-2.431)].

Conclusion- Apo B and Lp(a) increases in the stages of microalbuminuria and macroalbuminuria respectively. However, Triglyceride increases significantly throughout the 3 stages of albuminuria.

Index Terms- Dyslipidemia, Nephropathy, Apo A1, Apo B, Triglyceride, Type 2 diabetes

I. BACKGROUND AND OBJECTIVES

The prevalence of diabetes mellitus has been increasing worldwide with an expected doubling of diabetic population from 171 million to 366 million between 2000-2030. The greatest relative increase will occur in Middle Eastern Crescent, Sub Saharan Africa and India.1 This diabetic population is predisposed to an increase risk of both micro and macrovascular complications and some 50% of people with diabetes die of cardiovascular disease.2 Atherosclerosis which may began early in presence of diabetes, lipid and lipoprotein abnormalities can be a cause of increased cardiovascular complications in such patients3.

Diabetic patients are also known to be at increased risk of dyslipidemia which can contribute to the higher morbidity and mortality.4 Dyslipidemia in diabetes is characterized by elevated triglycerides, low high density lipoprotein (HDL) cholesterol levels, and increased low density lipoprotein (LDL).5 There are four major groups of lipoproteins that are known, namely chylomicrons, very low density lipoprotein (VLDL), low density lipoprotein (LDL) and high density lipoprotein ( HDL).The protein moiety of a lipoprotein is known as apolipoprotein which can be of different types with different functions . Apo B is the major protein component of VLDL and LDL in serum, forms an important part of their structure, while Apo A1 is a major protein component of HDL.6

Microalbuminuria, an early marker of diabetic nephropathy, is an independent risk factor for cardiovascular disease. Microalbuminuria is excretion of albumin 30 to 300 mg/day in a 24 hour urine collection or 30 to 300 µgram/mg creatinine in a spot collection. Diabetic nephropathy is characterised by progressive increase of urinary albumin excretion rate (UAER ). The increased levels of urinary albumin excretion may represent a more generalised vascular injury alone. During the past decade, the incidence of end stage renal disease has risen dramatically, primarily due to an increase in the incidence of diabetes.

The presence of microalbumin in the urine of persons with type 2 diabetes is perhaps the most important early signal heralding the onset of systemic vasculopathy and associated with target organ damage ( Brain, heart and kidney) . Microalbuminuria also identifies patients who need more rigorous cardiovascular risk management, especially more intensive blood pressure control, strict attention to glycemic control and lipid level. Interestingly it has been suggested that hyperglycemia, hypertension, and dyslipidemia cause disorders of albumin excretion rate by damaging the podocyte and slit diaphragm protein scaffold with overproduction of and extracellular release of oxygen radical species at the glomerular level.7

A study conducted on 1253 patients of type 2 diabetes over seven years by Bruno et al8 and showed the progression of 3.7% patients to overt nephropathy every year and microalbuminuria provided a risk increased by 42% as compared to normoalbuminuria. This raises the question as to which of the above statistics shows the importance of early diagnosis, treatment and prevention of microalbuminuria in type 2 diabetic
patients. Significant changes in the metabolism of lipoproteins occur with the progression of diabetic nephropathy, the lipid abnormalities associated with different stages of diabetic nephropathy could be different and should better be evaluated in the respective stages of UAER with appropriate control of confounders. The aim of this study was to evaluate the lipid abnormalities associated with different stages of albuminuria and also examine role of ApoB lipoprotein as a predictor of early diabetic nephropathy in type 2 diabetic patients.

II. MATERIAL AND METHOD

The present study was a cross sectional study done over a period of two year in the Department of Medicine, CSM Medical University, Lucknow India from August 2009 to July 2011. Patient having type 2 diabetes mellitus, attending diabetic clinic and admitted in indoor medical wards of Gandhi Memorial & Associated Hospital, CSM Medical University, and fulfilling the inclusion criteria were enrolled in the study. After written informed consent 259 patients were studied. The study was approved by the ethical & research committee of CSM Medical University Lucknow to use human subject in the research study. Patient with duration of diabetes for 5 years or more with GFR more than 60ml/min were included in the study. Subject not fulfilling the above mentioned criteria, proteinuria due to other causes like urinary tract infection, congestive heart failure, pregnancy and patients on Angiotensin Converting Enzyme Inhibitor (ACEI) / Angiotensin Receptor Blocker (ARB) , lipid lowering drugs were excluded from the study. After detailed history and thorough physical examination, relevant investigations were done.

Measurement of Albuminurea: A 24 hour urine sample was collected in a five litre clean plastic container. All the subjects were provided with a labelled container containing 5 ml toluene as preservative and a bag in which to carry the container. The patients were instructed to refrain from exercise at least 24 hours before urine collection which was started in the morning at 8:00 Am. After discarding the first voided urine sample, then all the urine of day and overnight was added to the specimen container till the next morning at 8:00 Am was subjected for measurement of microalbuminuria. Microalbuminuria was measured by Nephelometry method. On the basis of 24 hours urinary albumin, patients were divided into three groups. Normoalbuminuria, albumin excretion less than 30 mg/24 hour, microalbuminuria having albumin levels between 30-300 mg/24 hour, and macroalbuminuria were above 300 mg/24 hour. Creatinine clearance rate ( Ccr, ml/min ) was calculated from the Cockcroft – Gault formula as: [(140-age in years )× body weight in kg/ 72 × serum creatinine in mg/dl)]. For women, the values were multiplied by 0.85.

Lipid parameters: About 5 ml of venous blood were drawn under aseptic precautions, in a sterile bulb from selected subject after a period of overnight fasting; serum was separated by centrifugation and used for analysis. Serum lipid profile which includes triglycerides (TG), total cholesterol (TC), high density cholesterol (HDL-C) were measured by enzymatic method and serum low density cholesterol (LDL-C) and very low density cholesterol (VLDL-C) were calculated by using Friedwald formula (LDL-C=TC (HDL-C + TG/2.2)). Lipid profile was analyzed by using ERBA kits in microlab semi analyzer of MERK Company, all the reagents used in the estimation were of analytical grade. Serum Lp (a) was measured by turbidimetric immunoassay method. Serum apolipoprotein A1 (ApoA1) and apolipoprotein B (ApoB) were measured by Nephelometry method from random blood samples of the patients. This method is based upon a comparison of the intensity of light scattered by the sample under certain defined conditions with the intensity of light scattered by a standard reference suspension. The higher the intensity of scattered light, higher the turbidity. A standard suspension of Formazin is used for calibration.

Confounders: Age, sex, body mass index ( BMI), duration of diabetes, history of hypertension, smoking, systolic blood pressure ( SBP), diastolic blood pressure ( DBP), blood urea , serum creatinine , fasting plasma glucose ( FPG), glycosylated haemoglobin (HbA1c), were treated as potential confounder. Blood pressure was measured in the right arm after 20 minute rest on a sitting position with a standard mercury sphygmomanometer. Body height in centimetres and body weight in kilograms ( kg) were measured with light clothes and bare feet , and BMI in kg/m² was calculated. Blood urea, serum creatinine and plasma glucose levels were measured on an automatic biochemistry analyzer (Transasia GM360 India ). All the reagents used in the estimation were of analytical grade. HbA1c was measured by means of boronate affinity chromatography.

III. STATISTICAL ANALYSIS

Distribution of microalbumin, TG, and Lp(a) were highly skewed, the natural logarithms of these variables were used for statistical analysis. Continuous variables were expressed as the mean (standard deviation±SD) and categorical variables, as percentage. P <0.05 was considered as statically significant. Differences in the continuous variables among the three subgroup of albuminuria were tested by one way analysis of variance (ANOVA) followed by multiple comparison test using least significant difference (LSD) when ever the p values for one way (ANOVA) were <0.05. The χ² test was used when the variables were categorical. Correlation coefficients between microalbuminuria and the lipid parameters were generated in all patients, in patients without macroalbuminuria and in patients with abnormal albuminuria (macroalbuminuria + microalbuminuria).

IV. RESULTS

A total of 259 type 2 diabetic patients (110 men and 149 women) with mean age 62.5±11.2 years were studied. Table 1 shows base line characteristics. Comparisons of the characteristics among the three subgroups of albuminuria are shown in Table 2. In addition to age and sex, BMI, diabetic duration, SBP, GFR were selected as potential confounder for adjustment in the logistic regression analysis. Blood urea and serum creatinine were not selected because they were highly associated with creatinine clearance, and history of hypertension was not selected because of its association with systolic blood pressure. ApoB was elevated in the early microalbuminuric stage and remained high throughout the later stage macroalbuminuria. On the other hand Lp (a) levels were relatively similar for
normoalbuminuria and microalbuminuria, but increased significantly at the macroalbuminuric stage. TG differed significantly among the three subgroup of albuminuria.

The correlation coefficients between urinary albumin excretion (UAE) and lipid parameters are shown in Table 3. When analysed in all patients, UAE was correlated significantly with TC, TG, ApoB and Lp (a) in a positive pattern and HDL-C in a negative pattern. While excluding patients with macroalbuminuria, UAE was significantly correlated with TC, TG and ApoB. When analysed in patients with abnormal albuminuria, UAE was correlated with TG significantly and with Lp (a) with borderline significance. Table 4 shows the adjusted odd ratios for microalbuminuria and macroalbuminuria. After adjustment for the selected potential confounders and the other lipid parameters, only ApoB showed significant association with microalbuminuria, and both TG, Lp(a) were associated with macroalbuminuria.

V. DISCUSSION

It has been predicted that world wide the prevalence of diabetes in adults would increase to 5.4% by the year 2025 from the prevalence rate of 4.0% in 1995. Consequently the number of adults with diabetes in the world would rise from 135 million in 1995 to 300 million in the year 2025. It is expected that much of this increase in prevalence rate will occur in developing countries. While a 42% increase is expected in developed countries, a 170% increase is expected in the developing countries. In the latter, most of the diabetic patients are in the age range of 45–64 years, while in developed countries most of them are ≥65 years. Therefore diabetic patients in developing countries are even more vulnerable to develop the micro-vascular complications of diabetes including diabetic nephropathy.

Lp(a) is an independent risk factor for cardiovascular disease, cause vascular injury through activation of intercellular adhesion molecule-1 expression, vascular smooth muscle cell proliferation, interaction with macrophages, prothrombosis and inducing apoptosis with oxidative stress. The factors leading to elevated Lp(a) in more advanced renal disease are unknown, although increased hepatic synthesis and decreased renal excretion might be responsible. It is true that the increased Lp(a) was not explained by a decreased GFR in the present study, because the effect of Ccr had been adjusted (Table 4). Whether a decreased catabolic rate of Lp(a) can be responsible but it required further investigations.

This study indicated a lack of association between Lp(a) and the early stage of microalbuminuria, but it is a major lipid parameter associated with macroalbuminuria (Tables 2-4). On the contrary, a Spanish study observed that type 2 diabetic patients with microalbuminuria had higher Lp(a) than those with normoalbuminuria (15.7 mg/dL vs. 4.5 mg/dL, p<0.01); and a significant correlation coefficient of 0.34 (0<0.01) existed between Lp(a) and AER. Another study indicated that Lp(a) was definitely increased in diabetic patients with macroalbuminuria, but increase of Lp(a) was only observed in microalbuminuric patients with significant decrease of Ccr or increase of serum creatinine.

TG differed significantly among the three subgroups of albuminuria (Table 2) and was correlated with AER for all ranges of albuminuria (Table 3). Furthermore, TG was independently associated with microalbuminuria after adjustment for selected confounders (Tables 4). But with further mutual adjustment of the lipid parameters the association with microalbuminuria became insignificant, and became statistically significant for macroalbuminuria (Table 4). The association between TG and albuminuria could possibly reflect an association between the atherogenic small dense LDL particles and albuminuria, because TG level was inversely correlated with LDL size (γ=-0.66, p<0.001) and a TG level >1.5 mM (or 134 mg/dL) is significantly associated with small dense LDL. However, further investigations are required to confirm this speculation.

The strength of this study included the recruitment of a large number of cases in each subgroup of albuminuria and analysis of a variety of lipid parameters. Most of the commonly encountered confounders were also adjusted for in statistical analyses. However, some limitations existed. Since it was a cross-sectional design, the cause and effect relationship between lipid parameters and albuminuria was not certain. Referral bias could not be excluded because of the hospital based analyses. However, we were not able to provide such information due to the lack of its collection at the recruitment of patients. Because glycemic control appeared to be suboptimal in the study subjects with FPG of 151.7 (51.3) mg/dL and HbA1c of 7.6 (1.6)% (Table 1) and FPG seemed to increase (through not statistically significant) from normoalbuminuria to microalbuminuria and to macroalbuminuria (Table 2), residual confounding by glycemic control could not be completely excluded. However, the adjusted odds ratios derived from the logistic regression models as shown in Table 4 did not change significantly even when FPG or HbA1c was added into the models in secondary analyses. Therefore, the conclusions would not be different even after excluding the possible residual confounding by glycemic control.

In summary, during the development of diabetic nephropathy, different atherogenic lipoproteins may play significant role in different stages. Apo B was associated with the early development of microalbuminuria and remained elevated throughout the course of abnormal albuminuria. On the other hand, Lp(a) is not increased in the early microalbuminuric stage, it is highly associated with the later stage of maceralbuminuria. TG may increase throughout the three stages of albuminuria.

<p>| Table -1: Base line characteristics of study subjects (N=259) |
|-----------------|-------------|
| Age (years)     | 62.5±11.2   |
| Gender          |             |
| Male %          | 45          |
| Female %        | 55          |
| Body mass index (kg/m²) | 24.8±3.6   |</p>
<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Normoalbuminurea</th>
<th>Microalbuminurea</th>
<th>Macroalbuminurea</th>
<th>p-value</th>
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<td>93</td>
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</tr>
<tr>
<td>Gender</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male (%)</td>
<td>45</td>
<td>47</td>
<td>46</td>
<td></td>
</tr>
<tr>
<td>Female (%)</td>
<td>55</td>
<td>53</td>
<td>54</td>
<td></td>
</tr>
<tr>
<td>Diabetic duration (years)</td>
<td>8.5±2.4</td>
<td>12.5±7.5</td>
<td>13.6±6.8</td>
<td>0.025b</td>
</tr>
<tr>
<td>Smokers</td>
<td>25.2</td>
<td>28.5</td>
<td>35.6</td>
<td>&gt;0.1</td>
</tr>
<tr>
<td>Fasting plasma glucose (mg/dl)</td>
<td>148.4±45.6</td>
<td>155.2±56.5</td>
<td>156.4±53.5</td>
<td>&gt;0.1</td>
</tr>
<tr>
<td>HbA1C (%)</td>
<td>7.4±1.5</td>
<td>7.6±1.68</td>
<td>7.8±1.5</td>
<td>&gt;0.1</td>
</tr>
<tr>
<td>Hypertension (%)</td>
<td>35</td>
<td>42</td>
<td>47</td>
<td>0.056</td>
</tr>
<tr>
<td>Systolic blood pressure (mmHg)</td>
<td>130.4±16.5</td>
<td>136.5±16.5</td>
<td>137.5±18.5</td>
<td>&lt;0.001abc</td>
</tr>
<tr>
<td>Diastolic blood pressure (mmHg)</td>
<td>77.5±8.5</td>
<td>79.5±9.8</td>
<td>79.6±9.2</td>
<td>&gt;0.1</td>
</tr>
<tr>
<td>Estimated glomerular filtration rate (ml/min)</td>
<td>67.5±23.5</td>
<td>65.5±25.3</td>
<td>62.6±24.8</td>
<td>&lt;0.001abc</td>
</tr>
<tr>
<td>Blood urea nitrogen (mg/dl)</td>
<td>16±6.2</td>
<td>22.5±10.8</td>
<td>25.6±11.6</td>
<td>0.001abc</td>
</tr>
<tr>
<td>Serum creatinine (mg/dL)</td>
<td>1.02±0.96</td>
<td>1.05±0.94</td>
<td>1.42±0.92</td>
<td>0.015c</td>
</tr>
<tr>
<td>Total cholesterol (mg/dl)</td>
<td>196.2±36.8</td>
<td>205.6±40.2</td>
<td>206.3±36.3</td>
<td>0.05</td>
</tr>
<tr>
<td>Triglyceride (mg/dl)</td>
<td>225.6±25.8</td>
<td>340.2±35.7</td>
<td>422.7±38.6</td>
<td>&lt;0.001abc</td>
</tr>
<tr>
<td>High density lipoprotein cholesterol (mg/dl)</td>
<td>48.8±14.6</td>
<td>47.5±13.5</td>
<td>45.6±12.8</td>
<td>0.005</td>
</tr>
<tr>
<td>Low density lipoprotein cholesterol (mg/dl)</td>
<td>112.6±31.6</td>
<td>115.2±28.7</td>
<td>114.5±28.9</td>
<td>&gt;0.1</td>
</tr>
<tr>
<td>Apolipoprotein A1 (mg/dl)</td>
<td>137.2±32.5</td>
<td>140.2±31.5</td>
<td>138.5±29.5</td>
<td>&gt;0.1</td>
</tr>
<tr>
<td>Apolipoprotein B (mg/dl)</td>
<td>106.8±27.5</td>
<td>118.4±34.5</td>
<td>119.4±28.5</td>
<td>&lt;0.001abc</td>
</tr>
<tr>
<td>Lipoprotein (a) (mg/dl)</td>
<td>35.2±5.2</td>
<td>42.5±8.6</td>
<td>55.6±10.5</td>
<td>&lt;0.012abc</td>
</tr>
</tbody>
</table>

Data are expressed as mean ±SD or %, p* value for one way ANOVA p<0.005
a, b and c indicate p<0.05 for normoalbuminurea vs microalbuminurea,
normoalbuminurea vs macroalbuminurea and microalbuminurea vs macroalbuminurea
Table 3: Correlation coefficient between lipid parameter and microalbuminuria

<table>
<thead>
<tr>
<th>Lipid parameters</th>
<th>All patients</th>
<th>Excluding macroalbuminuria</th>
<th>Excluding normoalbuminuria</th>
</tr>
</thead>
<tbody>
<tr>
<td>N</td>
<td>259</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total cholesterol</td>
<td>0.108*</td>
<td>0.096*</td>
<td>0.065*</td>
</tr>
<tr>
<td>Triglyceride</td>
<td>0.170**</td>
<td>0.094*</td>
<td>0.155*</td>
</tr>
<tr>
<td>High density cholesterol</td>
<td>-0.085*</td>
<td>-0.052</td>
<td>-0.036</td>
</tr>
<tr>
<td>Low density cholesterol</td>
<td>0.035</td>
<td>0.031</td>
<td>0.30</td>
</tr>
<tr>
<td>Apolipoprotein A1</td>
<td>0.027</td>
<td>0.051</td>
<td>-0.024</td>
</tr>
<tr>
<td>Apolipoprotein B</td>
<td>0.158**</td>
<td>0.166**</td>
<td>0.030</td>
</tr>
<tr>
<td>Lipoprotein (a)</td>
<td>0.086*</td>
<td>0.011</td>
<td>0.107+</td>
</tr>
</tbody>
</table>

+:0.05<p<0.1; * : p<0.05; ** : p<0.01

Table 4: Adjusted odds ratio for microalbuminuria (excluding macroalbuminuria) and macroalbuminuria (excluding normal albuminuria) estimated by every one unit increment of lipid parameters in type-2 diabetics patients.

<table>
<thead>
<tr>
<th>Models</th>
<th>Adjusted odds ratio (95% confidence under )</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Microalbuminuria</td>
</tr>
<tr>
<td></td>
<td>Model entered separately</td>
</tr>
<tr>
<td>Total cholesterol</td>
<td>1.004(1.000-1.010)+</td>
</tr>
<tr>
<td>Triglyceride</td>
<td>1.403(1.015-1.942)*</td>
</tr>
<tr>
<td>HDL-cholesterol</td>
<td>0.985(0.971-0.997)*</td>
</tr>
<tr>
<td>LDL-cholesterol</td>
<td>1.001(0.996-1.007)</td>
</tr>
<tr>
<td>Apolipoprotein A1</td>
<td>1.004(0.998-1.009)</td>
</tr>
<tr>
<td>Apolipoprotein B</td>
<td>1.014(1.008-1.018)**</td>
</tr>
<tr>
<td>Lipoprotein (a)</td>
<td>0.987(0.841-1.161)</td>
</tr>
</tbody>
</table>

Adjusted variables age, sex, body mass index, diabetes duration, systolic blood pressure, and creatinine clearance rate, +:0.05<p<0.1, * :p<0.05; ** : p<0.01.

REFERENCES


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Prevalence and Predictors of Excessive Daytime Sleepiness in Obese Type 2 Diabetic Patients– A Tertiary Centre Experience

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Associate Professor, Department of Obstetrics & Gynaecology, CSM Medical University, Lucknow²
Assistant Professor, Department of Pulmonary Medicine, CSM Medical University, Lucknow³

Abstract
Aim: The objective of this study was to determine the prevalence and to evaluate factors associated with excessive daytime sleepiness as a symptom of sleep apnea syndrome (SAS) in type 2 diabetic patients.

Material and Methods: The Berlin Sleep Apnea (BSA) questionnaire was administered to 242 consecutive patients with type 2 diabetes and a body mass index (BMI) ≥30kg/m². High or low risk was considered pathologic.

Results: Twenty-two percent of diabetic obese patients had excessive daytime sleepiness. Compared with patients without daytime sleepiness, the median HbA1c was increased with 1.3% (p<0.001) in sleepy patients. Waist circumference (odds ratio:1.04, 95% CI (1.01-1.07), BMI (odds ratio: 1.1, 95%CI (1.04-1.18) and HbA1c (odds ratio 1.29, 95%CI (1.07-1.56) were significantly related to the presence of excessive daytime sleepiness.

Conclusion: Excessive daytime sleepiness as a symptom of suspected SAS is highly prevalent in patients with type 2 diabetes and should be systematically screened for, especially among obese individuals with higher waist circumference, higher BMI and higher HbA1c values.

Index Terms- Daytime sleepiness, Obesity, Diabetes.

I. INTRODUCTION

Recently, there has been increasing recognition that sleep-disordered breathing is frequently associated with type 2 diabetes, and the observed association has important clinical and public health implications¹. A possible explanation for this association is the presence of shared risk factors such as obesity, visceral adiposity and advancing age.

Sleep apnea syndrome (SAS) represents a constellation of signs and symptoms caused by repetitive episodes of absence (apnea) or reduction (hypopnea) of the airflow at the nose/mouth during the sleep, associated with fall in oxygen saturation, arousals and awakenings². Sleep apnea is a general term encompassing two distinct entities, central sleep apnea and obstructive sleep apnea (OSA). OSA syndrome is characterized by the repetitive episodes of upper airway obstruction during sleep, that results in sleep fragmentation (frequent arousals to reestablish breath), recurrent hypoxemia, hypercapnia. These can lead to neurocognitive decline, cardiovascular complications, and eventually death³. Excessive daytime sleepiness is usually assumed to be one of the clinical symptoms of sleep disturbances (eg, sleep apnea). Sleep deprivation, sedating medications, certain medical and psychiatric conditions represents other causes of excessive daytime sleepiness⁴. Another cause of the daytime sleepiness in patients with diabetes are the increased levels of inflammatory cytokines⁵. In present, these cytokines are accepted as mediators of sleepiness, and they are closely involved in the pathogenesis of type 2 diabetes⁶. The Berlin Sleep Apnea (BSA) represents a validated questionnaire consist of three categories related to the risk of having sleep apnea. Patients can be classified in to high risk or low risk based on their responses to the individual items and their over all scores in the symptom categories. High risk if there are two or more categories are present. Low risk if there is only one or no categories ⁷.

The aim of this study was to determine the prevalence of excessive daytime sleepiness as a symptom of sleep apnea syndrome in patients with obesity and type 2 diabetes attending outdoor clinic and to evaluate factors associated with the presence of excessive daytime sleepiness in this group of patients.

II. MATERIAL AND METHODS

Between July 2009 and June 2011 patients with type 2 diabetes and obesity presenting for routine visit in an outpatient clinic of Diabetes, at CSMMU, Lucknow were participated in the study. All study participants had type 2 diabetes (defined according to World Health Organization Criteria)⁸, a body mass index (BMI) ≥30kg/m² and were enrolled in this study after an informed consent. Patients were not included in the study if they had type 1 diabetes, other specific causes of diabetes, current diagnosis of SAS, or refused to sign an informed consent form.

The variance was estimated based on a pilot study⁹, which revealed a prevalence of symptomatic sleep apnea of 20%. We calculated that a sample size of 246 patients with type 2 diabetes and obesity will be needed to obtain a 95% confidence interval and ±5% precision, if the estimated prevalence of symptoms of sleep apnea will be at least 20%. After the correction for finite population, we obtained a sample size of 242 patients.

The Berlin Sleep Apnea (BSA) represents a validated questionnaire consist of three categories related to the risk of having sleep apnea. Patients can be classified in to high risk or
low risk based on their responses to the individual items and their overall scores in the symptom categories. High risk if there are two or more categories are present. Low risk if there is only one or no categories.

A complete medical history, including diabetes duration, diabetes treatment, diabetic complications and physical examination were performed. Height, weight, waist circumference, hip circumference and blood pressure were determined by a standardized protocol. Waist circumference was measured half way between the lower border of the last rib and the upper border of the iliac crest at the end of a normal expiration, using a non-stretchable tape measure. Hip circumference was measured around the maximum circumference of the buttocks. Body mass index (BMI) was calculated as weight (kg)/height $m^2$. Blood pressure was measured using a standard mercury sphygmomanometer. All readings were taken after a 5 minute rest, with the patient in the sitting position.

Fasting blood samples were drawn from every individual, in order to assess the levels of glycemia, glycosylated hemoglobin (HbA1c), total cholesterol, HDL-cholesterol and triglycerides. LDL-cholesterol was calculated using Friedewald formula$^{10}$.

### III. STATISTICAL ANALYSIS

Statistical analysis was carried out using SPSS-PC 15. Skewness and kurtosis, as well as Kolmogorov- Smirnov test were used to test the normal distribution of the variables. Data are reported as means and standard deviation for variables with normal distribution and as median and 1$^\text{st}$ and 3$^\text{rd}$ quartile for variables with an abnormal distribution. For comparative analysis were applied t-test (for continuous variables with normal distribution), chi-square test for dichotomial variables, Mann Whitney U-test for variables with a distribution that differs from a normal one. The association between excessive daytime sleepiness and other variables were assessed by Spearman correlation coefficients and logistic regression. The level of significance was set at 0.05, and all tests were performed two sided.

### IV. RESULTS

Present analysis included 124 women and 118 men, minimum age 34 years, maximum age 75 years with a mean BMI of 35.6 kg/m$^2$ (range from 30.0 kg/m$^2$ to 51.5 kg/m$^2$) (Table 1). Stratification for antidiabetic treatment was as follows: 7.2% were on diet alone, 52.6% on oral therapy and 40.2% on insulin (alone or in combination with oral therapy).

Based on results obtained at the Berlin Sleep Apnea Questionnaire, 22.3% of the study participants (54 patients) presented excessive daytime sleepiness. Of these, 22 were females (40.7%) and 33 were men (59.3%) (p<0.04). Characteristics of patients with or without excessive daytime sleepiness are presented in Table 2. Compared to patients without excessive daytime sleepiness, median HbA1c was increased with 1.2% (Mann-Whitney U-test; p<0.001) in sleepy patients. The prevalence of diabetic peripheral neuropathy and diabetic nephropathy was significant higher in group with excessive daytime sleepiness compared with patients without excessive daytime sleepiness, but the difference did not achieved the level of statistical significance. The other characteristics included in analysis were not statistically significant different between the two groups.

Spearman’s correlation coefficients were calculated to assess the association between the presence of excessive daytime sleepiness and other variables. Only sex, age, BMI, waist and HbA1c were significantly correlated with the presence of excessive daytime sleepiness.

These variables were further included in a univariate logistic regression analysis in order to identify predictors of excessive daytime sleepiness (table 3). Only age, waist, BMI and HbA1c were significantly associated with the presence of excessive daytime sleepiness after regression analysis. In other words, excessive daytime sleepiness odds increased with 4% with every 1cm increase in abdominal circumference (95% CI: 1.01-1.07) and with 10% with every 1kg/m$^2$ increase in BMI (95% CI:1.04-1.18). Also, excessive daytime sleepiness odds increased with 29% with every 1% increase in HbA1c (95%CI:1.07-1.56). Data in table are presented as mean±SD for continuous variables or % for dichotomial variables, *-variables with abnormal distribution are presented as median (1$^\text{st}$ quartile, 3$^\text{rd}$ quartile)

### V. DISCUSSIONS

The main finding of this study was the high prevalence of excessive daytime sleepiness in patients with type 2 diabetes (22.3%). Individuals with excessive daytime sleepiness were more frequently males, older, had higher BMI waist circumference and lower HDL-cholesterol compared with non-sleepy subjects. Other findings were that age, waist circumference, BMI and HbA1c were independent predictors of the presence of excessive daytimes sleepiness.

Compared with studies conducted on diabetic patients, this study revealed lower prevalence of excessive daytime sleepiness. In a similar study Kelly et al$^{11}$, examined the risk of having sleep apnea by Epworth Sleepiness Scale in a population of obese patients with type 2 diabetes from a district general hospital diabetes clinic. This article reported a prevalence of ESS>10 of 56%, higher than in the present report. This difference could be explained by the less number of patients (66) included in the study conducted by Kelly and 242 patients in the present study. Also the selection of these patients was different, patients in our study were selected from an outpatient clinic which is the standard for routine care in our setup while patients included in study published by Kelly et al patients were selected from those admitted in a diabetes unit from a general hospital). We tried to avoid a selection bias by inviting to participate every day the first 3 patients with type 2 diabetes and obesity who presented for a routine visit.

In our study, excessive daytime sleepiness was more common in men, and was associated with a higher BMI, waist circumference and advanced age. These results are similar with those of Einhorn and colleagues$^{12}$ and Kelly et al$^{11}$. In a study conducted on 330 patients with type 2 diabetes by Einhorn et al demonstrated that subjects with sleep apnea were more likely to be males, had a higher BMI and were older than the subjects without sleep apnea$^{12}$. In our study both BMI and waist circumference were predictors of the presence of excessive daytime sleepiness, even after adjustment for age and male sex.
Even more concerning is the fact that in patients with excessive daytime sleepiness the median HbA1c was increased with 1.3% (p<0.001) compared with patients without excessive daytime sleepiness. These results are comparable with those observed by Aronshon and collab\textsuperscript{13}. They demonstrated that increasing severity of OSA is associated with poorer glucose control, with effect size comparable to those of several hypoglycemia drugs\textsuperscript{a}. Our study demonstrated a positive correlation between the presence of excessive daytime sleepiness and the HbA1c value, excessive daytime sleepiness odds increased with 29% with every 1% increase in HbA1c (95%CI:1.07-1.56).

There are some limitations of our study that this was a cross sectional study that does not allows us to make any conclusive statement about the temporality of the observed associations and selecting a sample from an outpatient clinic could lead to a selection bias.

VI. CONCLUSION
Excessive daytime sleepiness is highly prevalent in type 2 diabetes and should be systematically screened for, especially among obese individuals with higher waist circumference and poor diabetes control.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (years)= Mean±SD</td>
<td>57.5±9.20</td>
</tr>
<tr>
<td>Men (%)</td>
<td>47.0</td>
</tr>
<tr>
<td>Duration of diabetes (years) Mean ±SD</td>
<td>7.2±5.6</td>
</tr>
<tr>
<td>Waist circumference (cm) mean±SD</td>
<td>120.4±11.6</td>
</tr>
<tr>
<td>BMI (kg/m\textsuperscript{2})-body mass index mean ±SD</td>
<td>35.6±4.5</td>
</tr>
<tr>
<td>Waist to hip ratio*</td>
<td>1.0(0.9;1.1)</td>
</tr>
<tr>
<td>Fasting blood glucose (mg/dl) mean±SD</td>
<td>160.9±48.6</td>
</tr>
<tr>
<td>HbA1c(%)*glycosylated hemoglobin</td>
<td>7.8 (6.6;8.6)</td>
</tr>
</tbody>
</table>

Table -1: Characteristics of study participants

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Excessive daytime sleepiness (n=54)</th>
<th>Non excessive daytime sleepiness (n=188)</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male/female gender</td>
<td>32/22</td>
<td>84/104</td>
<td>0.04</td>
</tr>
<tr>
<td>Age (years)</td>
<td>59.5±9.2</td>
<td>54.6±7.4</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>BMI (kg/m\textsuperscript{2})</td>
<td>±</td>
<td>±</td>
<td>0.005</td>
</tr>
<tr>
<td>Waist circumference (cm)</td>
<td>±</td>
<td>±</td>
<td>0.001</td>
</tr>
<tr>
<td>Systolic BP (mmHg)</td>
<td>±</td>
<td>±</td>
<td>0.65</td>
</tr>
<tr>
<td>Diastolic BP (mmHg)</td>
<td>±</td>
<td>±</td>
<td>0.20</td>
</tr>
<tr>
<td>Total cholesterol (mg/dl)</td>
<td>±</td>
<td>±</td>
<td>0.85</td>
</tr>
<tr>
<td>HDL-cholesterol (mg/dl)</td>
<td>±</td>
<td>±</td>
<td>0.007</td>
</tr>
<tr>
<td>LDL- cholesterol (mg/dl)</td>
<td>±</td>
<td>±</td>
<td>0.18</td>
</tr>
<tr>
<td>Triglycerides (mg/dl)*</td>
<td>±</td>
<td>±</td>
<td>0.36</td>
</tr>
<tr>
<td>FPG (mg/dl)</td>
<td>±</td>
<td>±</td>
<td>0.04</td>
</tr>
<tr>
<td>HbA1c(%)*glycosylated hemoglobin</td>
<td>8.5(7.2;9.8)</td>
<td>7.2(6.4;8.4)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Duration of diabetes (years)</td>
<td>±</td>
<td>±</td>
<td>0.55</td>
</tr>
<tr>
<td>Diabetic retinopathy (%)</td>
<td>26.4</td>
<td>18.5</td>
<td>0.16</td>
</tr>
<tr>
<td>Diabetic neuropathy (%)</td>
<td>41.5</td>
<td>28.8</td>
<td>0.04</td>
</tr>
<tr>
<td>Diabetic nephropathy (%)</td>
<td>16.7</td>
<td>7.1</td>
<td>0.03</td>
</tr>
</tbody>
</table>

BMI= body mass index, BP= blood pressure, FPG= fasting plasma glucose, HbA1c= glycosylated hemoglobin, CVD=cardiovascular disease
Table-3: Unadjusted odds ratio (95% CI) for the presence of excessive daytime sleepiness and different variables estimated by unadjusted logistic regression.

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Excessive daytime sleepiness (all patients)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>1.06 (1.03-1.10)</td>
</tr>
<tr>
<td>Male sex</td>
<td>1.80 (0.99-3.39)</td>
</tr>
<tr>
<td>BMI</td>
<td>1.10 (1.04-1.18)</td>
</tr>
<tr>
<td>Waist</td>
<td>1.04 (1.01-1.07)</td>
</tr>
<tr>
<td>HbA1c</td>
<td>1.29 (1.07-1.56)</td>
</tr>
</tbody>
</table>

Cl=confidence interval, BMI= Body mass index, HbA1c= glycosilated hemoglobin

REFERENCES


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Rhizosphere and non-rhizosphere microbial population dynamics and their effect on wilt causing pathogen of pigeonpea

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Abstract- Rhizosphere of healthy pigeonpea was heavily colonized by a number of microbes of which Gliocladium virens and Penicillium sp. were dominant. In contrast Fusarium udum dominated in the rhizosphere of diseased plant but there were mixed population of G. virens and Penicillium sp. in non-rhizosphere soil. Interestingly the fungi known for antimicrobial or antagonistic properties was high in the rhizosphere of healthy pigeonpea plants. Resident microorganisms were studied against Fusarium udum causing wilt disease of pigeonpea in vitro, as well as in vivo. Gliocladium virens, Trichoderma viride, Aspergillus niger, Penicillium citrinum, which were found to be most potent ones in inhibiting the radial growth of the test pathogen were used in field. Minimum incidence of the wilt disease was observed in seeds treated with G. virens. Details of microbial population of both rhizosphere and non-rhizosphere and their interaction is presented in this paper.

Index Terms- Antagonist, Fusarium udum, Microbial population, Non-Rhizosphere, Rhizosphere

I. INTRODUCTION

Rhizosphere is characterized by greater microbial activity where many micro flora along with their harmful and beneficial activities are present. It is the site for harmful and beneficial activities where many key interactions take place between microbes and plant. Rhizosphere of disease as well as healthy plants harbours several fungi and bacteria [7]. Among the soil micro flora few of them may be beneficial antagonist. Trichoderma viride and Aspergillus niger as a part of micro flora of wilt resistant cultivar while susceptible cultivar showed a predominance of Fusarium udum and other Fusarium spp. during all the stages of plant growth [18]. This disease can attack at any stage of the crop. The disease causes complete yield loss when it occurs at pre-pod stage. Wilt disease cause an estimated loss of US$36 million in India and $5 million in eastern Africa [5]. The present investigation was undertaken to find out the microbial population dynamic of rhizosphere and non-rhizosphere soil of pigeonpea in agro climatic conditions of Manipur and their effect against F. udum, the pathogen causing wilt disease of pigeonpea.

II. MATERIALS AND METHODS

Soil samples were collected from rhizosphere and non-rhizosphere of healthy and diseased plants of locally cultivated pigeonpea during the cropping season (May to Nov., 2009) from farmer’s field at Kanglatongbi, Senapati District, Manipur, located at 23.83°N and 25.68°N latitude and 93.03°E and 94.78°E longitude. Five plants were pulled out and soil attached with the complete intact roots was collected and kept separately as healthy and diseased samples. Non-rhizosphere soil was collected from in between space of two rows of the pigeonpea field. Thus, five samples were collected together for composite sample. Finally one part of soil was taken out from composite sample for analysis [7].

Total fungi and total bacteria were isolated by dilution plate technique from 1 g dried soil of rhizosphere and non-rhizosphere. Serial dilution of 1:10³ was prepared in sterilized water and plated on peptone dextrose rose Bengal agar medium for fungi. Serial dilution of 1:10⁶ was prepared and plated on soil extract agar medium for bacteria. One ml of soil suspension placed in each sterilized petriplate and 20 ml of cooled melted medium was poured in the same plate and gently rotated horizontally to get uniform distribution of the suspension in medium. These plates were incubated at 28± 1°C for four days in three replications. Identification of the fungal cultures was done by using relevant literature and keys. Bacterial cultures were sent to IMTECH, Chandigarh for identification. Total number of fungal and bacterial colonies were counted and calculated in colony forming units per gram of soil (cfu g⁻¹).

Screening for antagonism between the microorganisms isolated from the rhizosphere viz, Trichoderma viride, Aspergillus niger, Gliocladium virens Trichoderma harzianum, Penicillium citrinum were done by dual culture technique [15]. The potato dextrose agar (PDA) medium in culture plates was simultaneously seeded with actively growing 3 mm mycelial blocks of test pathogen and the antagonist isolates. Four days old F. udum block was seeded in the centre, where as three blocks of individuals antagonists were seeded at 4 cm equidistant point near the periphery from the centre and incubated at 28± 1°C. Three replications of each isolates including a control i.e., without inoculation of the antagonists were maintained. For bacteria screening was done by filter paper disc method [13]. The plates were seeded and incubated as described above. After 6 days incubations the percent inhibition in growth of pathogen was calculated by the formula:

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plants showed complete symptom of wilting. Percent Disease incidence, (DI\%) is calculated using the formula below:

\[
\text{Percent Disease incidence, (DI\%)} = \left( \frac{\text{Number of plants infected by the disease}}{\text{Total number of plants observed}} \right) \times 100
\]

Field application: Field experiment in randomized block design was carried out for two years (2010 and 2011) in wilt-sick farmer’s field located at Imphal West District, Manipur on a wilt susceptible local variety of pigeonpea. The sub-treatments included different seed treatments and untreated seeds as control. Seed treatment was done following [19]. The seeds were treated with conidial suspension (1×10^11 conidia per ml) for 24 hours of four antagonists which were found potent against the test pathogen. Untreated seeds were soaked for 12 hours in sterilized distilled water. The treated seeds were air dried for 7 days under ambient conditions before sowing. Plot size of 1×4 m² was prepared for each treatment and replicated thrice. The seeds of pigeonpea were sown in each plot at the rate of 40 seeds per plot. However, after germination, only 10 plants per plot were allowed to grow. The percent disease incidence was calculated by using the formula mentioned below after 60 days of sowing when the plants showed complete symptom of wilting.

**Table 1a. Microbial population of rhizosphere soil of healthy pigeonpea plant**

<table>
<thead>
<tr>
<th>Fungi</th>
<th>June</th>
<th>July</th>
<th>August</th>
<th>September</th>
<th>October</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aspergillus niger</td>
<td>-</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Trichoderma viride</td>
<td>1</td>
<td>4</td>
<td>1</td>
<td>1</td>
<td>-</td>
</tr>
<tr>
<td>Gliocladium virens</td>
<td>9</td>
<td>14</td>
<td>13</td>
<td>3</td>
<td>-</td>
</tr>
<tr>
<td>Fusarium udum</td>
<td>-</td>
<td>2</td>
<td>3</td>
<td>1</td>
<td>-</td>
</tr>
<tr>
<td>Penicillium sp.</td>
<td>1</td>
<td>3</td>
<td>5</td>
<td>6</td>
<td>1</td>
</tr>
<tr>
<td>Curvularia sp.</td>
<td>1</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Phoma sp.</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Aspergillus flavus</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Rhizopus nigricans</td>
<td>-</td>
<td>1</td>
<td>1</td>
<td>-</td>
<td>1</td>
</tr>
<tr>
<td>Nigrospora sp.</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>2</td>
<td>-</td>
</tr>
<tr>
<td>Verticillium sp.</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>1</td>
</tr>
<tr>
<td>Trichoderma harzianum</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Cladosporium sp.</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

**Table 1b. Microbial population of rhizosphere soil of diseased pigeonpea plant**

<table>
<thead>
<tr>
<th>Microorganism</th>
<th>June</th>
<th>July</th>
<th>August</th>
<th>September</th>
<th>October</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aspergillus niger</td>
<td>-</td>
<td>3</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Trichoderma viride</td>
<td>3</td>
<td>3</td>
<td>1</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Gliocladium virens</td>
<td>1</td>
<td>2</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Fusarium udum</td>
<td>6</td>
<td>9</td>
<td>12</td>
<td>4</td>
<td>2</td>
</tr>
<tr>
<td>Penicillium sp.</td>
<td>1</td>
<td>3</td>
<td>5</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Curvularia sp.</td>
<td>1</td>
<td>3</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Phoma sp.</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Aspergillus flavus</td>
<td>-</td>
<td>-</td>
<td>3</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Rhizopus nigricans</td>
<td>-</td>
<td>3</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Nigrospora sp.</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Verticillium sp.</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>1</td>
</tr>
<tr>
<td>Trichoderma harzianum</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Cladosporium sp.</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>White sterile mycelium</td>
<td>12</td>
<td>24</td>
<td>24</td>
<td>10</td>
<td>9</td>
</tr>
<tr>
<td>Total</td>
<td>14</td>
<td>23</td>
<td>30</td>
<td>20</td>
<td>7</td>
</tr>
</tbody>
</table>
Table 1c. Microbial population of non-rhizosphere soil of pigeonpea

<table>
<thead>
<tr>
<th>Microorganism</th>
<th>June</th>
<th>July</th>
<th>August</th>
<th>September</th>
<th>October</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aspergillus niger</td>
<td>-</td>
<td>-</td>
<td>5</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Trichoderma viride</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>1</td>
</tr>
<tr>
<td>Gliocladium virens</td>
<td>9</td>
<td>10</td>
<td>4</td>
<td>4</td>
<td>1</td>
</tr>
<tr>
<td>Fusarium udum</td>
<td>2</td>
<td>4</td>
<td>9</td>
<td>-</td>
<td>3</td>
</tr>
<tr>
<td>Penicillium sp.</td>
<td>-</td>
<td>-</td>
<td>5</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Phoma sp.</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Aspergillus flavus</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Rhizopus nigricans</td>
<td>-</td>
<td>1</td>
<td>1</td>
<td>-</td>
<td>1</td>
</tr>
<tr>
<td>Nigrospora sp.</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>1</td>
</tr>
<tr>
<td>Verticillium sp.</td>
<td>-</td>
<td>-</td>
<td>1</td>
<td>2</td>
<td>-</td>
</tr>
<tr>
<td>Trichoderma harzianum</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Cladosporium sp.</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>White sterile mycelium</td>
<td>11</td>
<td>15</td>
<td>25</td>
<td>8</td>
<td>8</td>
</tr>
<tr>
<td>Bacillus sp.</td>
<td>2</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Bacillus MTCC 10514</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>3</td>
<td>-</td>
</tr>
<tr>
<td>Bacillus licheniformis</td>
<td>4</td>
<td>2</td>
<td>4</td>
<td>3</td>
<td>2</td>
</tr>
</tbody>
</table>

*Each figure is a mean of three replications

Table 2. In vitro screening of microorganisms for antagonistic activity towards Fusarium udum

<table>
<thead>
<tr>
<th>Antagoists</th>
<th>Disease Incidence %</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2010</td>
</tr>
<tr>
<td>Gliocladium virens</td>
<td>67.8</td>
</tr>
<tr>
<td>Trichoderma viride</td>
<td>76.7</td>
</tr>
<tr>
<td>Aspergillus niger</td>
<td>72.2</td>
</tr>
<tr>
<td>Penicillium citrinum</td>
<td>94.4</td>
</tr>
<tr>
<td>Control</td>
<td>95.7</td>
</tr>
</tbody>
</table>

*Each figure is a mean of three replications

Table 3. Effect of bioagents on wilt disease of pigeonpea under field condition

<table>
<thead>
<tr>
<th>Antagoists</th>
<th>Disease Incidence %</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2010</td>
</tr>
<tr>
<td>Gliocladium virens</td>
<td>67.8</td>
</tr>
<tr>
<td>Trichoderma viride</td>
<td>76.7</td>
</tr>
<tr>
<td>Aspergillus niger</td>
<td>72.2</td>
</tr>
<tr>
<td>Penicillium citrinum</td>
<td>84.4</td>
</tr>
<tr>
<td>Control</td>
<td>95.7</td>
</tr>
</tbody>
</table>

*Each figure is a mean of three replications

III. RESULT AND DISCUSSIONS

Total fungi: The analysis of rhizosphere and non-rhizosphere soil of pigeonpea showed that the colonies of G. virens were dominating in the rhizosphere of healthy pigeonpea plants (Table 1a). Colonies of *F. udum* appeared on all the soil samples. *F. udum* in the rhizosphere of diseased plant was $12 \times 10^3$ cfug$^{-1}$ which was higher than healthy plants and non-rhizosphere. The presence of *F. udum* in the healthy and non-rhizosphere soil is due to the planting of the crops in wilt sick field. The dominance of *F. udum* in the rhizosphere of diseased plant and presence of *F. udum* in healthy and non-rhizosphere soil was also earlier reported by [7]. Result presented herein (table 1a, 1b, 1c) indicated more microbial activity during early part of the growth of the plant. In general the fungal population was higher in rhizosphere than non-rhizosphere irrespective of healthy and diseased plant due to availability of nutrients released by the root exudates around the vicinity of root zone of pigeonpea. The fungi known for antagonistic activity such as *T. viride, A. niger, G. udum*.
virine was higher in the rhizosphere of healthy plants as compared to diseased and non-rhizosphere.

Total bacteria: Three types of bacterial colonies Bacillus sp. (MTCC 10514), (Bacillus licheniformis) (MTCC 10516), Pseudomonas montelli (MTCC 10517) appeared on soil extract agar medium (table 1a, 1b,1c). The population of P. montelli was maximum in the rhizosphere of healthy, diseased and non-rhizosphere soil. However, maximum colonies (20×10^6 cfu g^-1) were associated with healthy plant (table 1a). There is no clear trend of increasing or decreasing population of bacteria. However, the total number of bacteria was also high in rhizosphere of healthy plant as compared to diseased and non-rhizosphere as reported by [16].

Screening for antagonism
All the five fungal isolates tested were found to inhibit the growth of F. udum. Findings presented in (table 2) showed that the maximum inhibition of radial growth of F. udum was observed with the treatment of T. viride (78.3 %) followed by A. niger (68.3 %) and T. harzianum (66.6 %), P. citrinum (61.7%) and G. virens (35.0%). The percent growth inhibition of G. virens after 6 days was low but the interaction studies on Bell’s scale (table 2) showed that G. virens and A. niger belonged to type 1 antagonist. Both of them completely overcolonized the pathogen after 10 days. Pathogen growth is completely restricted. The interaction of Trichoderma spp. With F. udum showed yellow pigmentation beneath overcolonized colony of the pathogen. The mycelium of both cultures comes in contact with each other at 3 days. They belonged to type 2 antagonists. Among the bacterial isolates B. licheniformis showed 35.0% inhibition of radial growth but belonged to type 4 antagonist. Others showed no antagonism. Potential antagonism of Trichoderma as evidenced by the results is due to competition, antibiosis and mycoparasitism [11]. Moreover these fungi produce antibiotics such as gliotoxin, viridin and cell wall degrading enzymes and also biologically active heat stable metabolites such as ethyl acetate. These substances are known to be involved in disease incidents suppression [10]. A. niger, G. virens, P. citrinum, T. harzianum, and species of Bacillus control soil-borne diseases [6]. A. flavus, A. niger, and T. viride amended in soil suppressed the growth of F. oxysporum f. sp. ciceri and exhibited strong fungistatic activity against germination of conidia of test pathogen [9].

Under field conditions, minimum disease incidence were observed with G. virens (68.9%) followed by A. niger (72.8%), T. viride (77.3%), P. citrinum (90.5%) (table 3). G. virens and T. viride have been recognized as the most effective antagonist for biological control of several plant pathogens by many investigators [2,3,4,17].

IV. CONCLUSION

The beneficial effects of the application of antagonistic microbes are well narrated. Our investigation also reported potentiality of the antagonistic fungus G. virens to incorporate in the integrated disease management for pigeonpea wilt. However further work is necessary to enhance the disease control capability of G. virens.
Business Process Reengineering for Indian Rural Health Care Sector using Data Envelopment Analysis Technique

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²Department of Mechanical Engineering, Malnad College of Engineering, Hassan-573102, Karnataka, India
³Department of Mechanical Engineering, Adichunchanagiri Institute of Technology, Chikmagalur, India

Abstract- Business Process Reengineering (BPR) has become an increasingly significant and integral part of a health-care system as well as of any other organization. This paper presents an application of Business Process Reengineering as an aid to enhance productivity in Indian rural health care delivery system. Business process reengineering may be the medicine required to achieve dramatic productivity improvement without jeopardizing the quality and scope of core rural healthcare program services. Reengineering challenges rural healthcare sectors to redesign its inefficient programs. Data Envelopment Analysis (DEA) may facilitate to evaluate and Business Process Reengineering to redesign the rural health care programs. The Programs of the reengineering can be enhanced over time by Continuous Quality Improvement. In this paper, we have focused on the evaluation and reengineering of programs of National Rural Health Mission (NRHM) with particular reference to Chikmagalur District, Karnataka, India.

Index Terms- Business Process Reengineering, Data Envelopment Analysis, National Rural Health Mission, Rural Healthcare, Reengineering

I. INTRODUCTION

The delivery of rural health care services in India remains poor due to lack of infrastructure and personnel, financial constraints, lack of awareness, poor accountability and transparency. Though the networks of the department have spread to almost every village, the availability and utilization of the services continue to be very poor and grossly inadequate. Even as medical facilities in India are going hi-tech and its professionals global, rural India seems to be languishing. There is a great difference between medical facilities available in rural and that of urban in India. Rural doctors to population ratio lower by six times, rural beds to population ratio lower by fifteen times, villagers spend 1.5 times more compare to urban counterparts for same illness, spurious drugs, seven of ten medicines in rural areas substandard / counterfeit, 22 million population pushed below poverty line annually due health care expenditure alone, 40% hospitalization expenditure funded by borrowed money or sold assets, 700 million people living in 636 K villages, 66 % rural Indians do not have access to critical medicine, 31 % of the population travel more than 30 kms seeking health care in rural India, a third of symptoms presented at the primary health setting might be psychosomatic in nature. The country has created a vast public infrastructure of sub centers, Primary health centers (PHCs) and community health centers (CHCs). There is also a large cadre of health care providers (auxiliary nurse midwives, male health workers, lady health visitors and health assistants male etc). Recognizing importance of rural health in the process of economic and social development and improving the quality of life of the citizens, the government of India has resolved to launch the National Rural Health Mission (NRHM) to carry out necessary architectural correction in the basic health care delivery system. The mission adopts a synergistic approach by relating health determinants of good health viz.. The goal of the mission is to improve the availability of and access to quality health care by people and especially for those residing in rural areas, the poor, women and children[1][2][3].

India’s achievement in the field of rural health care delivery system has been less than satisfactory and the burden of disease among the rural Indian population remains high. So, the need for reengineering arises for critical analysis and radical redesign of existing rural health care delivery system to achieve breakthrough improvements in performance measure. The objective of this study is to adapt multi-criteria mathematical programming model Data Envelopment Analysis (DEA) to evaluate efficiency level of rural care programs and to develop the prototype model to redesign the inefficient programs as per the steps under the BPR.

A. Business Process Reengineering

Davenport and short, Teng et al. define Business Process Redesign as "Critical analysis and radical redesign of existing processes to achieve break through improvements in performance measures". Reengineering also known as process redesign or process innovation, refers to discrete initiatives that are intended to achieve radically redesign and improved work processes [4]. Hammer and Champy defined Business Process Reengineering (BPR) as the “Fundamental rethinking and radical redesign of business processes to bring about dramatic improvements in performance”[5]. A manufacturing process exists to accomplish the particular function of building some tangible product. The objective of Reengineering effort is usually to increase the yield of that product / unit cost or time or to improve its quality. The Reengineering effort has been extended to improvement of business processes as well. The basic approach is the same ; a processes is analyzed as a sequence of steps along a value chain with the main difference being that the end product is a service rather than a tangible object. BPR is the process that contributes to organizational transformation (OT),
however it is not synonymous with transformation. OT is defined as, “Profound, fundamental changes in thought and actions, which create an irreversible discontinuity in the experience of a system”. The OT is generally about the emergence of new belief system and necessarily involves reframing, which is a discontinuous change in the organizations or groups shared meaning or culture. It also involves broad changes in other organizational dimensions besides the work processes.

Davenport and Short prescribe a five-step approach to BPR with specific objectives of the business such as Time Reduction, Output Quality improvement. The steps are i) Identify the process to be Redesigned. ii) “Exhaustive” approach that attempts to identify all the processes within an organization and then prioritize them in order of redesign urgency. iii) Understand and Measure the Existing Process for avoiding the repeating of old mistakes and for providing baseline for future improvements. iv) Identify IT Levers to influence process design v) Design and Build a prototype of New Process.[6]

Business process reengineering (BPR) has become an increasingly significant and integral part of a health-care system as well as of any other organization. It is, therefore, important that rural health-care decision-makers be aware of the vision for and commitment to BPR as an essential aspect of strategic planning for the mission of health-care service and management. The goals surrounding BPR decisions are complex and conflicting since the goals are different in each subsystem and sub process. It is very complicated and difficult to balance current requirements of multi-dimensional subsystems without a systematic approach to evaluate potential future BPR decisions. If it is overlooked in the evaluating and structuring of the BPR decision, the system may fail to meet the challenging demands of the market and satisfying stakeholders. In other words, if one goal is selected with little or no consideration for other goals, the decision can be costly both in terms of competitive advantages and long-term strategic planning. BPR planning is considered as a particularly complicated multi-criteria decision-making problem. It is complicated because many qualitative and quantitative factors have to be included in the BPR decision-making process. Since the content of the BPR problem has practical applications, many studies have applied diverse optimization algorithms and/or approximation algorithms to the real-world situations. In recent years, a plethora of information technology related BPR researches have appeared in the literature [6]-[9]. As per the literature survey very little work has been carried out on rural health care delivery system by the application of business process reengineering.

B. Data Envelopment Analysis

Data Envelopment Analysis (DEA) uses nonparametric deterministic mathematical programming to optimize the relative efficiency ratio in each decision-making unit (DMU) such as organization, program, service, that utilizes similar inputs to produce similar outputs when compared to a peer group of DMUs. The mathematical model and theoretical base model of DEA have been mentioned in many articles. The efficiency of any DMU is obtained by using a nonlinear programming model, as the maximum of a ratio of weighted outputs to weighted inputs subject to the condition that the ratio for every DMU be less than or equal to unity. Those programs with a positive efficiency ratio of less than 1 are defined as "inefficient" compared to programs with an efficiency ratio of 1. Those programs with an efficiency ratio of 1, while not necessarily efficient in the absolute sense, represent the "best-practice" units when compared with other programs in their subset. A health program that is found to be relatively efficient, for instance, may still be able to innovate and improve its operating efficiency[10]-[15]. The reason for using the term "Data Envelopment" is this technique uses the current values of chosen multiple inputs and outputs simultaneously in each DMU to generate efficiency boundaries and then compares the relative relationships between other DMUs. It produces a summary scalar efficiency ratio for each DMU in the study and also identifies the amount of inefficiency for each resource in each inefficient DMU. One advantage of the DEA model is that each input and each output variable can be measured independently in any useful unit, without being transformed into a single metric, provided the same variables are utilized for every DMU. Moreover, by not requiring a predetermined specific input-output relationship, the DEA model can use as inputs any factors that significantly affect the output variables. This avoids the problems associated with techniques used to convert and unify variables. The efficiency criterion employed is the maximization of relative efficiency for each program rather than an arbitrary cutoff point; hence, each multiplier (weight) is generated, not a priori, but from actual data for each DMUs[16]-[27].

II. FRAMEWORK OF THE STUDY

In this study, first we adapted multi criteria mathematical programming model Data Envelopment Analysis (DEA) to evaluate efficiency level of rural care programs. Second, Design and Build a prototype of New Process to redesign the inefficient programs by adapting the framework of BPR.

The data’s were collected from NRHM centre, District health office Chikmagalur District, Karnataka, India. Questionnaire techniques was use to gather detailed information about Rural Health centre programs such as provider a characteristics, scope of services, provider stability and productivity, revenues and costs and administrative and financial policies. The database includes 52 randomly selected programs of NRHM (2008-2010). Only two main categories are considered in a DEA model: input and output. This study model has controllable and uncontrollable variables. Input controllable and uncontrollable variables Output controllable and uncontrollable variables. Health programs that produce more outputs with given inputs are considered to be relatively more efficient. For our study, outputs can be any product of the rural health program, such as services provided and patients served. As mentioned previously, inputs can be any factors that affect significantly the production of outputs. According to previous studies potential input and output variables were identified and justified. To select non redundant output variables, correlation analysis was used. Output and input variables were selected from the results of correlation and stepwise regressions. Then controllable (discretionary) and uncontrollable (nondiscretionary) inputs and outputs were considered by classifying the selected inputs and outputs according to their relationship to managerial decisions.
The rural primary health care programs are heterogeneity in nature; it was evident not only in their outputs but also in their inputs. Most of the variables used in this study had coefficients of variation (s.d./mean) greater than 100 percent. Accordingly, all of the uncontrollable input variables were classified into two or three (0-1) categories in order to limit the range of peer programs that belonged to the same comparative group. The common major services in rural primary health care programs are medical services. Since no direct measure of quality of medical services was available in the data set, the provision of medical services was considered by type of provider, instead of an aggregated measure for all medical services. For this study, we used three main types of health care providers: Doctors, ANMs and Health assistants. In addition to the three medical output measures, "total encounters," the summation of medical other encounters was considered as an "uncontrollable" output in the DEA model. This methodology took total volume of the program into account in the efficiency comparisons and allowed consideration in the model of other non medical services that the center produced.

The input factors used in the model were: Doctors (DOCs), ANMs, Administrative cost, service area population size. The service area population size was used as control variables of user’s health need (or demand).

### III. THE DEA MODEL FOR THE STUDY

The DEA relative efficiency model is defined as the ratio of total weighted output to total weighted input. By comparing n units with s outputs denoted by $y_{vuk}$, $i = 1, \ldots, m$, the efficiency measure for DMU k is

$$h_k = \max_{u_i, v_i} \frac{\sum_{r=1}^{s} u_r y_{rk}}{\sum_{i=1}^{m} v_i x_{ik}}$$

Where the weights, $u_i$ and $v_i$, are non-negative. A second set of constraints requires that, when applied to all DMUs, do not provide any unit with efficiency greater than one. This condition appears in the following set of constraints:

$$\sum_{r=1}^{s} u_r y_{rk} \leq 1$$
$$\sum_{i=1}^{m} v_i x_{ik} \leq 1$$

The efficiency ratio ranges from zero to one, with DMU k being considered relatively efficient if it receives a score of one. Thus, each unit will choose weights so as to maximize self-efficiency, given the constraints. The result of the DEA is the determination of the hyper planes that define an envelope surface or Pareto frontier. DMUs that lie on the surface determine the envelope and are deemed efficient, whilst those that do not are deemed inefficient. The formulation described above can be translated into a linear program, which can be solved relatively easily and a complete DEA solves n linear programs, one for each DMU.

### IV. THE DATA FORMULATION

From 52 programs of National Rural Health Mission (NRHM) programs in the data set, only 38 have complete data (including 0) for each chosen variable; further, only 22 of them provided services by Doctors (DOCs), ANMs (Auxiliary Nurse Midwife), Health assistants, service area population size. Due to technical difficulties in the LPP software, those programs that contained zero values in controllable input and output variables were not used. Therefore, only 22 programs were used to test the applicability of DEA a-efficient DMU’s, b-inefficient DMU’s.

<table>
<thead>
<tr>
<th>Input</th>
<th>Output</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>DMU's</td>
<td>$I_1$</td>
<td>$I_2$</td>
</tr>
<tr>
<td>1^a</td>
<td>0.1273</td>
<td>0.1022</td>
</tr>
<tr>
<td>2^b</td>
<td>0.4831</td>
<td>0.4606</td>
</tr>
<tr>
<td>3^c</td>
<td>0.0537</td>
<td>0.0177</td>
</tr>
<tr>
<td>4^d</td>
<td>0.2300</td>
<td>0.1950</td>
</tr>
<tr>
<td>5^e</td>
<td>0.9193</td>
<td>0.4436</td>
</tr>
<tr>
<td>6^f</td>
<td>0.0669</td>
<td>0.2636</td>
</tr>
<tr>
<td>7^g</td>
<td>0.4924</td>
<td>0.6990</td>
</tr>
<tr>
<td>8^h</td>
<td>0.1150</td>
<td>0.5303</td>
</tr>
<tr>
<td>9^i</td>
<td>0.0705</td>
<td>0.0117</td>
</tr>
<tr>
<td>10^j</td>
<td>0.1391</td>
<td>0.0804</td>
</tr>
<tr>
<td>11^k</td>
<td>0.0792</td>
<td>0.1985</td>
</tr>
<tr>
<td>12^l</td>
<td>1.0000</td>
<td>1.0000</td>
</tr>
<tr>
<td>13^m</td>
<td>0.2466</td>
<td>0.2659</td>
</tr>
<tr>
<td>14^n</td>
<td>0.2638</td>
<td>0.1861</td>
</tr>
<tr>
<td>15^o</td>
<td>0.2688</td>
<td>0.3750</td>
</tr>
<tr>
<td>16^p</td>
<td>0.4108</td>
<td>0.9466</td>
</tr>
<tr>
<td>17^q</td>
<td>0.6827</td>
<td>0.5379</td>
</tr>
<tr>
<td>18^r</td>
<td>0.1813</td>
<td>0.2148</td>
</tr>
<tr>
<td>19^s</td>
<td>0.1249</td>
<td>0.1621</td>
</tr>
<tr>
<td>20^t</td>
<td>0.4086</td>
<td>0.3235</td>
</tr>
<tr>
<td>21^u</td>
<td>0.4505</td>
<td>0.1931</td>
</tr>
<tr>
<td>22^v</td>
<td>0.2416</td>
<td>0.2875</td>
</tr>
</tbody>
</table>

Table 1: Efficiency score of different rural health care programs (DMU’s).
V. THE PROPOSED PROTOTYPE MODEL FOR REDESIGNING THE INEFFICIENT RURAL HEALTH CARE PROGRAMS

Sample: Consider analyzing the efficiencies of 3 DMUs (Rural health care Programs) where 2 inputs and 3 outputs are used. The data is as follows:

<table>
<thead>
<tr>
<th>DMUs (Programs)</th>
<th>Inputs</th>
<th>Outputs</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>5</td>
<td>14</td>
</tr>
<tr>
<td>2</td>
<td>8</td>
<td>15</td>
</tr>
<tr>
<td>3</td>
<td>7</td>
<td>12</td>
</tr>
</tbody>
</table>

The linear programs for evaluating the 3 rural health care programs (DMUs) are given by:

LP for evaluating DMU 1:
\[
\begin{align*}
\text{min } & \theta \\
\text{st } & 5L1+8L2+7L3 - 5\theta <= 0 \\
& 14L1+15L2+12L3 - 14\theta <= 0 \\
& 9L1+5L2+4L3 >= 9 \\
& 4L1+7L2+9L3 >= 4 \\
& 16L1+10L2+13L3 >= 16 \\
& L1, L2, L3 >= 0
\end{align*}
\]

LP for evaluating DMU 2:
\[
\begin{align*}
\text{min } & \theta \\
\text{st } & 5L1+8L2+7L3 - 8\theta <= 0 \\
& 14L1+15L2+12L3 - 15\theta <= 0 \\
& 9L1+5L2+4L3 >= 5 \\
& 4L1+7L2+9L3 >= 7 \\
& 16L1+10L2+13L3 >= 10 \\
& L1, L2, L3 >= 0
\end{align*}
\]

LP for evaluating DMU 3:
\[
\begin{align*}
\text{min } & \theta \\
\text{st } & 5L1+8L2+7L3 - 7\theta <= 0 \\
& 14L1+15L2+12L3 - 12\theta <= 0 \\
& 9L1+5L2+4L3 >= 4 \\
& 4L1+7L2+9L3 >= 9 \\
& 16L1+10L2+13L3 >= 13 \\
& L1, L2, L3 >= 0
\end{align*}
\]

Solution:
DMU 1.
Adjustable Cells

<table>
<thead>
<tr>
<th>Cell</th>
<th>Name</th>
<th>Final Value</th>
<th>Reduced Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>B16</td>
<td>theta</td>
<td>-0.103473</td>
<td>0</td>
</tr>
<tr>
<td>B17</td>
<td>IN1</td>
<td>-0.289724</td>
<td>-0.07142857</td>
</tr>
<tr>
<td>B18</td>
<td>OUT1</td>
<td>9</td>
<td>0.085714286</td>
</tr>
<tr>
<td>B19</td>
<td>OUT2</td>
<td>4</td>
<td>0.057142857</td>
</tr>
<tr>
<td>B20</td>
<td>OUT3</td>
<td>16</td>
<td>0</td>
</tr>
</tbody>
</table>

Constraints

Note that DMUs 1 and 3 are overall efficient and DMU 2 is inefficient with an efficiency rating of 0.773333.

Hence the efficient levels of inputs and outputs for DMU 2 are given by:

Efficient levels of Inputs:
\[
\begin{bmatrix}
0.261538 \\
0.661538 \\
0.661538
\end{bmatrix}
\]

Efficient levels of Outputs:
0.261538 \[ \begin{bmatrix} 9 \\ 4 \\ 16 \end{bmatrix} + 0.661538 \begin{bmatrix} 4 \\ 9 \\ 13 \end{bmatrix} = \begin{bmatrix} 5 \\ 7 \\ 12.785 \end{bmatrix} \]

Note that the outputs are at least as much as the outputs currently produced by DMU 2 and inputs are at most as big as the 0.773333 times the inputs of DMU 2. This can be used in two different ways: The inefficient DMU should target to cut down inputs to equal at most the efficient levels. Alternatively, an equivalent statement can be made by finding a set of efficient levels of inputs and outputs by dividing the levels obtained by the efficiency of DMU 2. This focus can then be used to set targets primarily for outputs rather than reduction of inputs.

VI. RESULTS AND DISCUSSION

DEA identified the relatively more efficient programs and provided the user to differentiate efficient programs with the other programs. DEA empirical model generates a scalar efficiency ratio and identifies a group of comparative DMUs for each program. Those programs with a positive efficiency ratio of less than 1 are declared as "inefficient" compared to programs with an efficiency ratio of 1. Among the 22 programs, 10 had an efficiency ratio of 1 compared to a reference set of DMUs and no slacks; these were then classified as efficient. Twelve were inefficient since their efficiency ratios were less than 1. The proposed BPR prototype model reinforces the rural health-care delivery system’s ongoing strategic planning policy to position the health-care system to respond to the aspiration of rural peoples.

VII. CONCLUSION AND FUTURE ENHANCEMENT

The inefficient programs will be redesigned and suggest to implement as per the prototype model illustration. This paper provides an effective and practical approach for evaluating relative efficiency and redesign the inefficient Indian rural health care programs especially useful for program management and policy making. It also addresses the correction in the rural health care delivery system to improve the quality of life of the citizens and for the economic and social development of the nation.

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[3] National health policy 2002, Govt. of India

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Design of a LabVIEW Based Real Time Simulator for ABS Tester

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Abstract- This paper focus on developing a design for performance monitoring and data analysis ABS tester using LabVIEW. The use of LabVIEW reduces complexity and improves reliability. Measurement and analysis are two important issues for ensuring the high quality of ABS. Hence the proposed design focuses on measuring various parameters through the sensors and analysis of the same. The simulator acquires data from the sensors installed in the vehicle through serial communicator. The data will be displayed in the PC monitor and required manual action may be executed using the panel of the real time simulator.

Index Terms- ABS; Sensors; Serial Communication; Actuators; Virtual Instrumentation; Simulator

I. INTRODUCTION

An anti-lock braking system is a safety system that allows the wheels on a motor vehicle, to continue interacting tractively with the road surface as directed by driver steering inputs while braking, preventing the wheels from locking up and therefore avoiding skidding.

ABS [3][4][5] was first developed and used for aircraft in 1920s by French automobile and aircraft pioneer. An experiment conducted by the Road Research Laboratory on Royal Enfield in 1950s demonstrated that the ABS can be used in motor cycles effectively. The use of ABS could reduce bike accidents as most of the bike accidents are results of wheel slipping. ABS offers improved vehicle control and decreases stopping distances on dry and slippery surfaces. With improvement in research and development of ABS, the modern versions of ABS provide additional electronic control of the front-to-rear brake bias. LabVIEW is a comprehensive development environment that provides engineers and scientists unprecedented hardware integration and wide-ranging compatibility. LabVIEW is commonly used for data acquisition, instrument control, and industrial automation on a variety platform including Microsoft Windows. The programming language used in LabVIEW is data flow programming and the execution is determined by the structure of a graphical block diagram on which the programmer connects different function nodes by drawing wires.

This paper involves in designing a performance monitoring and data analysis ABS tester using LabVIEW.

II. HARDWARE

A. Wheel speed sensor

The wheel speed sensor is used to sense the speed of the wheel and convert it to electrical equivalent. The wheel speed sensor used here is Hall Effect type wheel speed sensor. It works on the principle of Hall Effect.

\[ V_x = \frac{I*B}{n*e*d} \]

B. Disk brake

The disk brake assembly consists of a disc rotor, caliper assembly attached to the steering knuckle and disc pads mounted to the caliper assembly. The hydraulic pressure applied to the caliper piston forces the inside pad to contact the disc. As the pressure is increased the caliper moves and causes the outside pad contact the disc. Braking force is generated by friction between the disc pads as they are squeezed against the disc rotor.

C. Actuator

The actuator used here is hydraulic type which has a hollow cylinder with a piston inserted in it. The force applied to the actuator using brake pedal causes the disc brake to work appropriately. The hydraulic actuator can provide a controlled precise linear displacement of the piston. The displacement is only along the axis of the piston.
III. DATA ACQUISITION AND PROCESSING

When a force is applied on the brake pedal, the actuator is activated appropriately. The actuator being hydraulic causes a linear precise displacement to cause the disc brake to operate properly.

The disc brake contacts the inner pad for small forces and the outer pad for large amount of force. This causes a friction between the disc and pads. This friction generates the braking force and reduces the wheel speed. The wheel speed is continuously monitored using a speed sensor whose output signal is sent to a PIC microcontroller. The microcontroller uses the inbuilt ADC in ports A and E to convert the signal into digital equivalents. The microcontroller compares the signals with the predefined threshold (desired) values. If the controller identifies that the braking is not enough, it activates the actuator using the PWM drive and motor unit. This technique helps to overcome the disadvantages of roads with high slip ratio.

For example, from figure 2, the slip ratio for snow surface will be higher and we need more braking than in normal surface\[1\]. As the controller monitors and acts accordingly, this problem is overcome.

![Graph showing adhesion coefficients](image)

IV. SOFTWARE

**LabVIEW:**

LabVIEW \[2\][7][8][9] is centerpiece of graphical interface design and provides engineers and scientists with the tools you need to create and deploy measurement and control system.

Using LabVIEW control design and simulation module, we can model the braking dynamics, slip function and characterize the slip curve of wheels speed. Fig 3 demonstrates the overall simulation diagram for simulating simple anti-lock braking system.

Figure 3 show the block schematic of the software developed using LabVIEW. When the port number is provided, the execution enters the while loop. All the structures come inside the while loop with each of them having separate execution for true and false conditions. Some of the structures are interlinked according to the logic of execution. The output from each structure is manipulated using decimal to number converter. These manipulated values may be visualized in the display panel.

![Display panel](image)
V. SAMPLE WORKING

When the brake pedal is applied, the pneumatic or hydraulic signal activates the actuator. Now the actuator output signal along with the PWM signal operates the disk brake accordingly. The speed of the wheel is continuously monitored by the speed sensor and the output signal is fed to the microcontroller. The microcontroller is fed with the logic for operation of the ABS. And hence it manipulates the speed value and the desired value and provides suitable output through the PWM drive. This works as a closed loop control system. The microcontroller is connected to the PC with RS-232. The LabVIEW is programmed to graphically analyze, acquire data, control and monitor the ABS performance test. The LabVIEW display panel may be used to set the RPM values and the instantaneous speed is visualized through the analog speedometer and the graph. The indicators in the panel help in understanding the status of the speed limit and ABS activation.

VI. CONCLUSION

The real time simulator for data acquisition and analysis of ABS tester using LabVIEW was designed successfully. The use of LabVIEW helped to reduce many devices and it served as a useful display panel.

In future, more sensors may be integrated and the communication can be made wireless.

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Media and Development Communication: A Perspective

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Abstract - Development has become the global ‘civil religion’. Since the past 40 years- a battle cry for all nations rich or poor, strong or weak. It is a long and complex evolutionary process- more a process of social change rather than merely generation and accumulation of material resources. Scholars have proposed various theories and models while development agencies set various goals for the development of nations and some of the theories have failed to yield results and new theories that emerged have tried to offer solutions to speed up development. Development implies change and this is one sense in which the term development is used; to describe the process of economic and social transformation within countries. The paper is an attempt to develop an understanding about the process of development communication and the various approaches that have been used in order to assess the role of media in the process of development.

Index Terms - Communication, change, development, media

I. INTRODUCTION

The concept of development has been open to many definitions, connotations and interpretations and has invited multi-disciplinary approach as a consequence of the scale of the connotations it assimilates in its realm. Development as a term has emerged as an umbrella under which numerous phenomenon- varying from human and spiritual development to economic development as well as technological development have become related. At the beginning of 21st century, development was recognized as complex, integral, participatory process, involving stake holders and beneficiaries and aimed at improving the overall quality of human life through improvements in a range of social sectors in an environmentally responsible manner. (Cambridge, 2002:114).

Various means of communication have been used for communication purposes. From paintings to stone writing to printing press to the modern computer based technology, the media have been used to efficiently transmit knowledge and information to people. Communication is used as an empowerment tool in order to facilitate the participation of people in development activities. The term ‘Development Communication’ can be divided into two components - Communication and Development. In this scenario, communication implies the utilization of different types of media in the context of development. Communication also signifies the understanding or sharing of information to further the process of development. Development refers to the change of society for the better. It can be about social or economic change for improvement or progress. Hahn-Been Lee says, development is a process of acquiring a sustained growth of a systems capability to cope up with new continuous changes towards the achievement of progressive, political, economic and social objectives. Development is seen as a process of change to be set in motion and guided toward the objective of eradicating the hunger, disease, injustice, exploitation and related ills that afflict vast section’s of the world’s population.

II. PRE-REQUISITE OF DEVELOPMENT

As development is a continuous process, the existence of certain pre-requisites for development has to be ensured by:

i) A stable political system: If a society aspires for a planned development, it must have the basic infrastructure laid down in an acceptable political order and a well defined constitutional system. Without such a base no society can move in the direction of nation building and socio economic progress.

ii) Stable Administrative System: Unless a society has a well regulated system of public administration, it cannot undertake any programme of development for improvement in the environment of society. A system of public administration must have a sound base of rules and regulations.

iii) A well grounded Cultural System: Development cannot take place in a society which has heterogeneous groups of people come together suddenly for any reason. There must be historically minimum cultural affiliation linguistic or otherwise, binding the people together for common understanding the heterogeneous elements of society would always be clashing among themselves and instead of paving the way for the development of civilization they would be tending to destroy or retard its development. An environment of integrity-social, political and cultural is essential for economic development.

iv) A system of planning: For a concrete programme of development and for achieving the desired objectives of such programmes, it is necessary for a society to improve the concept of planning. Without a system of sound planning and the necessary machinery for the implementation of plans.

v) People’s Participation: For development of society, it is extremely necessary that people as a whole must be active or indirect participants in the process of development. Since in modern civilization, people are conscious of their existence and role in society in different walks of life, any administration which wishes to ignore their participation is likely to fail in its objectives. No democracy can function without establishing a healthy contact with the people through its administration.

In human development report (1995) the three key concepts have been defined to measure development:

i) The Human Development Index(HDI): It measures the average achievement of a country in basic human capabilities. The HDI indicates whether people lead a long and healthy life, are
educated and knowledgeable and enjoy a decent standard of living. The HDI examines the average conditions of various segments of society which have to be calculated separately.

II) The Gender Related Development Index (GDI): It measures achievement in the same basic capabilities as HDI does but takes note of inequality in achievement between women and men. The methodology used imposes a penalty for inequality such that the GDI falls when achievement level of both women and men in a country goes down or disparity between their achievement increases. The greater the gender disparity in basic capabilities the lower the country’s GDI compared to HDI.

III) The Gender Empowerment Measure (GEM): It examines whether men and women can actively participate in economic and political life and take part in decision making. While the GDI focuses on expansion of capabilities, the GEM is concerned with the use of these capabilities to take advantage of the opportunities of life.

According to Human Development Report 1995, the four essential components of the human development paradigm are:

i) Productivity: People must be enabled to increase their productivity and participate fully in the process of income generation and remunerative employment. Economic growth is therefore a subset of human development models.

ii) Equity: People would have access to equal opportunities. All barriers to economic and political opportunities must be eliminated so that they can participate in and benefit from these opportunities.

iii) Sustainability: Access to opportunities must be ensured not only for the present generations but also for future generations. All forms of capital, human and environmental—should be replenished.

III. DEFINING DEVELOPMENT COMMUNICATION

When we refer to development communication, it is about such communication that can be used for development. It is about using communication to bring change or improve the way of living of the citizen of a country. The messages which are designed to transform the behavior of people or for improving their quality of life can be termed as development communication and these messages used to change the socioeconomic condition of people.

Though communication for development or development communication grew out of agricultural communication, the term comprehensively includes not only agriculture but also population, nutrition, health, education, housing, employment and so on. Because all these areas require communication inputs to expedite the process of development, development communication has vast scope for its reach and utility in development. Nora Quebral (1975) defined development communication as “the art and science of human communication applied to the speedy transformation of a country from poverty to a dynamic state of economic growth and makes possible greater economic and social equality and larger fulfillment of human potential”. Everett M. Rogers, an influential scholar defined development communication as “it refers to the uses to which communication is put in order to further development. Such applications are intended to either further develop in a general way, such as by increasing the level of mass media exposure among the nations citizens, in order to create a favorable climate for development, or to support a specific definite program or project.” Roger’s definition essentially emphasizes the creation of climate for development which includes physical climate and psychological climate.

Development communication through dissemination of information plays a key role in bringing about a social change among the receivers. Primarily, development communication performs two key functions: transforming role as it seeks social changes for a higher quality of life: socializing role as it seeks to maintain some of the established values of the society. These roles expedite the process of development. The purposive and positive nature of development communication enhances the ability of contemporary society to usher in an environment of change and progress.

Significantly, communication as a process facilitates in making people understand their environment. Majority of people in the third world countries are illiterate and may not be aware about the benefits of literacy and hence they need to be educated about the positive effects of literacy. The reinforcement of messages through communication channels will positively impact them and the role of mass media is crucial in this regard.

The term development has been interpreted in various ways by sociologists, communists, development planners, etc. To some it means modernization, to others social change, and to others it means enhancing quality of life or Sustainable Development. The term ‘development’ suggests some amount of improvement, self reliance, upliftment and progress and also self awareness and independence to an extent. Development implies change and this is one sense in which the term development is used; to describe the process of economic and social transformation within countries.

IV. APPROACHES TO DEVELOPMENT COMMUNICATION

The western model for development predominated in 1950s and 1960s. Rogers (1960) called this the “dominant paradigm” of development as it exercised a dominant influence in the field of development. The emphasis of this model was that development could be achieved by increased productivity, economic growth and industrialization, through heavy industries, capital intensive technologies, urbanization, centralized planning. Development was measured by gross national product (GNP), total or per capita income. There was a shift from a static, agricultural, primitive and rigid society to a dynamic, industrialized, urbanized and socially mobile nation.

The early generation of development communication studies was dominated by Modernization theory. This theory suggested that cultural and information deficits lie underneath development problems, and therefore could not be resolved only through economic assistance (a la Marshall Plan in post-war Europe). Instead, the difficulties in Third World countries were at least partially related to the existence of a traditional culture that inhibited development. Third World countries lacked the necessary culture to move into a modern stage. Culture was viewed as the “bottleneck” that prevented the adoption of modern attitudes and behavior. McClelland (1961) and Hagen (1962), for example, understood that personalities determined social structure. Traditional personalities, characterized by authoritarianism, low self-esteem, and resistance to innovation,
were diametrically different from modern personalities and, consequently, anti-development.

Scholar’s like Daniel Lerner and Wilbur Schramm involved in third world development proposed new theories. Daniel Lerner (1958) book ‘The Passing of a Traditional Society’ and Wilbur Schramm’s (1964) book ‘Mass Media and National Development’ were influential in the modernization process. Daniel Lerner’s passing of a traditional society (1958) illustrates the major ideas of early mass media and modernization approach. Modernization, according to Lerner was westernization. However, since many third world leaders denounced west for political reasons, the process of change was termed modernization. Lerner’s model recapitulated the development of Western Europe and North America from a feudal and traditional stage to modern military industrial societies. His social development model consisted of following components:

a) A core of mobile individuals whose psychological orientation made it easier to accept rapid changes in their personal lives and overall social system

b) An omnipotent mass media system that reinforced and accelerated societal and individual change by disseminating the new ideas and attitudes conducive to modernization

c) Co-relations between important indices of urbanization, literacy, media exposure and economic and political participation to establish a modern Western type society.

According to Lerner, traditional society was non-participant. People were deployed by kinship into communities isolated from another and from center, without an urban-rural division of labor. Thus people developed few needs that required economic interdependence. Their world views were limited to their physical horizon and their decisions involved other known people in familiar situations. On the other hand modern society was participant and functioned by consensus, Here people went through formal schooling, read newspapers, were paid in cash for jobs, used cash to consume goods in a fair and open market and were free to vote in elections and express opinions on matters external to their personal lives. Lerner identified and explained a psychological pattern in individuals that was both required and reinforced by modern society: a mobile personality. This person was equipped with a high capacity for identification with new aspects of his/her environment and internalized the new demands made by larger society. In other words, this person had a high degree of empathy-capacity to see oneself in other fellow’s situation. Lerner stated empathy fulfilled two important tasks. First it enabled the person to operate efficiently in modern society which was constantly changing. Second, it was an indispensable skill for individuals wanting to move out of their traditional settings.

The second element in Lerner’s model was the mass media. They performed a special function: by exposing individuals to new people, ideas and attitudes, they accelerate the process of modernization. In short, the mass media had the potential to blow the winds of modernization into isolated traditional societies. He identified four indices for modernization-urbanization, literacy, mass media exposure and political participation. People had to be mobile, empathetic and should participate in development.

In this approach mass media were considered as ideal vehicles for transferring new ideas and models from developed nations to the third world and from urban areas to rural countryside. The mass media were entrusted with the task of preparing individuals in developing nations for rapid social change by establishing a climate of modernization.

Research in this tradition generated high expectations from the mass media. They were considered as ‘magic multipliers’ for development benefits in third world nations. Information, therefore, was considered the missing link in the development chain. The quality of information available and its wide development was a key factor in the speed of development (Schramm, 1964). Adequate mass media outlets and information would act as a spur to education, commerce and a chain of other related development activity.

Laxman Rao (1963) also suggested that communication was a prime mover in the development process. He selected two villages in India for his study: Kothooru- a village on the verge of modernization and Pathooru- a village isolated and steeped in traditional customs and beliefs. Rao suggested that laying of a new road to Kothooru from a nearby city started the process of modernization. Among other things this road brought new people, ideas and mass media while at the same time allowing the villagers to visit urban centers. All of this new information opened up people’s minds. They were not only ready for change but demanding and expecting it. The new ideas were first available to the elite and then trickled down to others. Melkote and Steeves (2001:116) observed that the quality and quantity of information that triggered change in Kothooru, the new road and mass media brought in modern ideas from outside. There was a great spur to education.

Diffusion of innovations theory has important theoretical links on the role of media in modernizing traditional societies. Evert Rogers whose work has been central in this area identified the following elements in the diffusion of idea or an innovation: the innovation, its communication, the channels of communication and the social system within which and for which the process occurs. Adoption was defined as the process through which individuals arrive at the decision to adopt or reject an innovation from the time of first awareness. The five stages were awareness, interest, evaluation, trial and adoption. Diffusion studies indicated differences among adopter groups in terms of their personal characteristics, media behavior, and position in society. Early adopters were young, had higher financial status and were equipped with greater mental ability than late adopters.

The diffusion of innovation research established the importance of communication in the modernization process at the local level. In the dominant paradigm, communication was visualized as the important link through exogenous ideas entered the local communities.

Over time, diffusion theory proved to be inadequate as a guide for communication. Hence it has largely been replaced by social marketing which provides a model for the strategic, scientific determination of message and media strategies to disseminate ideas to promote social cause. Social marketing has been one of the approaches that has carried forward the premises of diffusion of innovation and behavior change models. Since the 1970s, social marketing has been one of the most influential strategies in the field of development communication.

In the third world context, major themes have included family planning, equal status for women, responsible sexual
relationships, adult literacy, responsible parenthood and HIV/AIDS prevention and control. Until the 1970’s communication models in family planning or other health related areas reinforced the active source and passive receiver stereotype. The incorporation of social marketing techniques in the 1970’s emphasized the challenges of changing the knowledge and values as well as the behavioral pattern of receivers.

Environment, education programs have become increasingly popular in the last two decades often as part of social marketing campaigns. This approach environmental-education content is embedded in entertainment campaigns in media such as radio, TV, records, videos and film theatre. Singhal and Rogers points out that entertainment, education programs either directly or indirectly facilitate social change.

Communicating for Sustainable Development:

Communicating for sustainable development encompasses social, environmental and economical development planning including concerns for equity. The communication strategy for sustainable development should be based on grass root approach so that societies and local communities become more sustainable and prosperous. It should help people to develop and restore the sense of belonging to a local community where people are interested in working together for their own development or towards a common goal or sustainable development. The strategy should encourage participation of the community groups where they express their views, needs and problems.

Sustainable development is mainly development on the values of the people. Values of the people can be assessed from inter-cultural dialogue. Such dialogue provides insight into the crisis of values which may be giving rise to current ecological and economic crisis. The inter-cultural dialogue may also lead to development practitioner to acknowledge and strengthen the value of indigenous knowledge and ways of living such as knowledge regarding indigenous technology, arts, irrigation, practices, and medicines and so on. Many indigenous principles and practices are directly linked to the maintenance of ecological support systems.

Information systems play a very important role in promoting sustainable development as communication regarding our national priorities in the environment and society is basic to decision making for sustainable development. In developed countries such information is managed by specialized organizations using sophisticated technology so that it is available and useful for decision making. In developing countries this infrastructure is lacking. Therefore, no up-to-date systematic national statistics is available and there is often a disparity of access by various groups within developing societies. The issue of technology transfer is linked to these concerns. The problem is most acute in coping with global concerns and with the effects of advanced technologies. For example, the production of hazardous substances. In order to promote sustainable development this information disparity needs to be recognized and steps taken to level them. Thus providing the required infrastructure for information systems for access to very advanced environment and development information in the first and foremost step in the direction of promoting sustainable development.

Education both formal and informal should also incorporate component of sustainable development in their curriculum-both theory and practical’s. It should help in raising people sense of autonomy and responsibility. This can be done by providing community based learning experiences.

Hasnson and Gabriel suggests the following requirements for any education program:

- understanding and supporting the various structures of teaching and learning evolved by such society in order to cope with development processes.
- helping to establish the accountability of organs of power at all levels and working with groups and local communities, particularly in determining what local needs are.
- creating institutions and networks of educational and practical exchange between groups from various regions and experiences and
- ensuring that there are opportunities for continuous review and monitoring of all programs with the widest possible feedback from those directly involved. (41)

The communication strategies used for distance educating people for sustainable development which combines task oriented educational workshops, film, video, radio, theatre, magazines and other communication media. This can arouse self awareness and self consciousness which ultimately leads to action.

Communication participation is very important for promoting sustainable development. People will have to care for the environment and make it way of life. They can contribute in pollution control, improvement of environment and economic use of natural and community resources. Government and development agencies should also support community participation for sustaining development. Communicating for sustainable development leads to problem solving and strengthening and rediscovering an art of living which is in harmony with nature,

V. CONCLUSION

The communication needs as identified by UNESCO (1978) in the “New Paradigm” are open dialogue which reflects diversified views and experiences. Secondly, multi directional communication flow is necessary. This multi directional flow calls for top down as well as horizontal communication and bottom-up communication. The horizontal communication is across society horizontally – from person to person, village to village and rural to urban. UNESCO further contends that for participatory rural communication, media should be made available in rural areas. There should be linkage between development initiatives and communication channels.

The communication strategy urged in this paradigm used mainly interpersonal channels with support from mass media-both cosmopolitan and indigenous media. The functions of communication were not only to disseminate information but also educate them for development by persuasion through mass media. Interpersonal channels were utilized for communicating feedback on development activities.

Globally the development communication scenario has changed in the last four decades, which have shifted to the availability of new communication channels, the characteristics of the audience, and development demands. The communication strategies are planned according to the focus of development. The new
channels of communication technologies have even changed the nature and scope of interpersonal communication.

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Reasons of Mobile Calls Drop so Frequently

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I. INTRODUCTION

Have you had problems in your area with cell phone reception? Just about everyone has had the frustration of using the cell phone for an important call, and having the signal suddenly drop. There's nothing worse than being in the middle of a conversation only to realize that you've been talking to your phone for a two minutes with nobody else on the other end anymore. Cell phone dropped calls like that can be irritating, the frustration and annoyance of dealing with a dropped call or dead spot and they can affect everything from your personal life to business relationships. Nobody wants to lose a contract because of call dropped. This dropping of phone calls are not a new topic, everyone have experience of them much more often with cellular service than with landlines. Actually, it is right that current cellular technology has some technical issues that do allow the potential for cell phone calls dropped, without regard of the service provider. Here are some scenarios that can lead to dropped calls during cell phone usage.

Unlike wired phone services, which rely primarily on fiber optic cable and physical switches to provide service within a given geographic area, cell services function with the use of towers that link to and from phones to the switching software located at the towers. When a tower is rendered temporarily inoperable for any reason, such as inclement weather, a software glitch, or a momentary overload of signals to switch, calls that are in progress may disconnect and the user may find their phones flashing a “no mobile network available” or “dropped call” message. If a software glitch or a temporary overload of switching caused the dropped call, chances are the situation will be corrected in seconds. Persons can simply re-dial and resume their dropped calls with a new session. If weather conditions have taken the tower off line, it may take a longer period to restore service.

How do Drop Zones affect the customers?

II. PHONE DROPPED CALLS

We provide a convenient method for reporting these dead spots and drop zones, where dropped calls are all to frequent to each of the cell phone carriers. Better Mobile network is, in part, a result of investment in the cell phone infrastructure and maintenance. CellCoverage.com allows you to submit dead spots where you need coverage so that your voice can be heard.

Even though telecom and information technology are my areas of expertise and I still do occasional editorials and columns in the Economic Times and the Times of India print edition on the subject, I have so far shied away from writing on these subjects in my blog posts. For one, I felt the subject was far too serious and technical to be attempted in a general blog post, and two, I thought I would rather use the post to tackle other topics of common/general interest.

In this post, however, I am making a minor deviation from this self imposed restriction. And this deviation has been forced by an issue that has been bothering me, indeed a whole lot of people in
this country - the alarming drop in the quality of service in the fastest growing mobile market in the world.

Nine out of ten in the industry would swear and convince you that the quality of service has dropped due to the government's complete failure to make more spectrums available to tide over the clogged and overworked network. While there may be a modicum of truth in this, for compared to the subscriber numbers, the spectrum availability is indeed low, the real reason is neither that technical nor complicated. It is a simple case of outsourcing and the subsequent sub-contracting that happens.

We all know that the mobile network consists of hundreds or thousands of cells that are served through the mobile network towers. These are the ubiquitous towers you see all over the country, with the pole antennae that emit signals for your mobiles and the normal dish that communicates with the next tower, or with the switch where the calls are processed. As can be understood, for each cell to work efficiently, the tower needs electricity and generally need to be maintained properly.

Let me now try and explain how this simple thing is one of the main reasons for the falling service quality. Operator X decides that it needs to outsource the nationwide tower maintenance to company 'A'. After a lot of haggling, the price has been fixed at Rs 2000 for each person that 'A' would employ for the task. 'A' decides that it needs to outsource work in different parts of the country. So, it appoints company 'B' to look after North Zone @ Rs 1800 per person. 'B' now outsource Uttar Pradesh in North to company 'C' @ Rs 1650 per person. This company further outsource three districts in UP to company 'D' @ Rs 1500 per person. 'D' too realizes it is better to outsource each district, so it appoints company 'E' @ Rs 1400 per person.

So you see, while the Operator started off as paying Rs 2000 per person, it has actually come down to Rs 1400, and we are still to get down to how a district or a city is further divided into zones and further sublet. One person in the know actually confessed to me that they could go down to seven layers before the company that actually maintains the tower comes into play. So, it is possible that the person who actually does the job is paid no more than Rs. 1000.

Now we all know that all operators are hard taskmasters and drive a hard bargain and would never part with a single paisa more than they need to. So, if they agreed to Rs 2000 per person, it must already be the rock bottom rate for a person qualified for the job. Now imagine if the actual person who does the job is hired at half that amount. Does one for a moment think that the person would be competent enough to handle something as critical as maintaining the mobile tower? Clearly, at such rates, you can only hire illiterates!

Believe me, this simplistic explanation is all that there is, or at least a major reason for the constantly falling service quality. And now that I am at it, let me also reveal that one of the largest operators in the country, in its zeal to out do others in the race to offer 'per second billing' actually came out with adverts, including TV spots, but without working out the details. As a result, neither were the system jigged to handle the changed billing system nor was its call center alerted that a thing like this was being done. I felt sorry for the head of one such call center that had to handle thousands of queries from customers while he had no clue what to tell them. And it was true of ALL operators and not just one. That whose switched to the new plan should do some test whether the plan actually came into play the day it was supposed to.

We have a telecom regulator in the country who can, if it chooses to, take these operators to task for making a fool of us, the gullible idiots, but over a period we have realized that leave alone bite, it doesn't even bark well. Instead of being a watchdog, it's a mere poodle, and though its powers are ambiguous in some cases, it chooses to remain quiet even where it's unambiguous. Under what compulsion, your guess is as good as mine.

III. POSSIBLE PROBLEM AREAS

1. The originating telecommunication might be directing the call to the incorrect switch, CLLI, point code, etc. They might also be pre-pending the incorrect digits. They might not be doing a dip. Often you'll hear an error message, so take note of which phone carrier is giving it.

2. Not enough trunks or T1s between the networks. In this instance, the caller might notice an intermitted “fast-busy”.

3. In many cases, if your phone number range is new, some telecommunications are too dim-witted, incompetent, or slothful to load the range into their translations tables. This is ridiculous, considering the carriers are warned months before a new line range is due to be activated.

There are other causes for these issues, but the top method of getting them resolved is to have the caller contact their provider. Essentially a network that gives power to countless cell phone users, so that together, cell phone carriers will hear the voices. Dead spots are often caused by a lack of the appropriate infrastructure in a given area or the need for maintenance or antenna adjustments. Most cell phone carriers provide maps of their coverage areas, and you'll find links to them here on our site. However, dead spots occur within covered areas all the time, for a variety of reasons, ranging from zoning issues governing the construction of cell phone towers to topography. With your help, we can work toward putting and end to AT&T dropped calls.

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Heavy Mineral distribution studies in different micro-environments of Bhimunipatnam coast, Andhra Pradesh, India

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Abstract- The study of heavy mineral placer deposits of the coastal sediments in Bhimunipatnam stretch for 12 km from Chapala Uppada to Annavaram in the south was carried out, the surface sediments samples from eighteen locations of different micro-environments along the coast are collected. The main framework of this paper is to study the distribution of various heavy minerals in different coastal micro-environments of a part of an eastern coast in India. Different sizes of sieves are used to make the samples into three (+60, +120, and +230) fractions. The data sets reveal that the heavy minerals are associated with fine (+230) fractions and only three minerals viz., opaque, sillimanite and garnet are more than 85% and other minerals constitute only 15%. The concentration of heavy minerals is more in dunes (new and old) than in beach sediments. The heavy mineral concentration shows an increasing trend from south to north. The observed variations in the distribution of heavy minerals in the area are found to be due to differences in the sediment supply, their sorting and oceanographic processes all of which result in a selective sorting of the sediments. The observed mineral assemblages of transparent heavy minerals (pyroxene, amphibole, tourmaline, kyanite, garnet, zircon and sillimanite) are suggestive of their derivation from a heterogeneous provenance comprising of igneous rocks, high grade metamorphic rocks, characterize the Precambrian gneissic, granitic and basic rocks and has been derived from the Eastern Ghats and the river Gosthani. In some samples rounded zircon is also present which indicates the sediments that are formed from reworked sediments. In economical point of view a considerable amount of heavy minerals are present in the dunes of the northern side of the Gosthani river mouth.

Index Terms- Heavy Mineral Distribution, Density separation, Micro-Environments, Beach, New Dunes, Old Dunes, River Gosthani.

I. INTRODUCTION

Each sands contain the most economically important minerals accumulations; wave action deposits sand on the beach and the heavy minerals are concentrated when backwash carries some of the lighter minerals such as quartz back into the sea. Placer deposits are formed as a result of the selective concentration of valuable minerals these are derived from the weathering of pre-existing rocks, and accumulated by wind or water. Mineral sand deposits are a loose aggregate of un lithified mineral or rock particles of sand size (generally 0.02 to 2.0 mm) forming an unconsolidated or moderately consolidated sedimentary deposit has medium grained clastics. Mineral sand deposits are syngenetic concentrations of valuable mineral particles with high specific gravity accumulated within the sand deposits, also known as placer deposits.

Beach placer deposits around the world are known for ilmenite, rutile, zircon, monazite, sillimanite and garnet. By definition, heavy minerals are generally considered to be those having a specific gravity of 2.9 or greater. (This value was not chosen arbitrarily but rather due to the fact that liquid bromoform [CHBr₃], often used for separation purposes, has a specific gravity of 2.89). While many minerals from the commonplace to the exotic fall under this broad classification (Table 1), they are usually only minor constituents of most rock types. In placer deposits, however, it is possible for such heavy minerals to be selectively concentrated during transport and deposition of unconsolidated sediments because of their high density. Thus it should be no surprise that placers play an important role in modern day mining activities for those heavy minerals with commercial value.

The Indian coastline of 6,500 km stretch is marked by accumulation of various types and grades of placer deposits. Several scientists have made their attempts to study the placer minerals, in terms of their occurrence, distribution, chemical composition, texture and provenance to understand the transportation trends of sediments. In India, beach sand mineral exploration and exploitation started in 20th century after the accidental discovery of monazite from the beach sands of Travancore State by a German Scientist, Schombery. In the west coast, beach placers have been reported in Kerala (Prabhakara Rao, 1968) and Ratnagiri (Mane and Gawade, 1974). In Tamilnadu, Chandrasekar (1992) reported that the Coastal stretch from Nagore to Tirumullai was rich in zircon, garnet and kyanite. Mineralogical assemblages in beaches vary from one region to another depending on a number of factors like host rocks in the province, climate...
conditions prevailing in the area, agents and mechanism of transport and hydraulic condition during deposition (Borreswar, 1957). These are enriched in radioactive minerals and are of special interest for their use in nuclear industry (Alencar and Freitas, 2004, El Nahas et al., 2011) and potential for environmental hazards engendered from natural radiation (Vassas et al., 2006). Heavy minerals are economically valuable (after Mohan et al., 2000).

Table 1—specific gravity of selected heavy minerals, modified after Klein & Hurlbut, 1993

<table>
<thead>
<tr>
<th>Mineral</th>
<th>Specific Gravity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Monazite</td>
<td>4.6 - 5.4</td>
</tr>
<tr>
<td>Magnetite</td>
<td>5.18</td>
</tr>
<tr>
<td>Ilmenite</td>
<td>4.7</td>
</tr>
<tr>
<td>Zircon</td>
<td>4.68</td>
</tr>
<tr>
<td>Chromite</td>
<td>4.6</td>
</tr>
<tr>
<td>Rutile</td>
<td>4.18 - 4.25</td>
</tr>
<tr>
<td>Spinel</td>
<td>3.5 - 4.1</td>
</tr>
<tr>
<td>Corundum</td>
<td>4.02</td>
</tr>
<tr>
<td>Anatase</td>
<td>3.9</td>
</tr>
<tr>
<td>Staurolite</td>
<td>3.65 - 3.75</td>
</tr>
<tr>
<td>Kyanite</td>
<td>3.55 - 3.66</td>
</tr>
<tr>
<td>Sphene</td>
<td>3.40 - 3.55</td>
</tr>
<tr>
<td>Hypersthene</td>
<td>3.4 - 3.5</td>
</tr>
<tr>
<td>Epidote</td>
<td>3.35 - 3.45</td>
</tr>
<tr>
<td>Augite</td>
<td>3.2 - 3.4</td>
</tr>
<tr>
<td>Hornblende</td>
<td>3.0 - 3.4</td>
</tr>
<tr>
<td>Sillimanite</td>
<td>3.23</td>
</tr>
<tr>
<td>Apatite</td>
<td>3.15 - 3.20</td>
</tr>
<tr>
<td>Biotite</td>
<td>2.8 - 3.2</td>
</tr>
</tbody>
</table>

The concentration of heavy minerals depends on the hydrodynamic conditions like sediment in the flux from the hinterland; wave energy and its velocity; long shore current and wind spread which control littoral transport; sorting and deposition of placer minerals in suitable locations (after Rao et al., 2001). The beach morphology and inferences from heavy mineral assemblage of Bhimunipatnam coast, Visakhapatnam, east coast of India, have been reported by Sastry et al., 1987; Jagannadha Rao et al., 2005, etc. Very few studies were undertaken in micro-environments of Indian beaches related to heavy mineral variation in respect of density and size etc.

In this view, an attempt has been made in this paper, for heavy mineral characteristics and their distribution in micro-environments (beach, new dune and old dune region) and the influence of hydraulic fractionation by shape and density on total variability of heavy mineral concentration. The concentration, composition and reserves of heavy mineral suites vary from deposit to deposit. The present study area is an attempt to identify such suitable zones for heavy mineral deposition and its distribution in different micro-environments of Bhimunipatnam coast, Visakhapatnam district, Andhra Pradesh, India.

II. STUDY AREA

The area under investigation lies between latitudes N 17° 51' and N 17° 56' and longitudes E 83° 25' and E 83° 30' covering parts of the Survey of India’s toposheet No.: 65 O/5 in scale is 1:50000. The area from Chapala Uppada to Annavaram is...
situated to the south of Visakhapatnam, Andhra Pradesh, India (Fig. 1)

III. GEOLOGY OF THE AREA

The rock types exposed in the study area are mainly of khondalites, charnockites, quartzites, granites, leptynites, pegmatite’s, laterites and very less pyroxene granulites found in some places. These litho-units belong to Eastern Ghats group of Precambrian formations. General structural trend of this Eastern Ghats is NE – SW and dipping towards S or SE. The drainage pattern of the study area is control mainly by the Gosthani River; the beaches in the study region are composed of rocky/sandy material, geology of the present study area is clearly given the figure 2.
IV. MATERIALS AND METHODS

A. Sampling
A total of 18 sediment samples are collected by pushing down a PVC tube (60 mm dia) along 6 Travers with an interval of 2 km from Chapala Uppada to Annavaram in different microenvironments, i.e. old dunes, new dunes and beaches. A representative portion of the sediments weighing 100 gm from the bulk sediment samples and are separated by coning and quartering procedure. 100 gm of sample is soaked in distilled water to dissolve the salts, then in $\text{H}_2\text{O}_2$ to remove carbonates and in HCl to remove shell material for 12 hours, respectively. Later the sample is soaked in $\text{NH}_3$ for a period of 12 hours to disperse the grains. The dry sample is placed in the uppermost sieve in a set of stacked sieves. The samples are subjected to grain
size analysis by standard Ro-Tap sieve shaker at ½ Φ intervals of ASTM meshes (Hegde et al., 2006).

B. Heavy Mineral Separation

Different sizes of sieves are mixed to make the samples into three (+60, +120, and +230) fractions. These sub samples are utilized in the separation of the light and heavy minerals (sink–float) using bromoform (Sp.Gr. =2.89 g/cm³), following standard method. These samples get dried (at 60°C) in an oven and the light and heavy fractions are used to calculate wt % of heavy minerals in three size fractions. The magnetic fraction is removed with a bar magnet and wt % of magnetic mineral is calculated. Heavy minerals are mounted on glass slides in Canada balsam. Polished thin sections are prepared for the determination of heavy minerals. The relative abundances of heavy mineral species are determined using point counting of grain mounts using standard petrographic techniques. 300 grains are counted on each slide and the number % obtained by the counting procedure, have been converted to modal %.

V. RESULTS AND DISCUSSIONS

A. Textural Studies

The grain size analysis data was used to compute textural parameters like graphic mean size, graphic standard deviation, graphic skewness and graphic kurtosis according to the formulae of Folk and Ward (1957), all the statistical analysis data shown in Table 2.

Table 2. Statistical analysis of beach sands of different micro-environments of study area, (1, 2, 3, 4, 5, &6) are the station numbers. Mean size, standard deviation, skewness and kurtosis of all micro-environment samples is in (phi) value.

<table>
<thead>
<tr>
<th>Station</th>
<th>Station No</th>
<th>Environment</th>
<th>Mean size</th>
<th>Standard</th>
<th>Skewness</th>
<th>Kurtosis</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHAPALAUPPADA</td>
<td>1</td>
<td>Beach</td>
<td>1.5</td>
<td>0.593</td>
<td>0.155</td>
<td>0.845</td>
</tr>
<tr>
<td>RED BEDS</td>
<td>2</td>
<td>Beach</td>
<td>2.33</td>
<td>0.303</td>
<td>2.7</td>
<td>0.746</td>
</tr>
<tr>
<td>BHIMUNIPATNAM</td>
<td>3</td>
<td>Beach</td>
<td>2.58</td>
<td>0.43</td>
<td>-0.114</td>
<td>0.949</td>
</tr>
<tr>
<td>PEDDA NAGAMAYYAPALEM</td>
<td>4</td>
<td>Beach</td>
<td>2.03</td>
<td>0.471</td>
<td>0.127</td>
<td>0.964</td>
</tr>
<tr>
<td>CHINA NAGAMAYYAPALEM</td>
<td>5</td>
<td>Beach</td>
<td>2.15</td>
<td>0.406</td>
<td>0.291</td>
<td>0.882</td>
</tr>
<tr>
<td>ANNAVARAM</td>
<td>6</td>
<td>Beach</td>
<td>2.133</td>
<td>0.529</td>
<td>0.192</td>
<td>1.101</td>
</tr>
<tr>
<td>CHAPALAUPPADA</td>
<td>1</td>
<td>New dune</td>
<td>2.416</td>
<td>0.559</td>
<td>-0.191</td>
<td>0.922</td>
</tr>
<tr>
<td>RED BEDS</td>
<td>2</td>
<td>New dune</td>
<td>2.31</td>
<td>0.517</td>
<td>0.004</td>
<td>1.65</td>
</tr>
<tr>
<td>BHIMUNIPATNAM</td>
<td>3</td>
<td>New dune</td>
<td>2.45</td>
<td>0.484</td>
<td>0.016</td>
<td>0.907</td>
</tr>
<tr>
<td>PEDDA NAGAMAYYAPALEM</td>
<td>4</td>
<td>New dune</td>
<td>2.04</td>
<td>0.404</td>
<td>0.018</td>
<td>1.05</td>
</tr>
<tr>
<td>CHINA NAGAMAYYAPALEM</td>
<td>5</td>
<td>New dune</td>
<td>2.356</td>
<td>0.441</td>
<td>0.134</td>
<td>0.851</td>
</tr>
<tr>
<td>ANNAVARAM</td>
<td>6</td>
<td>New dune</td>
<td>2.266</td>
<td>0.552</td>
<td>0.007</td>
<td>0.8962</td>
</tr>
<tr>
<td>CHAPALAUPPADA</td>
<td>1</td>
<td>Old dune</td>
<td>2.3</td>
<td>0.66</td>
<td>-0.232</td>
<td>0.79</td>
</tr>
<tr>
<td>RED BEDS</td>
<td>2</td>
<td>Old dune</td>
<td>2.2</td>
<td>0.487</td>
<td>-0.009</td>
<td>0.919</td>
</tr>
<tr>
<td>BHIMUNIPATNAM</td>
<td>3</td>
<td>Old dune</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>PEDDA NAGAMAYYAPALEM</td>
<td>4</td>
<td>Old dune</td>
<td>2.163</td>
<td>0.616</td>
<td>0.31</td>
<td>0.811</td>
</tr>
<tr>
<td>CHINA NAGAMAYYAPALEM</td>
<td>5</td>
<td>Old dune</td>
<td>1.89</td>
<td>0.594</td>
<td>0.221</td>
<td>1.139</td>
</tr>
<tr>
<td>ANNAVARAM</td>
<td>6</td>
<td>Old dune</td>
<td>2.276</td>
<td>0.545</td>
<td>0.077</td>
<td>0.815</td>
</tr>
</tbody>
</table>

B. Distribution of heavy minerals

In the study area the size distribution with greater concentration of heavies in the 230 mesh size grade and 120 mesh sizes. The samples at Bhimunipatnam region are having heavies in the 120 mesh size when compare to the other locations. However, an increment of heavies was observed at Pedda namayyapalem, China nagamayyapalem and Annavarm these are northern side regions of the Gosthani River in 230 mesh size grades. The concentration of heavy minerals in the surficial sediments from Chapala uppada (beach, new dune &old dune zone) in the southern side of Bhimunipatnam and Annavarm (beach, new dune &old dune zone) northern side are varies considerably. The trends of the wt % of heavy mineral concentrations in the micro–environments of the entire area (including Chapala uppada to Annavarm) shown in Table 3. The distribution of heavy minerals in micro-environments (beach, new dunes and old dunes) an increasing trend in the heavy mineral concentration is noted.
Table 3: Distribution of Heavy Minerals in Coastal sands of Chapala Uppada –Annavaram

<table>
<thead>
<tr>
<th>STATION</th>
<th>ENVIRONMENT</th>
<th>+60 Fraction</th>
<th>+120 Fraction</th>
<th>+230 Fraction</th>
<th>Wt %</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>CHAPALA UPPADA</strong></td>
<td>BEACH</td>
<td>0.334</td>
<td>1.164</td>
<td>4.315</td>
<td>38.91</td>
</tr>
<tr>
<td></td>
<td>NEW DUNE</td>
<td>0.4</td>
<td>1.27</td>
<td>3.89</td>
<td>37.2</td>
</tr>
<tr>
<td></td>
<td>OLD DUNE</td>
<td>0.411</td>
<td>0.659</td>
<td>2.478</td>
<td>23.77</td>
</tr>
<tr>
<td></td>
<td>TOTAL</td>
<td></td>
<td></td>
<td></td>
<td>99.88</td>
</tr>
<tr>
<td><strong>RED BEDS</strong></td>
<td>BEACH</td>
<td>0.409</td>
<td>3.3</td>
<td>3.302</td>
<td>39.939</td>
</tr>
<tr>
<td></td>
<td>NEW DUNE</td>
<td>0.742</td>
<td>1.64</td>
<td>3.4</td>
<td>33.223</td>
</tr>
<tr>
<td></td>
<td>OLD DUNE</td>
<td>0.047</td>
<td>0.686</td>
<td>3.978</td>
<td>24.837</td>
</tr>
<tr>
<td></td>
<td>TOTAL</td>
<td></td>
<td></td>
<td></td>
<td>99.99</td>
</tr>
<tr>
<td><strong>BHIMUNIPATNAM</strong></td>
<td>BEACH</td>
<td>0.12</td>
<td>3.85</td>
<td>4.13</td>
<td>55.147</td>
</tr>
<tr>
<td></td>
<td>NEW DUNE</td>
<td>0.138</td>
<td>1.761</td>
<td>4.689</td>
<td>44.852</td>
</tr>
<tr>
<td></td>
<td>OLD DUNE</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>TOTAL</td>
<td></td>
<td></td>
<td></td>
<td>99.99</td>
</tr>
<tr>
<td><strong>PEDDA NAGAMAYYAPALEM</strong></td>
<td>BEACH</td>
<td>0.8</td>
<td>4.33</td>
<td>4.42</td>
<td>37.41</td>
</tr>
<tr>
<td></td>
<td>NEW DUNE</td>
<td>0.4</td>
<td>1.88</td>
<td>4.32</td>
<td>25.85</td>
</tr>
<tr>
<td></td>
<td>OLD DUNE</td>
<td>1.5</td>
<td>3.03</td>
<td>4.55</td>
<td>36.74</td>
</tr>
<tr>
<td></td>
<td>TOTAL</td>
<td></td>
<td></td>
<td></td>
<td>100</td>
</tr>
<tr>
<td><strong>CHINNA NAGAMAYYAPALEM</strong></td>
<td>BEACH</td>
<td>4.8</td>
<td>4.86</td>
<td>4.95</td>
<td>48.55</td>
</tr>
<tr>
<td></td>
<td>NEW DUNE</td>
<td>0.15</td>
<td>1.85</td>
<td>4.53</td>
<td>21.7</td>
</tr>
<tr>
<td></td>
<td>OLD DUNE</td>
<td>1.21</td>
<td>3.43</td>
<td>4.31</td>
<td>29.75</td>
</tr>
<tr>
<td></td>
<td>TOTAL</td>
<td></td>
<td></td>
<td></td>
<td>100</td>
</tr>
<tr>
<td><strong>ANNAVARAM</strong></td>
<td>BEACH</td>
<td>0.59</td>
<td>0.4</td>
<td>3.77</td>
<td>23.4</td>
</tr>
<tr>
<td></td>
<td>NEW DUNE</td>
<td>0.66</td>
<td>3.5</td>
<td>3.4</td>
<td>37.17</td>
</tr>
<tr>
<td></td>
<td>OLD DUNE</td>
<td>0.31</td>
<td>3</td>
<td>4.71</td>
<td>39.43</td>
</tr>
<tr>
<td></td>
<td>TOTAL</td>
<td></td>
<td></td>
<td></td>
<td>100</td>
</tr>
</tbody>
</table>

The heavy mineral concentration and its distribution in terms of sizes (60, 120, &230 mesh) in different micro-environments from Chapala uppada to Annavaram Coast is shown in the figure 3, by means of bar diagrams. The Bhimunipatnam area, south of the mouth of river Gosthani, has found there is no concentration of old dunes are due to beach erosion is more. In general, in the study area, from south to north, increasing definite trend in the concentration of heavy minerals in sub-surface sediments is observed but for samples at Annavaram and Pedda nagamayypalem, the concentration of heavy minerals is very high in 230 mesh size in all the micro-environments.
Fig.3 Distribution of heavy minerals (wt %) in different micro environments of Chapala Uppada – Annavaram coastal sands (beach, new dune, old dune) in different fractions (+60, +120 and +230)
Fig. 4 Distribution of total heavy minerals (Beach, New dune, old dune) in Wt % Vs Stations (1, 2, 3, 4, 5, 6) are Chapala Uppada, Red beds, Bhimunipatnam, Peddanagmayya Palem, Chinnanagmayya Palem, Annavarm

From the figure 4, the distribution of heavy minerals in all the environments is explained in detail. Heavy minerals in different micro environments (beach, new dune, old dune) show lot of variations. This may be due to the source of sediments, direction of wind and mechanical action of waves. In beach the total heavy mineral concentration is low on station 1 to 3, the southern part of Gosthani River, but in the northern part these concentration is increased gradually in the stations 4 and 5. The new dune deposits are increased from south to north part of the coast. The heavy minerals and its contractions in old dunes are low on south side of river (station 1, 2) and in the station 3 there is no formation of old dunes in that area. It is steep u shaped coast, the wave and wind action is very high so, there is no stable sand deposits are formed. In the north side of the river the old dune height and distribution is very high, the sediments carrying from the river are transported to the northern side by the waves and winds. The heavy mineral concentration in old dunes are high in station no, 5&6.

C. Heavy mineral studies
The heavy mineral suite in the study area consists predominantly of opaque (ilmenite, magnetite and chromite), garnet, amphibole, zircon, tourmaline, rutile, staurolite, etc. An increase in the heavy mineral content with decreasing grain size is noticeable. In few slides, grains have lost their original optical properties because of their transportation leading to certain difficulties to establish their precise identification and need supportive studies such as X-Ray Diffraction (XRD), which might help to identify and name them properly; those minerals which are not identified clearly in the study are included in as part of other minerals.

Total average grain % of the each heavy mineral in beach, new dune and old dune environments is given in table 3, 4 and 5 respectively.

Table 4. Average concentration of Heavy Minerals in Beach Environment

<table>
<thead>
<tr>
<th>Heavy Mineral</th>
<th>Fraction 0-60 mesh</th>
<th>Fraction 60-120 mesh</th>
<th>Fraction 120-230 mesh</th>
<th>Average grain %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Opaque</td>
<td>44.65</td>
<td>47.04</td>
<td>56.86</td>
<td>49.52</td>
</tr>
<tr>
<td>Sillimanite</td>
<td>20.42</td>
<td>19.68</td>
<td>14.6</td>
<td>18.23</td>
</tr>
<tr>
<td>Garnet</td>
<td>24.9</td>
<td>15.96</td>
<td>12.14</td>
<td>17.67</td>
</tr>
<tr>
<td>Zircon</td>
<td>1.91</td>
<td>4.7</td>
<td>4.22</td>
<td>3.61</td>
</tr>
<tr>
<td>Rutile</td>
<td>0.79</td>
<td>1.9</td>
<td>2.01</td>
<td>1.57</td>
</tr>
<tr>
<td>Monazite</td>
<td>0.62</td>
<td>0.98</td>
<td>1.55</td>
<td>1.05</td>
</tr>
<tr>
<td>Other minerals</td>
<td>6.71</td>
<td>9.74</td>
<td>8.62</td>
<td>8.36</td>
</tr>
</tbody>
</table>
Table 5. Average concentration of Heavy Minerals in New Dune Environment

<table>
<thead>
<tr>
<th>Heavy Mineral</th>
<th>Fraction 0-60 mesh</th>
<th>Fraction 60-120 mesh</th>
<th>Fraction 120-230 mesh</th>
<th>Average grain %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Opaque</td>
<td>48.65</td>
<td>52.11</td>
<td>58.84</td>
<td>53.20</td>
</tr>
<tr>
<td>Sillimanite</td>
<td>20</td>
<td>16.42</td>
<td>18.07</td>
<td></td>
</tr>
<tr>
<td>Garnet</td>
<td>20.4</td>
<td>10.9</td>
<td>12.66</td>
<td></td>
</tr>
<tr>
<td>Zircon</td>
<td>1.12</td>
<td>3.9</td>
<td>5.26</td>
<td>3.43</td>
</tr>
<tr>
<td>Rutile</td>
<td>0.766</td>
<td>1.56</td>
<td>1.946</td>
<td>1.42</td>
</tr>
<tr>
<td>Monazite</td>
<td>0.4</td>
<td>0.64</td>
<td>0.84</td>
<td>0.63</td>
</tr>
<tr>
<td>Other minerals</td>
<td>8.664</td>
<td>14.47</td>
<td>8.634</td>
<td>10.59</td>
</tr>
</tbody>
</table>

Opaque: The concentration of opaque minerals is flooded in fine fraction than in the medium and coarse fractions. Among the opaque minerals ilmenite and magnetite is dominant, sub angular to sub rounded in shape and black in colour with framboidal texture. Heavy mineral % decreases as the grain size increases. The opaque concentration is on average 49-58 % in all the three fractions. viz., +60, +120 and +230 and shown in figures 4, 5and 6 for beach, new dune and old dunes respectively. In the vicinity of the river mouth, however, movement of the materials is dominantly northward. Sediments on the beach ranges from fine to medium grained, moderately to well sorted, which suggest dominance of waves on the coastal processes and the concentration of opaque is higher in northern side of Gosthani river mouth.

Sillimanite: The concentration of sillimanite in an average ranges from 12-18%. Study of characteristics of sillimanite in study area suggests that, they are largely derived from the khondalites of Eastern Ghats. The prismatic character of the minerals (sillimanite) also suggests their derivation from khondalitic rocks.

Garnets: The garnets are abundant in beach environment and are more in larger (+60) and medium (+120) fractions. Concentration of garnets present in all the environment in an average of 11.65 – 17 %. They are of two types, colourless and pale pink. The provenance is related to khondalite suite (garnet – sillimanite-graphite gneisses and schists) of Eastern Ghats; occasional dark pink garnets are derived from charnockite. The sediments that are delivered into the sea by the river will be redistributed by the waves and currents according to their densities, size and shape (Kumar and Wang, 1984). Earlier, the concentration of red garnet sands along Visakhapatnam – Bhimunipatnam was reported by Sastry et al., (1981). Some dark brown garnets are also noticed in the study.

Zircons: Zircons are generally euhedral character but in the present study they are rounded to sub rounded with yellow and brown colouration showing straight extinction where as some varieties are colourless. The average grain % of zircons is 1-4 and abundant in finer (+230) fractions. In few samples zircons are completely absent and few samples of zircons are rounded which indicates that the sediments are formed from reworked sediments.

Rutile: The rutile average grain % is 0.93-1.3. They are dark red to brownish in colour with prismatic shape. But most of the rutile grains in the present study are rounded nature and some in kidney shape. Some rutile samples in the study area are in anhedral form, which indicates that the sediments are immature and may be derived from adjoining acidic igneous and metamorphic rocks. Presence of rounded rutile in few samples indicates that they are sourced from reworked sediments.

Monazite: The monazite grains are colourless to yellow characterized by rounded to sub rounded shape, ultra stable mineral during weathering and its presence indicates that they are derived from charnockites. They are in 0.6-1.57 average grain %. Presence of monazite and other black sand concentrations of Visakhapatnam are reported elsewhere (Mahadevan and Nateswara rao., 1950 and Sri ramadas, 1951). Ramamohana Rao et al., (1982) have recorded the occurrence of thin layers of black sand in the inland stream channels along Visakhapatnam-Bhimunipatnam coastal areas. Zircon and monazite constitute the main
radioactive association in the highly altered portions of the rocks (after El Feky et al., 2011). The other minerals are 6-14% on average and cannot be named without XRD studies. These are concentrated in beach and new dune environments.

VI. CONCLUSION
The heavy minerals in the study area might have been derived originally from khondalites and charnokites. These heavy mineral deposits are governed by the presence of host rocks in the proximity (Eastern Ghats), existing river (drainage pattern), topography and coastal arrangements (beach, old and new dunes). In the present study, mostly Aeolian & marine actions and shape of coastal geomorphology have played important role in the concentration of heavy minerals (Burt, 1989). The distribution pattern exhibited by opaque, garnet, zircon and rutile suggest that difference in specific gravity, settling velocity and differential transportation have played a major role in their distribution at micro environments under the study.

Sediment grain size and heavy mineral wt% have inverse relationship and they are highly associated with the fine fractions. The wt% of ilmenite and sillimanite increases as the grain size decreases and also the wt% of garnet is more in coarse fraction, and it decreases as the grain size decreases. More opaque are observed in (+230) fraction of the sediments in study area. The dunes present in the northern side of the Gosthani river mouth are having good amount of heavy minerals like ilmenite, magnetite, sillimanite and garnets that are more than 85% which have economical importance and a detail study for long stretch of beach is required before commenting on economic viability for mining.

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Abstract- The aim of this study is to examine the change of population composition in terms of religion and language in the districts of state Assam in Northeast India during post independence period. The analysis is based on district level census data of Assam during 1951 to 2001. The result shows that the proportion of Muslim population has been rising rapidly in some districts whereas the Hindu population is declining and losing their share in all the districts of Assam. The change of religious composition has been projected by using polynomial curve fitting and it is found that Hindu and other religion may become minority in Assam after 2040 in comparison to combined proportion of Muslim and Christian population. The growth of various language speaking population is also analyzed and it is observed that the proportion of Bengali speaking population is also rapidly rising but the proportion of Assamese speakers are declining in all the districts of Assam. To investigate the impact of cross border migration the growth of Muslim population in Assam and Bangladesh is also compared in this study.

Index Terms- Religion, Language, Curve fitting, Assam

I. INTRODUCTION

Religion is one of the basic socio-cultural characteristic of a society. Different people understand and express religious identity in their own way. The growth and decline of populations and changes in the relative balance between various groups of religion within a population play a crucial role in the rise and fall of nations and even civilization. On the other hand language is the most important medium of human interaction. The demands for more autonomy, separate states based on language not only challenge and threaten the political stability of the country but also very often lead to ethnic conflicts. North East India is surrounded by the border of four countries which are Bangladesh, Bhutan, China and Myanmar. Though they are separated by political boundary but they have a cultural affinity in both side of the border. Therefore it is important for us to know the changing demographic patterns to make an informed judgment about the cross borderer migration and strategic pressures that India is likely to face from its neighboring countries in the near future. This paper examined the changing trend of population composition in terms of religion and language in Assam and all districts during post independence period. This change of religious composition has been projected by using polynomial curve fitting. Moreover to investigate the impact of cross border migration on religious change the growth of Muslim population of Assam and Bangladesh is also compared in this study.

The Census organization of India is the only instrument that collects the individual information of various religions and language. In this study the religion and language analysis based on district level census data of Assam during 1951 to 2001. The religion data of Bangladesh from 1974 to 2001 has been collected from the publication of National Series, Volume –I, Analytical Report, Oct, 2007 of Bangladesh Bureau of Statistics.

II. RELIGION CHANGE

Almost all the major religions of the world are practiced in Assam. It represents in full the religious diversity of the country. Besides the major religions, some of the tribes also follow animism, and worship nature in its various manifestations. The Hindus, who constitute a majority of the population practice different disciplines of Hinduism. The Muslim is the second largest religion in Assam and occupied 31 percent population according to 2001 census. Although there have been some Muslim population in Assam for several centuries, Most Muslims are recent settlers from Bangladesh. The older Muslims are well integrated with the society (Barpujari, 1990). There are scattered populations of Buddhists, Sikhs and Jains in different parts of the State. So far as change of religious composition in Assam, being a Hindu majority state, fears that it will become Muslim-dominated due to high growth of Muslim population. The October 2008 violence in Udalguri and Goalpara districts between the Bodos community and the Bangladeshi migrants was a flare up based on such social fears resulting in the death of nearly 36 people (Goswami, 2011). It is therefore important to analyze the changing demography of different religious groups in Assam. According to 2001 census the various religious group living in Assam and India respectively are 64.9 and 80.5 per cent Hindu, 30.9 and 13.4 per cent Muslim, 3.7 and 2.3 percent Christian and 0.5 and 3.8 per cent other religion. It is seen that the proportion of Muslim population in Assam is significantly higher than that of the country as a whole. Strikingly, Assam occupies second position after Jammu and Kashmir in terms of proportion of Muslim population in the country (Kar, 2007). It is seen in table-1 that during 1951-2001 the Muslim population increased by 6 percent whereas Hindu population declined by 7.2 per cent. The percentage change of Christian and other religion during this period are 1.7 and -0.5 percent respectively. This significantly high growth of Muslim population in the state may
due to the consequence of large scale Muslim migration from Bangladesh and also prevalence of high birth rate (Nath et al., 2012). As a consequence of the slow improvement of socio-economic conditions among the Hindus, the natural growth rate of population among them has declined to a great extent in the state during the period (Kar, 2007).

Table 1: District wise Percentage of major Religious group in Assam during 1951-2001. (Area of Districts adjusted according to 1951 census)

<table>
<thead>
<tr>
<th>Religion</th>
<th>Year</th>
<th>Assam</th>
<th>Goalpara</th>
<th>Kamrup</th>
<th>Darrang</th>
<th>Lakhimpur</th>
<th>Nowgoan</th>
<th>Sibsagar</th>
<th>UM&amp;NC Hills</th>
<th>Cachar</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hindus</td>
<td>1951</td>
<td>72.1</td>
<td>51.5</td>
<td>69.7</td>
<td>78.6</td>
<td>90.8</td>
<td>58.4</td>
<td>92</td>
<td>80.5</td>
<td>60.6</td>
</tr>
<tr>
<td></td>
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So far the growth of population during 1951-2001 at district level is concerned all the districts witnessing very high growth of Muslim population than the growth of other religion. The proportion of Muslim population in undivided district Kamrup, Darrang, Nowgoan and Cachar has been increased by 6%, 8%, 10%, and 7% respectively. But in Lakhimpur, Sibsagar and UM&NC hills district this growth of Muslim population during 1951-2001 is only 2%, 1%, and 2% respectively. The undivided district of Goalpara, Kamrup, Darrang, and Nowgoan are in continuation of the eastern border belt of high Muslim presence and growth. The undivided Cachar district also falls near the border of Bangladesh and showing high Muslim presence and growth. On the other hand in almost all districts of Assam and in the state as a whole the Hindu and other Religions declined during 1951-2001. In a similar way the percentage declined of Hindu population in Kamrup, Darrang, Nowgoan and Cachar are 6%, 11%, 10%, and 8% respectively. But in Lakhimpur, Sibsagar and UM&NC hills district this decline of Hindu population during 1951-2001 is only 2%, 3%, and 0.5% respectively. The percentage increase of Christian population during 1951-2001 in all the districts are 1 to 2 percent only except undivided UM&NC hills district which is 9.1%. A major reason behind growth of Christian population in Assam is the intense movement of conversion towards Christianity. The high growth of the Christian population in Assam is mainly due to conversion of scheduled caste and scheduled tribe to Christianity (Ghosh, 2000). Table-2 represents the district wise percentage of religion in all 23 district of Assam during 1971-2001. According to 2001 census the percentage of Muslim population in some districts like Dhuburi(74.3), Barpeta(59.4), Goalpara(53.7), Nagoan(51.0), Karimganj(52.3), Hailakandi(57.6) have occupied dominant position. But out of 23 districts in Assam the 17 districts are Hindu dominant where proportion of Hindu population is above 50 percent.
Table 2: District wise Percentage of major Religious group in all 23 districts of Assam during 1971-2001. (Area of Districts according to 2001 census)

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Figure 1: The projected growth trend of major Religious group in Assam.
It is seen that the proportion of Muslim population is rising and Hindu population is losing their share in all the districts of Assam. In this study the time series data of percentage change of religion during 1971 to 2001 has been used to statistically project the trend in the near future. The projection by obtaining the best possible fit for the available data points and resulting trend line extend further in to the future is presented in figure-1. The upper curve in the graph plots is indicating the percentage change of Hindu and other population and lower curve indicating the percentage change of Muslim and Christian population. The available data fits best to a polynomial equation of third order as $R^2$ value is 1. The two curves projected in to the future intersect at the 50 percent mark in around 2040. Thus, if the change of proportion of religious population in the last 30 years continues then Hindu and other religion become minority in Assam in comparison to combined proportion of Muslim and Christian population after 2040.

III. CHANGE OF LANGUAGE SPEAKING POPULATION

India’s northeastern state Assam is one of the most heterogeneous linguistic and cultural regions of the country. The region presents a mixed and varied population of diverse linguistic groups, each group having a distinct life-style and heritage, and even aspiring for a separate political identity (Nath et al., 2012). There is large number of tribes in this region and each tribe speaks a different language which is not understood by its immediate neighboring tribe. In Assam there are two major schedule language Assamese and Bengali. They represent 49 and 28 percent of the total population of the state respectively as per 2001 census data. Although Assamese is the state language, it is largely confined to only the Brahmaputra valley. In Barak Valley Bengali (Sylheti) is the dominant language and it is also found in significant number in the other districts of the state. As per 2001 census there are 23 notified scheduled tribes in Assam. The different tribes of Assam are Bodo, Mishing, Rava, Tiwa(lalung), Deuri,Chakma, dimasa Kachari, Garo, Khasi, Jaintia, Hojai, Mech etc. Due to a large number of tribal groups Assam also has a significantly high proportion of non scheduled language speakers. Among these Boro, Mishing, Karbi, Garo, Santali and Rava are the major non schedule languages whose number of speakers are more than one lakh population each. The Boro language speakers live mostly in Kokrajhar, Bongaigoan, Barpeta, Nalbari, Darrang and Sonitpur (more than one lakh each). According to 2001 census the Mishing speakers mostly in Lakhimpur and Dhemaji district (above 1 lakh each), Karbi in Karbi Anglong district (more than 3 lakh) and the Garo speakers mostly in Goalpara district (more than 60 thousand). The Nepali speaking people mainly in Sonitpur (above 1 lakh) and Tinsukia district (above 80 thousand) and Hindi speaking people live mainly in tea garden and urban area. In this study for analyzing language data of Assam during 1951-2001, all the languages are divided in to 5 groups viz Assamese, Bengali, Hindi, Nepali and Others Language. In the group of Assamese language includes Assamese and other local tribal and tea garden language. In the group of other language contains all other northeastern and other Indian language. Table-3 represents the details of language groups. Table-4 represents the district wise percentage of language during 1951-2001. The area consider undivided 9 districts of Assam in 1951. It is observed from table -4 that the percentage increase of Bengali speaking population is inordinately high than all the other groups of language. During 1951 to 2001 the percentage of Bengali speaking population has increased by 6 percent from 21.2 to 27.5 but during these periods the proportion of Assamese speaking people in Assam had declined by 9 percent i.e. from 69.3 to 60.8. The percentage change of Hindi, Nepali and other language speaking people is only 1 to 2 percent.

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</table>
In the district wise language speaking population the undivided district of Goalpara, Kamrup, Darrang and Nagoan are in continuation of eastern border belt and show high Bengali speakers presence and growth. The Bengali speakers in Goalpara, Kamrup, Darrang and Nowgong district has increased by 11, 11, 17, and 7 percent respectively during 1971 to 2001. Another border district Cachar was the only district of Assam to have a significant Bengali speaking population (77.1) in 1951 and proportion of Bengali speakers rose by 80 percent in 2001. In the rest of districts the percentage increases of Bengali speaker is comparatively low, increasing only 1 to 2 percent except UM&NC Hills where percentage of Bengali speakers increase by 7 percent. So far as the percentage increase of other language is concerned in all the districts the proportion of Assamese language has declined during 1951-2001 and it has more rapidly declined in most of the border districts from 10 to 26 percent. There is no major change seen for Hindi, Nepali and Other language groups.

Due to the historical links, geographical and physical proximity the migrants of northeast India are mainly from Bangladesh. The state Assam has 262 km border with Bangladesh out of which 92 km is riverine (Sinha, 1998) therefore migration from Bangladesh to Assam is much easier. Since Bangladesh is a Muslim dominant country therefore to know the impact of cross border migration on religious change it is essential for us to compare the growth of Muslim population in both sides of the border. In Bangladesh the average annual growth in per thousand Muslim populations during 1974 -1991 and 1991-2001 are 29.1 and 18.7 respectively. But corresponding Muslim population growth in Assam comparatively very high which are 38.7 and 29.3 respectively. This is very much suggestive that the cross border migration from Bangladesh may behind this unusual growth.

Table 4: District wise Percentage of Language in Assam during 1951-2001 (Area of Districts adjusted according to 1951 census)

<table>
<thead>
<tr>
<th>State/Dist</th>
<th>Year</th>
<th>Assam</th>
<th>Cachar</th>
<th>Goalpara</th>
<th>Kamrup</th>
<th>Darrang</th>
<th>Nowgong</th>
<th>Sibsagar</th>
<th>Lakhimpur</th>
<th>UMNC Hills</th>
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<tr>
<td>Assamese</td>
<td>1951</td>
<td>69.3</td>
<td>1.8</td>
<td>76.8</td>
<td>81.3</td>
<td>82.2</td>
<td>72.1</td>
<td>88.6</td>
<td>78.1</td>
<td>81.2</td>
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<tr>
<td></td>
<td>1961</td>
<td>70.1</td>
<td>2.2</td>
<td>81.9</td>
<td>82.1</td>
<td>73.6</td>
<td>78.1</td>
<td>89.4</td>
<td>75.7</td>
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<td>1971</td>
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<td>78.8</td>
<td>82.5</td>
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<td>90.4</td>
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<td>77.8</td>
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<td>12.3</td>
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<td></td>
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<td>79.9</td>
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<tr>
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<td>4.5</td>
<td>5.9</td>
</tr>
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</tr>
</tbody>
</table>

IV. CONCLUSION

The empirical analysis based on district level census data shows that the proportion of Muslim and Bengali speaking population are rapidly rising during 1951-2001 than the other religion and language. This unusual high growth is not only for the natural increase alone. The natural growth rate of Muslim should not have much difference between Bangladesh and Assam. But the difference in actual rate clearly confirms the migration of Muslim to Assam (Bhuyan, 2006). The unusual high growth of Muslim and Bengali population in Assam may be due to cross border illegal Muslim migrants from Bangladesh to Assam (Nath et al., 2012). It is a matter of grave concern because if the change of proportion of religious population continues with this trend; then it is possible that the Assamese Hindu become minority in their own state. In present study from the statistically projected trend it is found that the Hindu and other religion will become minority in comparison to combined proportion of Muslim and Christian population after 2040. The former governor of Assam S.K Sinha expressed in his report in 1998 that illegal migrants threatens to reduce the Assamese people to a minority in their own State, as happened in Tripura and Sikkim.

REFERENCES


AUTHORS

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Abstract— Distributed social peer to peer network are most vulnerable to Sybil attack. It forms a small network within the P2P network and can give unwanted results to other nodes in network, thereby decreasing the interest of non malicious nodes in the P2P network. We are proposing a Parental Control algorithm which is based on reputation scheme. It uses the false message concept for identifying and verifying the Sybil nodes in the network.

Index Terms— Reputation, peer to peer (P2P), social networks, DHT

I. INTRODUCTION

In Sybil attack[1] an attacker introduces itself in the network with many P2P identities. If an attacker gets large network identities, it can control large portion of the network. When an attacker wants to join the network, it most likely to get join its other fake nodes. Hence all Sybil nodes, most likely, form a small network inside the P2P network (in case of social network). But if identity assignment scheme, in P2P network, is uniformly distributed, then it is very difficult for an attacker to strategically place such Sybil nodes in network according to Castro [15].

Even such randomly placed attacking nodes can make harm to network. To avoid malicious activities in the network reputation scheme can be used. In reputation based schemes, all nodes get reputation based on the basis of their behavior in the network. If a node behaves well in the network its reputation will be improved. Using reputation based scheme some other attacks such as DDoS [16] can be prevented. But a Sybil node can increase its reputation by contacting to other Sybil node or it can defame the honest nodes. To minimize this effect, referral system [8] can be used. DHTrust [13] is a robust and distributed reputation system for Trusted Peer-to-Peer networks. It resists the malicious node from faking reputation.

This paper provides a model for Sybil detection in peer to peer network. This model has following components:

1. **Reputation scheme**: A robust reputation scheme is required for selection of suspects and trusted verifiers. Any reputation scheme can be used which is best suited to overlay network and most resistant to malicious activities.

2. **Verification Scheme**: Verifiers, selected using above scheme, are used for verification of nodes. Verifiers use this scheme for detecting the Sybil nodes.

II. TERMINOLOGY AND NOTATION

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>$N_i$</td>
<td>i-th node in the network</td>
</tr>
<tr>
<td>$R_{Mi}$</td>
<td>i-th Reputation Manager</td>
</tr>
<tr>
<td>$L_{Rj,k}$</td>
<td>Local reputation of node $N_j$ in reputation manager $R_{Mk}$</td>
</tr>
<tr>
<td>$G_{Ri}$</td>
<td>Global Reputation of node $N_i$</td>
</tr>
<tr>
<td>$T$</td>
<td>Threshold on Global Reputation</td>
</tr>
<tr>
<td>$QoS$</td>
<td>Quality of Service</td>
</tr>
<tr>
<td>$T_{i→k}$</td>
<td>Trust on $R_{Mk}$ as observed by node $N_i$</td>
</tr>
<tr>
<td>$AQ$</td>
<td>The average quantity of transactions of nodes in the system</td>
</tr>
<tr>
<td>$RF$</td>
<td>Reputation Feedback</td>
</tr>
<tr>
<td>$P_i$</td>
<td>Parent of node $N_i$</td>
</tr>
<tr>
<td>$G$</td>
<td>Group size a parent can handle</td>
</tr>
</tbody>
</table>

III. RELATED WORK

If Douceur [1] has proven that without use of central authority, it is not possible for a system to fully defend against Sybil attack. Hence in P2P network, which is fully distributed, Sybil nodes can not be removed completely from the network.

J. Dinger and H. Hartenstein [2] have given Self Registration mechanism. In this solution a node needs to register at ‘r’ successfully registered nodes in the network, and for verification any node checks its registration.

A. Cheng [7] has shown that no symmetric reputation function is Sybil proof. This paper has also given a general formula for asymmetric reputation function, which is more Sybil resistant.

G. Kesidis [8] have proposed a Sybil-Proof Referral System, which is based on Multiplicative Reputation Chains. Using multiplicative reputation chain, single step and multi step referrals can made Sybil proof. This technique is used in our solution to select more trusted node as verifier.

Haifeng Yu [4] provided Sybil Guard as solution to Sybil attack in social network. This solution restricts $O(\sqrt{n \log n})$ Sybil nodes per attacking edge where $n$ is number of nodes in the network. This solution uses pre computed permutations to generate random paths. Here, whenever an honest user’s node is corrupted, the friends of that user could be targeted by the adversary to create a number of Sybil identities which Sybilguard will be unable to detect [5]. They further reduced the number of
Sybil nodes per attacking edge to $O(\log n)$ in their next solution known as Sybil limit [3].

A. Kurve and G. Kesidis [9] provided Sybil Detection via Distributed Sparse Cut Monitoring as a solution. This method (also our) depends on the fact that, a Sybil cluster is typically sparsely connected via direct reputation links with the rest of the reputation graph [3][4]. It uses some trusted nodes as verifiers called as Police Nodes. Using min-sparse cut algorithm, it forms groups of nodes with nearly same reputation. The region with lower reputation is considered as Sybil group. For this a central trusted entity, which has entire network parameters, is required to form cuts in the network.

C. Hota [5] proposed Safeguard algorithm, some random verifiers are chosen. Each verifier verifies a group of random nodes, called as suspect group, by finding paths to each suspect node and then intersection of paths is taken. After intersection, the nodes remaining are more likely to be Sybils. To verify them further it used HIP [17]. But the main disadvantage is that HIP can not be used for verification if the node is under NAT (Network Address Translation).

### IV. SYSTEM ARCHITECTURE

System is fully distributed peer to peer network. Nodes are connected to other nodes for means of communication. The architecture can be viewed as a graph $G = (V, E)$, where $V$ is set of vertices representing nodes and $E$ is set of edges representing connection links between nodes (as shown in Fig.1).

![System Architecture](image)

Each node in $V$ has unique identifier as per the P2P network. Each node has reputation in the network, which is decided dynamically based on its work in the network.

In social network, all Sybil nodes form a small network inside a network. Some of these Sybil nodes are connected to honest nodes. The edge connecting two honest nodes is called as honest edge and the edge connecting honest node to malicious node is called as attacking edge. Hence honest region is connected to Sybil region via attacking edges.

A distributed reputation scheme is deployed in the network. All nodes have a parent node $P$ associated with them. Each parent has fixed set of nodes for under its consideration. There are more than one parent nodes in network.

### V. DETECTION ALGORITHM

We are proposing an algorithm to detect Sybil nodes in the peer to peer network. To perform detection action we have provided additional functionalities to some selected nodes. These nodes in one particular group known as “parents” which is responsible to detect such suspect, attacked nodes in that particular group which is under his observation. This allocation of verifier to groups is done in such a way that there will not be more than one verifier in single group. Job of verifier is to find out group of suspect nodes which are sending false messages in the network i.e. Sybil nodes and keep the network Sybil proof and make network more reliable.

**A. Reputation Scheme**

Our detection algorithm requires a robust and Sybil proof reputation scheme present in the network. Distributed asymmetric reputation schemes [7] are resilient to Sybil attack. This scheme gives local reputations to each node, which can be used to calculate global reputation of the node. This global reputation used in the verification process. Sybil proof Referral System [8] can also be used to add more robustness. Only those nodes whose reputation is below threshold $T$ are considered as suspect otherwise not.

Reputation of nodes is increased after each successful transmission of data and decreased after sending of each false message.

**B. Detection Algorithm**

Steps to detect suspect nodes are given as follows:

1. If any node say node $N_i$ requests for a file in the network and finds more than one nodes, who have the file, then $N_i$ selects one node out of all of these whose global reputation (GR) is higher. Let us say this node is $N_j$.

2. If $N_j$ is Sybil attacker it will send a false message to node $N_i$. Here by false message we mean wrong file sent; lower QoS than expected or no response from the sender. If $N_j$ is non malicious node, it may not send false message to node $N_i$.

3. If $N_i$ receives false message, it complaints about the node $N_j$ to its parent $P_i$.

4. Now parent will first find neighbors of node $N_j$ and put only those nodes in suspect group which has reputation below threshold $T$ along with node $N_j$ (if node $N_j$’s reputation is also below threshold).

5. To verify suspect group, $P_i$ will give a computational puzzle [14] to all these nodes. All the nodes have to give correct answer the puzzles in limited time simultaneously.

6. If there are Sybil nodes present in the suspect group it needs to respond to all puzzles from $P_i$ simultaneously but due to processing power limitation it will unable to respond in specific threshold time and is detected by $P_i$.

Detection of Sybil nodes depends upon the size and other characteristics of puzzles [1]

### VI. SIMULATION MODEL

We have used Chord [6], structured P2P network. DHTTrust [13] is used as reputation scheme in the network. Though Chord is structured P2P network, SPROUT [12], a DHT algorithm, can...
be used to add social links in it. Entire network and algorithm is simulated on PeerSim [10] simulator. Network contains maximum 3000 nodes. Any node is selected at random after 20 simulation steps to send messages to other nodes. Total false messages (the unreliable messages sent by malicious node), total malicious, total failed messages, network size are recorded every after 1000 simulation steps. Entire network is simulated for 1000000 simulation steps. Out of 3000 nodes in the network 10% nodes are malicious.

Before we move further let us discuss about working of DHTrust.

A. DHTrust

DHTrust selects several nodes as reputation managers to distribute the local reputation (LR) on them instead of putting the global reputation on score managers. This scheme is used on DHT based networks like Chord. In Chord network, according to DHTrust, each node in the Chord identifier circle selects all its finger nodes as its reputation managers. Local reputation of a node Ni held by k-th reputation manager is LRj,k. Because the node of Chord maintains all its finger nodes in its finger table, it can retrieve its local reputation instantly according to its finger table. Assuming that the identifier circle has the size of N = 2^M, acquiring local reputation of a node to aggregating it into global reputation (GR) only needs O(logN) messages.

Suppose node Ni wants to calculate the global reputation of node Nj, it accesses the reputation manager nodes of node Nj to obtain local reputation LRj,k (1 \leq k \leq M, M means the chord identifier’s length). During the calculation of global reputation of node Nj (GRj), trust on the k-th reputation manager with respect to the node Ni (Ti→k) must be considered hence GRj is calculated as follows:

\[ GR_j = \sum_{k=1}^{M} (Sk \times Ti \rightarrow k \times LR_j,k) \]

Where Sk is the size of the interval in which the k-th reputation manager is located. From eq. 1 it can be seen that global reputation is not dependent on a single reputation manager. Hence even if any reputation manager fakes about the reputation of node Nj, it will have very small (even negligible) affect on GRj.

Any node can calculate global reputation before transaction and can select node with highest global reputation. After transaction the requesting node Ni issues Reputation Feedback (RF) to update the local reputation of sending node Nj. RF is the estimation of services. A normal node would issue it strictly in accordance with the quality of service (QoS), but a malicious node may generate a totally opposite one. Ni can only modify the specified local reputation, which is the local reputation hold by the reputation manager of the interval which node Ni belongs to. After locating specified reputation manager eq. 2 is used to update local reputation at this manager.

\[ LR^n_j,k = LR^{n-1}_j,k + (1/AQ) (RF - LR^n_j,k) \]

Where LR^n_j,k is the k-th local reputation of node Nj being updated for n times, and LR^{n-1}_j,k is local reputation of last time.

The AQ means the average quantity of transactions of nodes in the system. Here Ni also updates its trust vector by updating the trust value of the k-th reputation manager using following equation:

\[ Ti→k = Ti→k + (1 - 2 |QoS - LR^n_j,k|) \times (1 - T i→k) \times T i→k / AQ \]

B. Sybil Detection in Chord

Different groups are formed in the Chord network with the fixed group size (G). Each group has a parent node. Here we have chosen random nodes as parents.

Suppose node Ni has done transaction with another node Nj and Ni received a false message (as described above) it signifies this to its parent (Pi) by issuing a Detect Message. After receiving this message Pi adds nodes Nj and all finger nodes of Nj in suspect list of Pi only if GR of the nodes is less than Threshold (T) reputation. Now Pi applies verification algorithm to this suspect list.

As we have used puzzle based verification, hence the efficiency of the Sybil Detection Algorithm depends on puzzle solving time and Threshold (T) on global reputation. If T is very small, Sybil detection will be very hard. If T is very high, Sybil nodes need to maintain reputation higher than T, to be undetected, but for this Sybil nodes must do trusted and correct transactions. Higher value of T also increases the overload on parent node Pr as this increases the size of suspect list. Hence T much be chosen so that to obtain overall efficiency.

Sybil node detection also depends on suspect group size (SG). This dependency is described by following graphs which are drawn assuming malicious entity has 4GHz processor and the puzzle is chosen so that it requires 1sec to solve to a 1GHz processor. Also it is assumed that in this social network each node has maximum 20 social links.

From Fig.3, we can see that efficiency of this algorithm depends on suspect group size. For SG=15 and SG=12 Sybil nodes, this algorithm has about 90% efficiency and for SG=10 Sybil nodes, it has about 87% efficiency. Hence it shows as SG increases efficiency of Sybil detection increases. From Fig.4, it can be seen that with increase in suspect group size, total number of false messages in the network are also reduced. For SG=10, SG=12 and SG=15 Sybil nodes, total false messages are reduced by about 85% to 90%.

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Number of social links per node in the network also has effect on this Sybil node detection algorithm. It can be shown by Fig.5. It can be seen that efficiency of the algorithm increases with increase in number of social links per node. This is because; it allows more neighbor nodes of a node to be considered as Sybil nodes when the node sends false messages.

![Graph showing total transaction messages vs total false messages before and after Sybil detection](image1)

**Fig.4**: Total Transaction messages Vs total false messages before and after Sybil detection.

![Graph showing change in % Sybil detection with social links](image2)

**Fig.5**: Change in % Sybil detection with social links.

**VII. CONCLUSION**

We presented a parent based detection algorithm for Sybil nodes. This algorithm detects about 90% of Sybil nodes in the static network as well as false messages are decreased by 85% to 90%. As Sybil nodes form a small network within the peer to peer network, hence, whenever a Sybil node issues false message to non Sybil node, the Sybil node along with its neighbors are verified. Due to this property of algorithm more Sybil nodes are detected at a time.

Future work includes, implementing the algorithm on dynamic network, selecting repudiated and trusted node as parent to newly arrived nodes. Also, parent node may go off at any time hence new trusted parent must be allocated to the group that it was guiding.

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Taxonomical study of Software Reliability Growth Models

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Abstract- Reliability has convert windfall of the software without which we cannot even contemplate of it. Reliability is very imperative which amplify the software endurance and its longevity. Due to the augmentation of the complexity and the complex system the demand of the reliability becomes imperative. Reliability growth models preempt and derived the consistency of the software which becomes obligatory. Now a-days nearly to hundred models for reliability have been developed. But research Scholar has difficult to choose it for reliability measure. In our research paper major emphasis is towards the taxonomical review of the reliability growth model and analyzing reliability pattern which is utterly based upon literature survey.

Index Terms- Software Reliability, Reliability Models, Reliability Modeling, Model’s Taxonomy.

I. INTRODUCTION

Towards moving 21’s century, software becomes a coerer for everything from elementary education to genetic engineering. Dependency & requirements on computer increases the difficulties & failures. Due to increase in addiction the size & complexity of system has grown. To avoid the failures & faults, reliability of software needs to be study during development of software so as to come up with reliable software. There are several projects executed by NASA, & DOD that deal with highly complex software. Due to change in the three lines of code in a single program in 1991 the telephone system was collapsed in California and eastern parts. Because of software failure, aircraft industry also faced lots of airliner crashes and abnormal flight conditions due to incompatible response to the pilots. This paper presents a review on the software reliability models. The study throws the light on various dimensions of reliability models. Categorization of models is based on identified dimensions.

A. Software reliability

Software reliability is a key attribute to software quality. Reliability is the property of referring ‘how well software meets its requirements & also ‘the probability of failure free operation for the specified period of time in a specified environment’. Software reliability defines as the failure free operation of computer program in a specified environment for a specified time. Software Reliability is an important to attribute of software quality, together with functionality, usability, performance, serviceability, capability, install ability, maintainability, and documentation. Software Reliability is hard to achieve, because the complexity of software tends to be high. While any system with a high degree of complexity, including software, will be hard to reach a certain level of reliability, system developers tend to push complexity into the software layer, with the rapid growth of system size and ease of doing so by upgrading the software. While the complexity of software is inversely related to software reliability, it is directly related to other important factors in software quality, especially functionality, capability, etc. Emphasizing these features will tend to add more complexity to software.

B. Software reliability modeling

Among all software reliability models, SRGM is probably one of the most successful techniques in the literature, with more than 100 models existing in one form or another, through hundreds of publications. In practice, however, SRGMs encounter major challenges. First of all, software testers seldom follow the operational profile to test the software, so what is observed during software testing may not be directly extensible for operational use. Secondly, when the number of failures collected in a project is limited, it is hard to make statistically meaningful reliability predictions. Thirdly, some of the assumptions of SRGM are not realistic, e.g., the assumptions that the faults are independent of each other; that each fault has the same chance to be detected in one class; and that correction of a fault never introduces new faults. Although some historical SRGMs have been widely adopted to predict software reliability, researchers believe they can further improve the prediction accuracy of these models by adding other important factors which affect the final software quality. Among others, code coverage is a metric commonly engaged by software testers, as it indicates how completely a test set executes a software system under test, therefore influencing the resulting reliability measure. To incorporate the effect of code coverage on reliability in the traditional software reliability models, proposes a technique using both time and code coverage measurement for reliability prediction. It reduces the execution time by a parameterized factor when the test case neither increases code coverage nor causes a failure. These models, known as adjusted Non-Homogeneous Poisson Process (NHPP) models, have been shown empirically to achieve more accurate predictions than the original ones.

II. SOFTWARE RELIABILITY WORK

Generally, Software reliability is working on three phases as 1. Problem searching ie. To catch the faults or errors.2. Applying
Techniques in order to solve or remove the problem. 3. Verifying and validating these techniques Reliability Modeling

1. Problem Searching
This is the first phase of software reliability plan. In this phase we are applying testing and comparing the performance of software with its previous standards. By using different type of testing such as black box and white box testing, we catch the problem occurring. If we catch the problem then we go to next phase as TMA for predicting, removing & solving the problem.

2. Applying Methods
After successful completion of problem searching phase we are applying the Methods. Methods is the collection of technique, approaches and methods. Here a lot of techniques, methods (model as SR model of Goel, Okumoto, Musa etc is used.) by using these models we can solve the upcoming problem in our software. We also apply few important approaches for solving these problems.

Approaches: - For selecting the SR model, to predict the software from failure & faults, two important approaches are (a) A model selection approach classified SR model on the basis of SDLC. Means we first check the status of upcoming problem i.e., in which phase of SDLC the problem is occurred. Then we apply related SR model for that phase to predict the software. (b) Systematic approaches of SR modeling are distinguished between SR model and parameters estimations procedure by using predicting performance. (ii) Techniques:-Generally in searching the problem, two testing techniques are applied. These techniques are (a) Black box testing (b) White box testing (iii) Methods: - By the help of methods we are finding approaches and techniques. It means they are inter-related to each other.

![Fig-1: Reliability models classification](image)

<table>
<thead>
<tr>
<th>Models</th>
<th>Proposed by</th>
<th>Year</th>
<th>Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>JMM</td>
<td>Z. Jelinski Paul and B. Moranda</td>
<td>1972</td>
<td>Binomial</td>
</tr>
<tr>
<td>GM</td>
<td>Amrit Goel and Kazu Okumoto</td>
<td>1979</td>
<td>Poisson</td>
</tr>
<tr>
<td>ETM</td>
<td>John Musa</td>
<td>1975</td>
<td></td>
</tr>
<tr>
<td>HEM</td>
<td>Ohba</td>
<td>1984</td>
<td></td>
</tr>
<tr>
<td>WM</td>
<td>Weibul</td>
<td>1983</td>
<td>Binomial</td>
</tr>
<tr>
<td>SSM</td>
<td>S. Yamada, M. Ohba, and S.Osaka</td>
<td>1983</td>
<td>Gamma</td>
</tr>
<tr>
<td>DM</td>
<td>J.T Duane</td>
<td>1964</td>
<td></td>
</tr>
<tr>
<td>GM</td>
<td>Paul B. Moranda</td>
<td>1979</td>
<td>Binomial</td>
</tr>
<tr>
<td>LPM</td>
<td>Musa-Oكومoto</td>
<td>1984</td>
<td>Binomial</td>
</tr>
<tr>
<td>LVRG</td>
<td>A.Ghaly, P. Chan, &amp; B. Littlewood</td>
<td>1986</td>
<td>Gamma</td>
</tr>
</tbody>
</table>

There are numbers of software available which can mimic the process involved in your research work and can produce the possible result.

A. Exponential Failure Time Model (EFTM)
Exponential models comprise of all finite failure models. Poisson and Binomial are two categorization of EFTM the Binomial and Poisson types are based on per fault constant hazard rate. Hazards rate function is defined as the function of the remaining number of faults and the failure function is exponential. $H(Z) = f(RNF) + f(exp(FF))$ (1) Where, $H(Z) = $ Hazard rate.RNF=Renaming number of faults. FF= Failure Function.

- J-M Model (JMM): The failure time is proportional to the remaining faults and taken as an exponential distribution. During testing phase the number of failures at first is finite. Concurrent mitigation of errors is the main strength of the model and error does not affect the remaining errors. Error removal is all human behavior which is irregular so it cannot be avoid by introducing new errors during the process of error removal. ($MTBF = 1/(N-(i-1)) (2) Where, N= Total number of faults. i= Number of fault occurrences. $MTBF=Mean Time between failure. $t= Time between the occurrence of the (i-1)th and ith fault occurrences.

- G-O Model (GOM): G-O model takes the number of faults per unit time as independent random variables. In this model the number of faults occurred within the time and model estimates the failure time. Delivery of software within cost estimates is also decided by this model.

- Execution Time Model (ETM): Musa’s Basic model assumes that all faults are equally likely to occur and Independent of each other. The intensity function is directly proportional to the number of faults remaining in the program and fault correction is proportional to the number of failure occurrence rate. $\mu(t) = \beta0 \ (1-exp (- \beta1t)) \ (3) Where, \( \mu (t) = \text{mean value function at time t.} \ \beta0 = \text{Total number of faults.} \$

- Hyper Exponential Model (HEM): The idea behind this model is that the different parts of the software experience an exponential failure rate. However the rate varies through these parts to ponder different behaviors Different failure rate are placed in different sections $\chi(t)=N \sum \pi_i \beta_i (exp(\beta_i t)) \ (4) Where, (t)=Failure Intensity Function. \( t= \) number of failures. $N= \text{finite number of failures.}$Pi=particular ith class. $\beta_i=\text{total number of ith faults.}$

B. Weibull & Gamma Failure Models (WGFTM)
Models under this category follow per fault failure Gamma distribution instead of exponential distribution.

- Weibull Model (WM): The model is used for hardware reliability. The model incorporates both increasing/decreasing and failure rate due to high flexibility. This model is a finite failure model. $MTTF = \int (1-F (t)) \ dt = exp (-\beta t) \ (5) Where, \( MTTF = \text{Mean Time to Failure \ alpha, \ \beta \ Weibull distribution parameters.} \ (6) Where, (t)=\text{time of failure.}$

- S-Shaped Model (SSM): This model considers that the number of failure with in time period is a Poisson type model .In this model time between failures depends on the time to failure. Mitigation of fault occurs immediately as failure happened.$\mu (t)=\alpha(1-(1+\beta) \ e^{-\beta t}) \ (6) Where, \( \alpha,\beta=\text{Distribution parameters.} \ e^{-\beta t}=\text{Exponential distribution.}$

C. Infinite Failure Time Model (IFTM)
Software is not completely error free when mean value function of a particular model tends to infinity. Models come under the
category of Infinite Failure Time Model. Duane’s Model (DM): Duane observed that an erected line has been generated by comparing testing time with failure rate. Based on the observations of hardware reliability the same behavior has been observed for software & used for estimating software reliability.

\[(t)/T = (\alpha T^\beta)/T\] (7) Where, \(t\) = Mean value function at time \(t\). \(\alpha T^\beta\) = Expected number of failures by time \(t\). \(T\) = Total testing.

- Geometric Model (GM): The model is based on the version of J-M. The time between failures is an exponentially distributed and mean time failure decreased geometrically. \(E(Xi)=1/Z(ti)^{-1}\) (8) Where, \(E(Xi)\) = Expected time between failure\(=ti\) = Fault detection rate. Logarithmic Poisson (LM): The model assumes that code has an infinite number of failures. The model follows NHPP. When failure occur distribution decreases exponentially The possible number of failures over the time is a logarithmic function therefore it is called Logarithmic Poisson [19]. \(\chi(t) = \chi_0 \exp(-\mu(t))\) (9) Where, \(\mu(t)\) = Mean value function at time \(t\). \(\mu\) = failure rate decay parameter. \(\chi(t)\) = Failure intensity function.

D. Bayesian Models (BM): The models are used by several organizations like Motorola, Siemens & Philips for predicting reliability of software. BM incorporates past and current data. Prediction is done on the bases of number of faults that have been found & the amount of failure free operations.

L-V Reliability Growth Model: The model tries to account for fault generation in the fault correction process by allowing for the probability that the software program could become less reliable than before. For every correction of fault, a separate program has to write. Fault correction is obtained by fixing fault \(D(i) = \mu(1/ \chi(i))\) (10) Where, \(\chi(i)\) = Sequence of independent variable. \(D(i)\) = Distribution for the \(i^{th}\) failure.

III. CONCLUSION

Software is an steady contrivance that encompassed of computer programs, procedures, rules, data and related documentation. The surge in numeral of software fiascos greatly pretentious the recital of conveyance, telecommunication, military, engineering process, showbiz offices, aircrafts and business. Therefore software reliability has become more & more imperative. Reliability is the competence of software to maintain a determined level of recital within the time period. Software reliability is a measuring technique for flaws that causes software failures in which software deeds is different from the specified behavior in a defined environment with static time. On the basis of the review the taxonomy on software reliability models has been presented as a major contribution.

REFERENCES


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Simulation of Optimal Power Flow incorporating with Fuzzy Logic Control and various FACTS Devices

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Abstract- This paper presents a novel method for optimal location of FACTS controllers in a multi machine power system using Fuzzy Controlled Genetic Algorithm (FCGA). Using the proposed method, the location of FACTS controller, their type and rated values are optimized simultaneously. Among the various FACTS controllers, Thyristor Controlled Series Compensator (TCSC) and Unified power Flow Controller (UPFC) are considered. The proposed algorithm is an effective method for finding the optimal choice and location of FACTS controller and also in minimizing the overall system cost, which comprises of generation cost and investment cost of FACTS controller using Genetic Algorithm, Fuzzy Logic and conventional Newton Raphson’s power flow method.

Optimal Power Flow (OPF) is one of the most important processes in power system, which improves the performance of system by satisfying certain constraints. There are so many methods were used in the literature to solve the OPF problem. Furthermore, to solve the OPF problems, several heuristic algorithms such as evolutionary programming (EP), Tabu Search (TS), Hybrid Tabu Search and Simulated Annealing (TS/SA), Improved Tabu Search (ITS) and Improved Evolutionary Programming (IEP) have been already proposed. In this paper IEEE standard 14 & 30 bus systems taken as the reference bus systems to obtain the optimal solution. Here various FACTS devices (SVC, TCVR) were incorporated to obtain the feasible solution of OPF Problem. Simulation results shown that the obtained output is feasible and most accurate solution in the OPF solution. FACTS devices can direct the active and reactive power control and flexible to voltage-magnitude control simultaneously, because of their adaptability and fast control characteristics. With the aid of FACTS technology, namely Static Var Compensator (SVC), Thyristor Switched Capacitor Variable Reactor (TCVR) and Unified Power Flow Controller (UPFC) etc., the bus voltages, line impedances and phase angles in the power system can be controlled quickly and flexibly. In my paper IEEE standard 14 & 30 bus systems were taken for obtaining optimum solution.

Index Terms- OPF, EP, TS, SA, ITS, IEP, TCVR, FACTS controller, SVC, UPFC

I. INTRODUCTION

In present days with the deregulation of electricity market, the traditional practices of power system have been completely changed. Better utilization of the existing power system resources to increase capabilities by installing FACTS controllers with economic cost becomes essential. The parameters such as transmission line impedances, terminal voltages and voltage angle can be controlled by FACTS controllers in an efficient way. The benefits brought about FACTS include improvement of system dynamic behavior and enhancement of system reliability. However their main function is to control of power as ordered.

The objective of this thesis is to develop an algorithm to simultaneously find the real power allocation of generators and to choose the type and find the best location of FACTS controllers such that overall system cost which includes the generation cost of power plants and investment cost of FACTS are minimized using Genetic Algorithm and conventional Newton Raphson’s power flow analysis.

The possibility of operating power systems at the lower cost, while satisfying the given transmission and security constraints is one of the main current issues in elongating the transmission capacity through the use of FACTS devices. FACTS devices can direct the active and reactive power control and flexible to voltage-magnitude control simultaneously, because of their adaptability and fast control characteristics. With the aid of FACTS technology, namely Static Var Compensator (SVC), Static Synchronous Compensator (STATCOM), Static Synchronous Series Compensator (SSSC) and Unified Power Flow Controller (UPFC) etc., the bus voltages, line impedances and phase angles in the power system can be controlled quickly and flexibly.

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II. PROBLEM FORMULATION

A. Optimal Placement of FACTS Devices

The essential idea of the proposed multi type FACTS devices, UPFC and TCSC placement approaches is to determine a branch
which is most sensitive for the large list of single and multiple contingencies. This section will describe the definition and calculation of the contingency severity index CSI and the optimal placement procedure for the UPFC and TCSC.

B. The participation matrix U
This is an \( (m \times n) \) binary matrix, whose entries are “1” or “0” depending upon whether or not the corresponding branch is overloaded, where \( n \) is the total number of branches of interest, and \( m \) is the total number of single and multiple contingencies.

C. The ratio matrix W
This an \( (m \times n) \) matrix of normalized excess (overload) branch flows. It’s \((i, j)\)th element, \( w_{ij} \) is the normalized excess power flow (with respect to the base case flow) through branch “\( j \)" during contingency “\( i \)" and is given by

\[
W_{ij} = \frac{P_{ij,cont}}{P_{oj,Base}} - 1 \quad \text{(1)}
\]

where,

\( P_{ij,cont} \) - Power flow through branch “\( j \)" during Contingency “\( i \)".

\( P_{oj,Base} \) - Base case power flow through branch “\( j \)".

D. The Contingency probability array \( P \)
This is an \( (m \times 1) \) array of branch outage probabilities. The probability of branch outage is calculated based on the historical data about the faults occurring along that particular branch in a specified duration of time. It will have the following form:

\[
P_{mx1} = [p_1, p_2, p_3, \ldots, p_m]^T \quad \text{(2)}
\]

\( P \) - Probability of occurrence for contingency “\( i \)"

\( m \) - The number of contingencies.

Thus the CSI for branch “\( j \)" is defined as the sum of the sensitivities of branch “\( j \)" to all the considered single and multiple contingencies, and is expressed as

\[
CSI_j = \sum_{i=0}^{m} p_i u_{ij} w_{ij} \quad \text{(3)}
\]

where \( u_{ij} \) and \( w_{ij} \) are elements of matrices \( U \) and \( W \) respectively.

CSI values are calculated for every branch by using (3). Branches are then ranked according to their corresponding CSI values. A branch with high value of CSI will be more sensitive for security system margin. The branch with the largest CSI is considered as the best location for FACTS device.

III. OPTIMAL SETTINGS OF FACTS DEVICES

In this paper UPFC is modeled as combination of a TCSC in series with the line and SVC connected across the corresponding buses between which the line is connected. After fixing the location, to determine the best possible settings of FACTS devices for all possible single and multiple contingencies, the optimization problem will have to be solved using Fuzzy Controlled Genetic Algorithm technique.

The objective function for this work is,

Objective = minimize \( \{ \text{SOL and IC} \} \)

\[
SOL = \sum_{C=1}^{M} \sum_{k=1}^{n} a_k (P_k/P_{k,\text{max}})^4 \quad \text{......... (4)}
\]

where,

\( M \) - Number of single contingency considered

\( n \) - Number of lines

\( a_k \) - weight factor=1.

\( P_k \) - real power transfer on branch \( k \).

\( P_{k,\text{max}} \) - maximum real power transfer on branch \( k \).

\( IC \) - Installation cost of FACTS device

\( SOL \) - Represents the severity of overloading

\[
C_{\text{TCSC}} = 0.0003S^2 - 0.2691S + 188.22(\text{US$/\text{KVAR}}) \quad \text{(5)}
\]

\[
C_{\text{UPFC}} = 0.0005S^2 - 0.2915S + 153.75(\text{US$/\text{KVAR}}) \quad \text{(6)}
\]

where, \( S \) - Operating range of UPFC in MVAR

\( Q_1 \) - MVAR flow through the branch before placing FACTS device.

\( Q_2 \) - MVAR flow through branch after placing FACTS device.

The objective function is solved with the following constraints:

1. Voltage Stability Constraints
   VS includes voltage stability constraints in the objective function and is given by,

\[
VS = \begin{cases} 
0 & \text{if } 0.9 < v_b < 1.1 \\
0.9 - v_b & \text{if } v_b < 0.9 \\
v_b - 1.1 & \text{if } v_b > 1.1 
\end{cases} \quad \text{(7)}
\]

\( V_b \) - Voltage at bus \( B \)

2. FACTS Devices Constraints
   The FACTS device limit is given by,

\[
-0.5 X_l < X_{\text{TCSC}} < 0.5 X_l
\]

\[
-200 \text{ MVAR} \leq Q_{\text{SVC}} \leq 200 \text{ MVAR} \quad \text{......... (8)}
\]

Where,

\( X_l \) - original line reactance in per unit

\( X_{\text{TCSC}} \) - reactance added to the line where UPFC is placed in per unit

\( Q_{\text{SVC}} \) - reactive power injected at SVC placed bus in MVAR

3. Power Balance Constraints
   While solving the optimization problem, power balance equations are taken as equality constraints. The power balance equations are given by,

\[
\Sigma P_G = \Sigma P_D + P_L \quad \text{......... (9)}
\]

Where, \( \Sigma P_G \)– Total power generation

\( \Sigma P_D \)– Total power demand

\( P_L \) – Losses in the transmission network
The proposed method is explained briefly in the below sections. The load flow calculation is important to compute the power flow between the buses. In our method Newton raphson method is used for load flow calculation. Newton raphson method is commonly used technique for load flow calculation. The real and reactive power in each bus is computed using equation 1 & 2.

\[ P_i = \sum_{k=1}^{N} V_i^* V_k \left( G_{ik} \cos \theta_{ik} + B_{ik} \sin \theta_{ik} \right) \tag{1} \]

\[ Q_i = \sum_{k=1}^{N} V_i^* V_k \left( G_{ik} \sin \theta_{ik} - B_{ik} \cos \theta_{ik} \right) \tag{2} \]

where, \( N \) is the total number of buses, \( V_i \) and \( V_k \) are the voltage at \( i \) & \( k \) bus respectively, \( \theta_{ik} \) is the angle between \( i \) & \( k \) bus, \( G_{ik} \) and \( B_{ik} \) are the conductance and susceptance value respectively.

After computing the power flow between the lines, the amount of power to be generated for the corresponding load with low cost is identified using PSO. In our method, there are two stages of PSO and a neural network is used. Here, PSO is used for generating training dataset to train the neural network. In the first stage, the amount of power generated by each generator for a particular load is computed using PSO and in the second stage, the bus where the FACTS controller is to be connected is identified and using this data, the neural network is trained. From the output of neural network, the amount of power to be generated by each generator for the given load and the location of FACTS controller to be connected are obtained.

### IV. FUZZY CONTROLLER AND ITS OPERATION

The collection of rules is called a rule base. The rules are in the familiar if-then format, and formally the if-side is called the antecedent and the then-side is called the conclusion (more often, perhaps, the pair is called antecedent - consequent or premise - conclusion).

A preprocessor, the first block in the structure conditions the measurements before they enter the controller. The first block inside the controller is fuzzification, which converts each piece of input data to degrees of membership by lookup in one or several membership functions. The rules may use several variables both in the condition and exclusion of the rules. The controllers can therefore be applied to both multi-input-multi-output (MIMO) problems and single-input-single-output (SISO) problems.

### V. OPF WITH FACTS CONTROLLER USING SIMULATION

Optimal power flow is one of the important methods used to increase the power flow between the buses. OPF is not only to increase the power flow in the system, but also to generate power based on the requirement with low cost. The power flow between the buses can also be increased by connecting FACTS controller in suitable places. By considering the above problems, here a new method for OPF with FACTS controller using MATLAB simulation was proposed. Initially, the load flow between the buses is calculated using Newton raphson method and then the amount of power to be generated by each generator is computed using PSO. Finally, the FACTS controller is placed in a suitable location using PSO and Fuzzy Controller to increase the power flow between the buses. The process that takes place in the proposed method is explained briefly in the below sections.

### VI. LOAD FLOW CALCULATION

The load flow calculation is important to compute the power flow between the buses. In our method Newton raphson method is used for load flow calculation. Newton raphson method is commonly used technique for load flow calculation. The real and reactive power in each bus is computed using equation 1 & 2.

\[ P_i = \sum_{k=1}^{N} V_i^* V_k \left( G_{ik} \cos \theta_{ik} + B_{ik} \sin \theta_{ik} \right) \tag{1} \]

\[ Q_i = \sum_{k=1}^{N} V_i^* V_k \left( G_{ik} \sin \theta_{ik} - B_{ik} \cos \theta_{ik} \right) \tag{2} \]
IX. CONCLUSION & FUTURE SCOPE

In this paper, the proposed method was tested for IEEE 14 & 30 bus system and FACTS controller used in our method is SVC and TCVR. From the above results it is clear that our method has reduced the power losses as well as the total cost in the system. This method to be tested for IEEE 50 bus system also in future. Also various FACTS controllers like Static Var Compensator (SVC), Static Synchronous Compensator (STATCOM), Static Synchronous Series Compensator (SSSC)
and Unified Power Flow Controller (UPFC) etc., also to be incorporated likely.

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APPLICATIONS OF THE LAPLACE-MELLIN INTEGRAL TRANSFORM TO DIFFERENTIAL EQUATIONS

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Abstract- In this work, the Laplace-Mellin integral transforms is suited in the infinite region \([0,0; \infty, \infty]\. This work which is put forward to understand the properties and relations, theorems, derivatives and applications for the Laplace-Mellin Integral Transform in \([0,0]\) to \([\infty, \infty]\). To illustrate the advantages and use of this integral transforms, Laplace equation in cartesian form, the one dimensional wave equation and heat flow equations and Cauchy linear differential equation are solve by using this integral transform solved at the end. Solution of the differential equations are graphically represented by using Matlab.

Index Terms- Laplace transform, Mellin transform, Double Laplace transform, Integral transform


I. INTRODUCTION

The Laplace- Bi Lateral Laplace transform is used to find the Laplace - Mellin integral transform in the range \([0,0]\) to \([\infty, \infty]\), properties like Linear property, Scaling property, Power property, theorems like inversion theorem, convolution theorem, Parseval's theorem, shifting theorem. By using this integral transform we obtain the results of derivative w.r.t. \(x\) and we find the generalized result of \(n\)th derivative of the function \(f(x,y)\) w.r.t. \(x\). Using these derivatives we solve the Laplace equation in Cartesian form, one dimensional wave and heat flow equations. Its solution is represented by using tools of Matlab.

II. PRELIMINARY RESULTS

Relation of the Mellin Integral Transform with Laplace Transform

The Laplace transform of the function \(f(x)\) of \(x\) is denoted by \(L[f(x),r]\) and defined as

\[ L[f(x),r] = \int_0^\infty e^{-rx} f(x) dx, \]

whenever this integral is exists for \(r>0\) is the parameter.

The inverse of the Laplace transform is denoted by \(L^{-1}[f(x),r]\) and defined as

\[ L^{-1}[f(x),r] = \frac{1}{2\pi i} \int_{c-i\infty}^{c+i\infty} e^{rx} L[f(x),r] dr \]

whenever this integral is exists for \(s>0\) parameter.

The Mellin integral transform of the function of \(f(y)\) of \(y\) is denoted by \(M[f(y),s]\) and is defined as

\[ M[f(y),s] = \int_0^\infty y^{-s-1} f(y) dy \]

whenever this integral is exists for \(s>0\) parameter.

The inversion of the Mellin integral transform is denoted by \(M^{-1}[f(y),r] = f(y)\) and defined as
The Laplace-Bi Lateral Laplace transform is denoted by \( L_2[f(x,z),s,r] \) and defined as

\[
L_2[f(x,z),s,r] = \int_0^\infty \int_0^\infty e^{-(sx+rz)} f(x,z) dx dz
\]

whenever this double integral is exists for \( r > 0 \) and \( s > 0 \) are parameters.

Substitute \( z = -\log(y) \) then \( y = e^{-z} \), \( dz = -e^{-z} dy \), if \( z = -\infty \) then \( y = \infty \) and if \( z = \infty \) then \( y = 0 \).

\[
L_2[f(x,z),s,r] = \int_0^\infty \int_0^\infty e^{-sx} e^{-rz} f(x,z) dx dz
\]

A very important property is that the Laplace-Mellin Integral Transform is a linear operation theorem; that is for the functions \( f(x,y) \) and \( g(x,y) \) whose Laplace-Mellin Integral Transforms exist and \( \alpha \) are \( \beta \) constants, then consider the equation

\[
Lm[f(x,y),s,p] = \int_0^\infty \int_0^\infty f(x,y) e^{-sx} y^{-p-1} dx dy
\]

\[
Lm[\alpha f(x,y) + \beta g(x,y),s,p] = \alpha Lm[f(x,y),s,p] + \beta Lm[g(x,y),s,p]
\]

(2)

**B. Scaling Property**

Second very important property is that the Laplace-Mellin Integral Transform is Scaling Property: that is for the functions \( f(x,y) \), whose Laplace-Mellin integral transform exists, then consider the equation

\[
Lm[f(cx,dy),s,p] = p^c Lm[f(q,r),s,p]
\]

(3)

**C. Power Property**

Third very important property is that the Laplace-Mellin Integral Transform is Power Property: that is for the functions \( f(x,y) \), whose Laplace-Mellin integral transforms exist, then consider the equation

\[
Lm[f(x,y)^r,s,p] = r Lm[f(x,t),s,p/r]
\]

(4)

**IV. MAIN RESULTS**

A. Inversion Theorem

The Laplace-Mellin Integral Transform is

\[
Lm[f(x,y),s,p] = \int_0^\infty \int_0^\infty f(x,y) e^{-sx} y^{-p-1} dx dy
\]

\[
Lm[f(x,y),s,p] = \int_0^\infty \int_0^\infty f(x,y) e^{-sx} y^{-p-1} dx dy
\]

where \( 0 < x < \infty \) and \( 0 \leq y \leq a \) and \( s > 0 , p > 0 \).

III. PRELIMINARY PROPERTIES

A. Linear Property
\[
\begin{align*}
Lm[f(x, y), s, p] &= \int_0^\infty \int_0^\infty f(x, y)e^{-sx}y^{-1}dxdy, \\
Lm[f^*(x, y), s, p] &= \int_0^\infty \int_0^\infty f^*(x, y)e^{-sx}y^{-1}dxdy.
\end{align*}
\]

C. Parseval’s Theorem (Orthogonality)
The Laplace-Mellin Integral Transform is

\[
\begin{align*}
Lm[f(x, y), s, p] &= \int_0^\infty \int_0^\infty f(x, y)e^{-sx}y^{-1}dxdy, \\
Lm[g(x, y), s, p] &= \int_0^\infty \int_0^\infty g(x, y)e^{-sx}y^{-1}dxdy, \\
Lm[f(x, y)g(x, y), s, p] &= \int_0^\infty \int_0^\infty f(x, y)e^{-sx}y^{-1}dxdy \int_0^\infty \int_0^\infty g(x, y)e^{-sx}y^{-1}dxdy.
\end{align*}
\]

D. Shifting Theorems
The Laplace-Mellin Integral Transform is

\[
\begin{align*}
Lm[f(x, y), s, p] &= \int_0^\infty \int_0^\infty f(x, y)e^{-sx}y^{-1}dxdy, \\
Lm[e^{sx}f(x, y), s, p] &= \int_0^\infty \int_0^\infty f(x, y)e^{sx}e^{-sx}y^{-1}dxdy.
\end{align*}
\]

V. LAPLACE–MELLIN INTEGRAL TRANSFORM OF DERIVATIVES

Theorem: Suppose that \( f(x, y) \) is continuous for all \( t \geq 0 \) and \( z \geq 0 \), satisfying for some value \( \gamma, \eta \) and \( m \) and has a derivative \( f_1(x, y) \) which is piecewise continuous on every finite interval in the range of \( t \geq 0 \) and \( z \geq 0 \). Then by using the Laplace-Mellin integral transforms, the derivative of \( f(x, y) \) exists when \( s > \gamma \) and \( p > \eta \) and

\[
|f(x, y)| \leq m e^{\gamma x} \quad \text{for all} \quad x \geq 0 \quad \text{and} \quad y \geq 0 \quad \text{for some constants}
\]

A. Laplace-Mellin Integral Transform of first order partial derivative of \( f(t) \) w.r.t. \( x \)
The Laplace-Mellin transformation is

\[
\begin{align*}
Lm[f(x, y), s, p] &= \int_0^\infty \int_0^\infty f(x, y)e^{-sx}y^{-1}dxdy, \\
Lm[f_1(x, y), s, p] &= \int_0^\infty \int_0^\infty f_1(x, y)e^{-sx}y^{-1}dxdy.
\end{align*}
\]

B. Laplace-Mellin integral transforms of \( n \)th order partial derivative of \( f(x, y) \) w.r.t. \( x \)
The Laplace-Mellin Integral Transform of first order partial derivative of \( f(x, y) \) w.r.t. \( x \)

\[
\begin{align*}
Lm[f(x, y), s, p] &= \int_0^\infty \int_0^\infty f(x, y)e^{-sx}y^{-1}dxdy, \\
Lm[f_1(x, y), s, p] &= \int_0^\infty \int_0^\infty f_1(x, y)e^{-sx}y^{-1}dxdy.
\end{align*}
\]
\[
\begin{align*}
\int_0^{\infty} \int_0^{\infty} f_{xx}(x,y) e^{-sx} y^{-1} \, dx \, dy &= \int_0^{\infty} \int_0^{\infty} f_{xx}(x,y) e^{-sx} y^{-1} \, dx \, dy, \\
\int_0^{\infty} \int_0^{\infty} f_{xx}(x,y) e^{-sx} y^{-1} \, dx \, dy &= \int_0^{\infty} \int_0^{\infty} f_{xx}(x,y) e^{-sx} y^{-1} \, dx \, dy.
\end{align*}
\]

This is the generalized result of the Laplace-Mellin Integral Transform of the \(n\)th derivative of \(f(x,y)\).

VI. APPLICATIONS TO LIMIT

A. One dimensional wave equation is solved by using Laplace-Mellin Integral Transform.

The one dimensional wave equation is

\[
\frac{\partial^2 f}{\partial x^2} = c^2 \frac{\partial^2 f}{\partial y^2}
\]

that is

\[
f_{xx}(t,z) = c^2 f_{yy}(t,z)
\]

where

\[
c^2 = \frac{1}{\rho}
\]

The Laplace-Mellin Integral Transformation is

\[
\begin{align*}
\int_0^{\infty} \int_0^{\infty} f(x,y) e^{-sx} y^{-1} \, dx \, dy &= s \int_0^{\infty} f(x,y) e^{-sx} y^{-1} \, dx \, dy, \\
\int_0^{\infty} \int_0^{\infty} f(x,y) e^{-sx} y^{-1} \, dx \, dy &= s \int_0^{\infty} f(x,y) e^{-sx} y^{-1} \, dx \, dy.
\end{align*}
\]

w. r. t. \(x\) and \(y\)-constant.

The one dimensional wave equation is

\[
\int_0^{\infty} \int_0^{\infty} f_{xx}(x,y) e^{-sx} y^{-1} \, dx \, dy = \int_0^{\infty} \int_0^{\infty} f_{xx}(x,y) e^{-sx} y^{-1} \, dx \, dy.
\]

This is the generalized result of the Laplace-Mellin Integral Transform of the \(n\)th derivative of \(f(x,y)\).
\[ \int_0^\infty y^{p-1} f_y(0,y) dy \]

where \( k = \int_0^\infty y^{p-1} f(0,y) dy \)

1. Example

To illustrate the use of the Laplace-Mellin integral transform in solving the certain partial differential equation. We propose to find the solution

\[ \frac{\partial^2 f}{\partial x^2} = c^2 \frac{\partial^2 f}{\partial y^2} \]

satisfying the boundary conditions, the initial and boundary conditions are

(1) If \( y=0 \) then \( f(x,0)=0 \), (2) If \( y=a \) then \( f(x,a)=0 \).

The solution of the one-dimensional wave equation

is

\[ Lm[f(x,y),s,p] = CS = C_1 e^{\frac{x}{c}} + C_2 e^{\frac{a-x}{c}} \]

If \( y=0 \) then \( f(x,0)=0=\frac{k}{s} \), then

\[ C_1 + C_2 = \frac{k}{s} \]

\[ C_1 e^{\frac{s}{c}} + C_2 e^{\frac{s-a}{c}} = \frac{k}{s} \]

We get

\[ \frac{-k}{s} \left( 1 - \left( 1 + e^{\frac{s}{c}} \right)^{-1} \right) \]

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2. Example

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satisfying the boundary conditions, the initial and boundary conditions are

(1) If \( y=0 \) then \( f(x,0)=0 \), (2) If \( y=a \) then \( f(x,a)=0 \).

The solution of the one-dimensional wave equation

is

\[ Lm[f(x,y),s,p] = CS = C_1 e^{\frac{x}{c}} + C_2 e^{\frac{a-x}{c}} \]

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satisfying the boundary conditions, the initial and boundary conditions are

(1) If \( y=0 \) then \( f(x,0)=0 \), (2) If \( y=a \) then \( f(x,a)=0 \).

The solution of the one-dimensional wave equation

is

\[ Lm[f(x,y),s,p] = CS = C_1 e^{\frac{x}{c}} + C_2 e^{\frac{a-x}{c}} \]

If \( y=0 \) then \( f(x,0)=0=\frac{k}{s} \), then

\[ C_1 + C_2 = \frac{k}{s} \]

\[ C_1 e^{\frac{s}{c}} + C_2 e^{\frac{s-a}{c}} = \frac{k}{s} \]

We get

\[ \frac{-k}{s} \left( 1 - \left( 1 + e^{\frac{s}{c}} \right)^{-1} \right) \]
where 

\[ k = \int_{0}^{\infty} y^{p-1} f(0, y) dy \]

**Graphical Representation**

One Dimensional Wave Equation

![Graphical Representation](image)

**B. Laplace equation in Cartesian form is solved by using Laplace-Mellin integral transform.**

The one dimensional wave equation is

\[ \frac{\partial^2 f}{\partial x^2} + \frac{\partial^2 f}{\partial y^2} = 0 \]

The Laplace-Mellin Integral Transformation is

\[ \mathbb{L}[f(x,y),s,p] = \int_{0}^{\infty} \int_{0}^{\infty} f(x,y) e^{-sx} y^{p-1} \, dx \, dy \]

Let

\[ \mathbb{L}[f_x(x,y),s,p] = s \mathbb{L}[f(x,y),s,p] + k \]

\[ \mathbb{L}[f_{yy}(x,y),s,p] = s^2 \mathbb{L}[f(x,y),s,p] + sk \]

\[ \int_{0}^{\infty} y^{p-1} f(0,y) dy \]

Where 

\[ k = 0 \]

\[ \mathbb{L}[f_{xx}(x,y),s,p] = 0 \]

\[ s^2 \mathbb{L}[f(x,y),s,p] + sk + D^2 y \mathbb{L}[f(x,y),s,p] = 0 \]

where 

\[ D^2 y \mathbb{L}[f(x,y),s,p] = 0 \]

This is the ordinary differential equation of second order in \( y \)

Its roots are 

\[ m_1 = is \quad \text{and} \quad m_2 = -is \]

Its Complementary Function=O.F.= \[ C_1 \cos(sy) + C_2 \sin(sy) \]

and

\[ \text{Particular Integral}=P.I.= - \frac{k}{s}, \text{the the Complete Solution is} \]

\[ \mathbb{L}[f(x,y),s,p] = C_1 \cos(sy) + C_2 \sin(sy) - \frac{k}{s} \] (19)

**2. Example**

To illustrate the use of the Laplace-Mellin integral transform in solving the certain partial differential equation. We propose to find the solution

\[ f(x,y) \] of \[ \frac{\partial^2 f}{\partial x^2} + \frac{\partial^2 f}{\partial y^2} = 0 \], satisfying the boundary conditions

1. If \( y=0 \) then \( f(x,0)=0 \)
2. If \( y=a \) then \( f'(x,a)=0 \)

Ans.

The solution of the partial equation \[ \frac{\partial^2 f}{\partial x^2} + \frac{\partial^2 f}{\partial y^2} = 0 \] is given by

\[ \mathbb{L}[f(x,y),s,p] = C_1 \cos(sy) + C_2 \sin(sy) - \frac{k}{s} \]

(1) If \( y=0 \) then \( f(x,0)=0 \)
(2) If \( y=a \) then \( f'(x,a)=0 \)

The required solution is

\[ Lm[f(x,y),s,p] = \frac{k}{s} \cos(sy) + \frac{k}{s} \cosec(as) - \frac{k}{s} \cot(as) \]

(20)
where \( k = \int_0^\infty y^{p-1} f(0, y)dy \)

### Graphical Representation

#### Laplace Equation

<table>
<thead>
<tr>
<th>y-axis</th>
<th>s-axis</th>
</tr>
</thead>
<tbody>
<tr>
<td>50</td>
<td>0.2</td>
</tr>
<tr>
<td>0</td>
<td>0.4</td>
</tr>
<tr>
<td>-50</td>
<td>0.6</td>
</tr>
<tr>
<td>-100</td>
<td>0.8</td>
</tr>
<tr>
<td>0</td>
<td>1</td>
</tr>
</tbody>
</table>

#### 6.3.6.3 One dimensional Heat Slow Equation is solved by using Laplace-Mellin Integral transform.

The one dimensional equation is

\[
\frac{\partial^2 f}{\partial x^2} = c^2 \frac{\partial^2 f}{\partial y^2}, \quad c^2 = \frac{1}{\rho s}
\]

The Laplace-Mellin Integral Transformation is

\[
\text{Lm}[f(x,y),s,p]= \int_0^\infty \int_0^\infty f(x,y)e^{-sx}y^{p-1}dxdy
\]

then

\[
\text{Lm}[f_x(x,y),s,p] = s\text{Lm}[f(x,y),s,p]
\]

\[
\text{Lm}[f_{xy}(x,y),s,p]
\]

\[
= s^2 \text{Lm}[f(x,y),s,p] + sk
\]

where \( k = 0 \)

\[
\text{Lm}[f_x(x,y),s,p] = \text{Lm}[c^2 f_y(x,y),s,p]
\]

\[
S\text{Lm}[f(x,y),s,p] = k c^2 D_x^2 \text{Lm}[f(x,y),s,p]
\]

\[
s\text{Lm}[f_y(x,y),s,p] = k
\]

\[
(D_y^2 - \frac{s}{c^2})\text{Lm}[f(x,y),s,p] = \frac{k}{c^2}
\]

This is the ordinary differential equation in \( y \)

\[
\text{C.F.} = C_1 e^\frac{\sqrt{s}}{c} + C_2 e^\frac{-\sqrt{s}}{c}
\]

### Graphical Representation

3. Example

To illustrate the use of the Laplace-Mellin Integral Transform in solving the certain partial differential equation

\[
\frac{\partial^2 f}{\partial x^2} = c^2 \frac{\partial^2 f}{\partial y^2}
\]

We propose to find the solution satisfying the boundary conditions

Its solution is

\[
\text{Lm}[f(x,y),s,p] = C_1 e^\frac{\sqrt{s}}{c} + C_2 e^\frac{-\sqrt{s}}{c} + \frac{k}{s}
\]

(1) If \( y = 0 \) then \( f(x,0)=0 \), (2) If \( y = a \) then \( f'(x,a)=0 \).

Answer.

(1) If \( y = 0 \) then \( f(x,0)=0 = C_1 + C_2 \cdot \frac{k}{s} \)

(2) and if \( y = a \) then \( f(x,a)=0 = C_1 e^{\frac{\sqrt{s}}{c}} + C_2 e^{-\frac{\sqrt{s}}{c}} + \frac{k}{s} \)

\[
\frac{k}{s}((1 + e^{\frac{\sqrt{s}}{c}})^{-1} - 1)
\]

\[
\frac{k}{s}((1 + e^{-\frac{\sqrt{s}}{c}})^{-1} - 1)
\]

\[
C_1 = \frac{k}{s}((1 + e^{\frac{\sqrt{s}}{c}})^{-1} - 1)
\]

\[
C_2 = \frac{k}{s}((1 + e^{-\frac{\sqrt{s}}{c}})^{-1} - 1)
\]

Graphical Representation
VII. REMARKS

By using Laplace – Mellin integral transform, solution of the Laplace equation in Cartesian form, one dimensional wave equation and Heat Flow equations are solved and its solutions are represented graphically by using tools of Matlab.

VIII. CONCLUSION

Representation of solutions of the differential equations by using tools of Matlab is the idea is given in this paper.

REFERENCES

Enhanced File Searching in Peer-2-Peer Network

Miss Priyanka Sahu, Mr. Brajesh Patel

Computer Science Department
School Shri Ram Institute of Technology, Jabalpur (M.P.).

Abstract- Each participant in the Peer-to-Peer concept is treated equally. Each peer is different from each other in respect of bandwidth, CPU power, and storage capacity. A variety of approaches have been adopted to use the high band width of powerful nodes to fully initialize to increase the system capacity. Over here, our suggestion is to improve the search efficiency of Peer-to-Peer network using the query answering heterogeneity. In differentiated Search algorithm proposed over here, the peers that have high query answering capability shall get the highest priority to be queried. Because the query answering capacity is extremely unbalanced among the peers, just by querying a small portion of a network can give a high query success rate. Due to the shrunken search space the search traffic shall further be reduced. For example, the investigation has been carried on the random walk or DHT can still be applied in the important peer overlay to further reduce the search traffic. Here we analyze and implement flooding search, proposed differentiated algorithm, with random walk techniques and compare these algorithm and finally show that more than 80 percent can be saved with the algorithm.

Index Terms- Peer to Peer network, Differentiated Search algorithm, Bandwidth, Storage Capacity.

I. INTRODUCTION

The fully distributed design of Peer-to-Peer network makes them fault-tolerant file sharing system which load balances the file storage and transfer, and because of this they are in boom in today’s network community. The search approach is flooding due to the unstructured Peer-to-Peer network increment. Many approaches have been proposed to replace or optimize the flooding search mechanism. By tight blending of the data the flooding search can be avoided in structured Peer-to-Peer networks; such as KaZaA tries reducing the flooding traffic by limiting the search scope within a small area of supernodes. In case of KaZaA, since the indices of leaf nodes are uploaded into supernodes that are why a good exposure of the entire network is done by passing a query to only some supernodes. We recommend over here Differentiated search algorithm, to improve the search efficiency of unstructured Peer-to-Peer networks, by giving superior querying precedence to peers with high querying reply capabilities.

Without alternating to index operations, this algorithm shall improve the search efficiency. This algorithm is enhanced with implementing random walk on differentiated search further reduce the search space.

II. DIFFERENTIATED SEARCH ALGORITHMS

The shared files already visited before are counted on so that important peers become self-aware. As long as the amount of shared effective files searches the threshold, a peer can advance itself as an important peer. Those peers shall form an important peer superimpose and shall possess higher priority to be queried by using Differentiated Search algorithm. Most important thing over here is to find the important peers and to powerfully connect them into an overlay. The motive behind our topology creation algorithm is a) At least one important peer as a neighbor exist in each leaf node and b) the important peer overlay is a connected graph.

A. Discovering important peers

For the first aim, an important peer as a neighbor has to be found among the peers that are isolated from important peers. For this there are two approaches. The first is a passive approach in which “important peer search” message is sent out to isolated peer, which is responded by flooding of the IP addresses of the important peers. In the second active approach important peers periodically publicize themselves to the Peer-to-Peer network and isolated peers discover them by overhearing the publicizing messages. First approach leads to incredible overhead because, all the isolated peers will be overwhelmed by the response messages sent back from thousands of important peers. In the second approach, the periodically publicized messages will also cause overhead, and the peer being publicized may be overwhelmed by the connection request from a large number of isolated peers, which will result in some heavily overloaded important peers.

B. The overlay of important peer

The first round of the algorithm forms a connected topology of all the peers in the important peer overlay. Crucial step is to find all the separated clusters which consist of important peers and interconnect them. To avoid many overhead caused by the cluster detection cautious design is necessary in case of a fully decentralized environment. All the alienated clusters can be found by flooding the cluster detection message to the entire Peer-to-Peer network. Lack of synchronization mechanism may cause flooding by multiple peers. Moreover periodic flooding of the cluster detection messages must be done because the connected overlay will be disjointed by the dynamic movement of the Peer-to-Peer network to reduce the overhead of the cluster recognition; same design principles will be needed as finding important peers. In our paper, the cluster design data gets a ride to Differentiated Search query messages.

C. The Fully Distributed Operations

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Over here, the above operations, which includes discovery of important peers, formation of overlay of important peer, and two-tier hierarchy structure maintenance, can be implemented in a fully distributed fashion.

In design above, each individual peer behaves as a Gnutella client, where it performs some basic functions of query and query response and above all the various operations of evolving and maintaining the two-tier hierarchy structure are hitch-hike to the query or response messages.

Peer’s query operation state transition is illustrated in Figure 1. The moment the peer initiates a query, first round query will be sent to the important peer overlay. If it fails, the second round query search is send to the entire network. After query replies are received from the second round search, an important peer is picked from the peers from the reply messages and request is send for a new connection from important peer. If global information is not there, then the querying peer completes the whole operations locally. Formation and maintenance of the two-tier hierarchical structure is done by the search operations when all of the peers who participate perform the two round query round searches.

III. THE RANDOM WALK ON THE IMPORTANT PEER OVERLAY

We recommend random walk to evade the exponentially increasing flooding traffic by choosing several searching paths among peers. When random walk combined the replication technique it can achieve a high search success rate, i.e., replication of the files in the network is necessary to increase the possibility to be found by the random walk search. Differentiated Search and the random walk are different from each other; in prior grouping of the peers with high query answering capabilities is done and then query is done to these peers before searching the entire network; and then random walk is applied on the important peer overlay to further reduce the search traffic. Another alternative way is the random walk for locating resources in Peer-to-Peer networks. The querying node that is locating a resource sends k queries for random neighbors selection. All these k queries are referred as random walker. Every random walk has a time to live (TTL) field which is initiated with T > 0 that is limited to the number of times the random walker is forwarded. Then a check is performed for the left resources when the intermediate node receives the random walker. If no resource is there with intermediate node, the TTL field is checked, and if T > 0, T is decremented by 1, the query is forwarded to a randomly chosen neighbor, else if T = 0 the query is not forwarded. Alternatively, if the resource is having the intermediate node, the query is not forwarded and reply is sent to the querying node.

IV. THE PERFORMANCE OF SEARCHING SCHEME

We shall study the performance of searching using Differentiated search, flooding and random walks on important peer overlay, and comparison is done in the three methods. The performance is determined in terms of the average number of distinct copies of an item located in the search, the probability of not finding any copy of the item, even though there are copies in the network, and the amount of messages that the searching algorithm uses.

Our experiment focuses that random walk on important peer overlay is better than flooding and differentiated search.

V. IMPLEMENTATION AND RESULTS

In Peer-to-Peer network differentiated search algorithm is used, to calculate the traffic of every peer, selection of important peer, Network bandwidth, CPU computing power, storage capacity and the query success rate.

A. Traffic Comparison of the Differentiated Search Algorithm

Figure 2 shows the traffic comparison of the Differentiated search algorithm. In flooding, volume of traffic is increasing, while in differentiated search, volume of traffic is decreasing. In Differentiated search with indices uploading method, traffic volume is further decreasing.

B. Selection of Important Peer
The peers sharing and containing more than 2000 files, are called Important peers, while peers which shared and contain less than 2000 files, are called the leaf node.

C. Heterogeneity By CPU Computing Power In Peer-to-Peer Network

CPU computing power varies in each peer. Maximum CPU power of the peer is 3.5 MHz. Minimum CPU power of the peer is 0.5 MHz.

D. Heterogeneity By Network Bandwidth In Peer-to-Peer Network

Network bandwidth varies in each peer. Maximum bandwidth of the peer is 125mbps. Minimum bandwidth of the peer is 25 mbps.

E. Heterogeneity By Storage Capacity In Peer-to-Peer Network

It shows the storage capacity and free space available of each peer in Peer-to-Peer network.

F. Query Success Rate In Existing System

Fig 5 is show the query success rate. Query success rate is increasing at the starting state. While the query process is going on, query success rate is decreasing. The net query success rate is 10%.

G. Query Success Rate In Proposed System

Figure 6 shows the query success rate. Query success rate is increasing and is constant at higher level. The net query success rate is 90%. It improves the effectiveness and efficiency of the query process. The search space of the Peer-to-Peer network shrinks.

VI. CONCLUSION

In proposed Differentiated search algorithm, a fully distributed approach which advances to a two-tier hierarchical structure from Peer-to-Peer network is expressed. Differentiated search algorithm achieves better performance with a small overhead on topology maintenance and index operations, by getting the topology messages and prompting content-rich peers to the important peer overlay. The Differentiated search algorithm is matching to many existing Peer-to-Peer optimization algorithms. For example, too reduce the traffic further; random walk can be applied in the important peer overlay. Differentiated search with Random walk progresses the 80 percent of the search traffic, increasing the efficiency and effectiveness of the query process at the same time.

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Use of RFID for Safety at School/Hospital Campus

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Abstract- With growth of technology and giant leap in the field of Radio frequency transmission, a requirement for the safety and campus security using RFID is desired. The main purpose of the campus security system is to make the campus secured in every way that is need to be done and also maintaining the discipline in the school/hospital campus. Authentication of the person entering the campus is done automatically with help of RFID system.

I. INTRODUCTION

We have seen the security personnel checking the employees’ identification cards at the entrances to avoid illegal entry. The employees sign a register at the entrance before getting in. This is still being practiced in most of the companies. However, the disadvantages are that, when there is a necessity of providing control at many locations inside the company, a person at each point will not be an economical way of implementing it. Then came were the punch cards. Employees possess cards, which are punched when they enter into the building. But it had disadvantages. Workers started to practice buddy punching, for their co-workers. It is a much common sight to see a bar code reader in the companies. These are used to check with the employee’s identification. The employees swipe the card in the provided slot. Then the access is given after checking the authenticity of the card. This was a substitute to the security and emerged as a new technique in access control. This acted as a starting to the automation of the access control. But, the bar code readers are contact readers where, the cards are required to touch the readers. With growth of technology and giant leap in the field of Radio frequency transmission, a requirement for the same application using RFID is desired. The term RFID (radio frequency identification) describes the use of radio frequency signals to provide automatic identification of items. RFID is a flexible technology that is convenient, easy to use, and well suited for automatic operation. It combines advantages not available with other identification technologies. RFID can be supplied as read-only or read/write, does not require contact or line-of-sight to operate, can function under a variety of environmental conditions, and provides a high level of data integrity. In addition, because the technology is difficult to counterfeit, RFID provides a high level of security. RFID is similar in concept to bar coding. Bar code systems use a reader and coded labels that are attached to an item, whereas RFID uses a reader and special RFID devices that are attached to an item. Bar code uses optical signals to transfer information from the label to the reader; RFID uses RF signals to transfer information from the RFID device to the reader.

Radio waves transfer data between an item to which an RFID device is attached and an RFID reader. The device can contain data about the item such as what the item is, what time the device traveled through a certain zone, perhaps even a parameter such as temperature. RFID devices, such as a tag or label, can be attached to virtually anything – from a vehicle to a pallet of merchandise.

II. RFID MODULE FOR SCHOOL/HOSPITAL CAMPUS

An RFID system typically includes the following components:
• An RFID device (transponder or tag) that contains data about an item
• An antenna used to transmit the RF signals between the reader and the RFID device
• An RF transceiver that generates the RF signals
• A reader that receives RF transmissions from an RFID device and passes the data to a host system for processing

If anyone has entered in campus then its identity is automatically recorded by RFID reader placed near main gate. Also identity and mobility in campus of each person in campus will be monitored and recorded by no. of RFID readers placed in campus and a central database station.

Every person has its permanent Tag attached to it which will be stored with the some details such as person name, mobile number, address and the gate at the campus will have the reader attached to it. When a person enters in the campus there is communication between reader and the tag which are at same frequencies, reader reads the information and feed it to the host computer.

A. Working of RFID tags
The RFID tags based on the mode of operation are classified as Active and Passive tags. The classification is done based on the tags’ ability to transmit the code embedded in it. Hence an active tag is capable of transmitting to a reader independently, whereas the passive tag needs an external excitation to transmit the code. The reader usually provides the excitation. Further, each of the tags either active or passive has its own frequency of operation. We have used the active type of tag operating at a frequency of 2.4GHz in this application.

### B. Tag Classes

One of the main ways of categorizing RFID tags is by their capability to read and write data. This leads to the following 4 classes. EPC global has also defined five classes

**CLASS 0 – READ ONLY. – Factory programmed**

These are the simplest type of tags, where the data, which is usually a simple ID number, (EPC) is written only once into the tag during manufacture. The memory is then disabled from any further updates. Class 0 is also used to define a category of tags called EAS (electronic article surveillance) or anti-theft devices, which have no ID, and only announce their presence when passing through an antenna field.

**CLASS 1 – WRITE ONCE READ ONLY (WORM) – Factory or User programmed**

In this case the tag is manufactured with no data written into the memory. Data can then either be written by the tag manufacturer or by the user – one time. Following this no further writes are allowed and the tag can only be read. Tags of this type usually act as simple Identifiers.

**CLASS 2 – READ WRITE**

This is the most flexible type of tag, where users have access to read and write data into the tags memory. They are typically used as data loggers, and therefore contain more memory space than what is needed for just a simple ID number.

**CLASS 3 – READ WRITE – with on board sensors**

These tags contain on-board sensors for recording parameters like temperature, pressure, and motion, which can be recorded by writing into the tags memory. As sensor readings must be taken in the absence of a reader, the tags are either semi-passive or active.

**CLASS 4 – READ WRITE – with integrated transmitters.**

These are like miniature radio devices that can communicate with other tags and devices without the presence of a reader. This means that they are completely active with their own battery power source.

### C. How tags communicate

**Near and Far fields**

In order to receive energy and communicate with a reader, passive tags use one of the two following methods. These are near field, which employs inductive coupling of the tag to the magnetic field circulating around the reader antenna (like a transformer), and far field, which use similar techniques to radar (backscatter reflection) by coupling with the electric field. The near field is generally used by RFID systems operating in the LF and HF frequency bands, and the far fields for longer read range UHF and microwave RFID systems.

In terms of computational power, RFID tags are quite dumb, containing only basic logic and state machines capable of decoding simple instructions. This does not mean that they are simple to design! In fact very real challenges exist such as, achieving very low power consumption, managing noisy RF signals and keeping within strict emission regulations. Other important circuits allow the chip to transfer power from the reader signal field, and convert it via a rectifier into a supply voltage. The chip clock is also normally extracted from the reader signal. Most RFID tags contain a certain amount of NVM (Non volatile Memory) like EEPROM in order to store data.

### D. LF, HF Tags

Tags at these frequencies use inductive coupling between two coils (reader antenna and tag antenna) in order to supply energy to the tag and send information. The coils themselves are actually tuned LC circuits, which when set to the right frequency (ex; 13.56 MHz), will maximize the energy transfer from reader to tag. The higher the frequency the less turns required (13.56 MHz typically uses 3 to 5 turns). Communication from reader to tag occurs by the reader modulating (changing) its field amplitude in accordance with the digital information to be transmitted (base band signal). The result is the well-known technique called Amplitude modulation (AM). The tags receiver circuit is able to detect the modulated field, and decode the original information from it. However, whilst the reader has the power to transmit and modulate its field, a passive tag does not. How communication is therefore achieved back from tag to reader?

The answer lies in the inductive coupling. Just as in a transformer when the secondary coil (tag antenna) changes the load and the result is seen in the Primary (reader antenna). The tag chip accomplishes this same effect by changing its antenna impedance via an internal circuit, which is modulated at the same frequency as the reader signal. In fact it’s a little more complicated than this because, if the information is contained in the same frequency as the reader, then it will be swamped by it, and not easily detected due to the weak coupling between the reader and tag. To solve this problem, the real information is often instead modulated in the side bands of a higher sub-carrier frequency, which is more easily detected by the reader.
E. Anti-collision

If many tags are present then they will all reply at the same time, which at the reader end is seen as a signal collision and an indication of multiple tags. The reader manages this problem by using an anti-collision algorithm designed to allow tags to be sorted and individually selected. There are many different types of algorithms (Binary Tree, Aloha...), which are defined as part of the protocol standards. The number of tags that can be identified depends on the frequency and protocol used, and can typically range from 50 tags/s for HF and up to 200 tags/s for UHF.

Once a tag is selected, the reader is able to perform a number of operations such as read the tags identifier number, or in the case of a read/write tag write information to it. After finishing dialoging with the tag, the reader can then either remove it from the list, or put it on standby until a later time. This process continues under control of the anti collision algorithm until all tags have been selected.

III. RESULT

This system delivers the flexibility, scalability, and responsiveness that today's organizations need. It provides accurate, up-to-minute information, high-speed communication, and powerful analysis features required to make better decisions faster. The major potential comes from the much acclaimed no line of sight and simultaneous reading properties of RFID.

It is now widely recognized that real-time information will revolutionize the control and logistical organization with significant safety of campus. So we came up with many challenges to make the campus security with the help of RFID system. With the concept of on stationary transceiver kept in campus at main gate and when the person enters in the campus the stationary RF module reads the another module entered in the campus attached to the person and that module is called as the tag.

IV. CONCLUSION

The implementation of RFID based security system is bound to increase in the future. The advantages, efficiency and reliability of the system have made it manifest itself over the existing systems. The system achieves a high level security making the incorporating school/hospital campus more secure.

Further this system is compatible for the future up gradations like a Finger print scanner, retina scanner, monitoring camera, etc. making it more versatile. With the introduction of more smart RFID devices in the near future the system is going to rule the field of access control and security.

And so on the RFID identification has much wide variety in its application

- Security
- Access control
Counterfeiting and Theft control/prevention

- **Manufacturing and Processing**
  - Inventory and production process monitoring
  - Warehouse order fulfillment

- **Supply Chain Management**
  - Inventory tracking systems
  - Logistics management

- **Retail**
  - Inventory control and customer insight
  - Auto checkout with reverse logistics

- **Location Tracking**
  - Traffic movement control and parking management

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Cyber Ethic’s infusion- a socio- cultural study of the youth and risk in the perception of Teachers

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Abstract- Encouraging students to expand their search for knowledge in cyberspace has brought in new dimension to consider. Does our student use the Internet in more socially responsible way? This study explores this research question qualitatively through the opinion of teachers by adopting the cultural risk perceptive of Internet regulation and utilization of school students. If a student encounters unsafe behavior on the Internet, are the students prepared to behave and act appropriately. The quantitative study deals the teacher perception of the evidence of problems associated with their student’s access to the internet. These suggestions of teachers about modification of curriculum for the integration of cyber ethics is to be identified and these findings should be of interest to the wider educational community.

Index Terms- internet risk, otherness, cultural perspective, risk

I. INTRODUCTION

Today, Internet and Information and Communication Technologies (ICT) open a world of possibilities for children, expanding their horizons and providing opportunities to learn create identities and participate in society. In parallel, however, this population can also be exposed to risks, such as giving out their private details, cyber bullying or grooming for sexual abuse.

Since the advent of personal computers and networking, the Education Departments in many developed nations have taken the opportunity to promote the technology’s educational benefits. In developing nations there have been several studies on the educational value of computers in schools and the research thus far describes some of the ethical changes that have emerged as a result of the technology.

So risk concerned from students internet use is a largely neglected issue that requests imperative attention. Perceptual the risk surrounding student’s internet use will clarify the problems that exist for educators. It also endow with amelioration policies and inform wider public debate on the dangers it is first on the main features of the cultural risk perspective.

The Cultural Risk Perspective

Douglas (1966,1985,1992) Wynne(1989) briefly overview of various approaches to risk events within the social science. Having made a distinction between realist and social constructionist perspectives, the three main approaches to risk evident in the sociological and cultural studies literature, the main focus will be given to cultural risk perspective which is best suited for exploring risk arising from Internet use.

In the social science literature the phenomenon of risk tends to be situated somewhere in or between the realist and social constructionist perspectives. The realist approach, which emerged from such discipline as engineering, statistics, psychology and economics treats risk calculation as ‘absolute truth’ (Bradbury 1989,p382). Drawing upon the fields of sociology and cultural studies, the social constructionist risk perspective emphasis the social and cultural contexts within which risk is understood and negotiated. From this perspective, knowledge of risk need to be understood within the sociocultural contexts in which it is generated( Lupton 1999, p.29).

There are three broad sociocultural approaches to risk evident in literature: namely, the ‘risk society’ perspective Beck(1992) this focus largely on macro-political processes; a Foucault influenced approach within which risk is seen solely as a ‘calculative rationality’(Dean,1999); the cultural perspective, stressing social construction.

Several brief points need to be made to justify the adoption of the cultural perspectives in exploring student’s internet use. The cultural perspective has been categorized as adopting a functional structuralist viewpoint (Lupton 1999,p.26), exploring how sociocultural systems maintain social order. Thus it offers an ideal framework for attempting to explain how staffs seek to maintain order even as dealing with students who disobey the rules relating to internet use. Furthermore, this approach attempts to explore staff risk narratives as it stresses the cultural construction of understanding.

Mary Douglas, adopting cultural approach argues that risk is always social and their perception and their levels of acceptability are ‘collective constructs’. This is not to deny that real danger exists but a choice is made as to which hazards are focused upon. Risks are selected. The dangers may (or may not) be real but they still must be identified and constructed through social process to be labelled as risk. The decision as to which risks form the focus of concern in a society is a political one. Different societies may select different dangers as worthy of attention.

Risk from cultural perspective is also exposed as a strategy for maintaining social order. Labeling something as risk reaffirms what is deemed desirable behavior in wider society. Culturally excluding certain risks from society may reaffirm social boundaries. Thus if individuals chose to engage in unacceptable, ‘risky’ behavior then they may find themselves excluded from the group or society as an ‘other’.

Uncertainty and confusion are fertile grounds for the creation of risks. Thus, through its capacity to transcend traditional time, space restriction, cyberspace has the potential to disembode bodies from their cultural, historical and geographical meaning.
(Castells 1996, p.375). Unlike those inside society, the ‘other’ of the internet are, to some extent, beyond the boundaries of social control.

II. METHODOLOGY

A. Research background

The following data are drawn from five educational institutions, which examined risk perception evaluated actual risks and described attempts by schools to alleviate online danger. The research took the form of semi-structured interview. Field sites were selected to produce a diversity of categories and information in order to provide some basis towards generalization (Kennedy, 1979). Overall, two primary schools, two middle schools and three higher secondary schools were selected as field sites (see table 1). Additionally, it believed that risk perception might change as staff gained more online experience, so schools were selected that had established Internet use.

Whilst the person with primary responsibility for information and communication technology (ICT) in school served as an initial contact, teachers with no specific internet-related roles were also interviewed. Forty-two staff members were interviewed, twelve in St. Marks, ten in Monfort school, ten in St. Santhome school, eight in St. Peters school and two in St. John's.

Table 1: Details of research field sites

<table>
<thead>
<tr>
<th>S.NO</th>
<th>NAME OF SCHOOL</th>
<th>AGE RANGE</th>
<th>MONTHS SCHOOL ONLINE</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Monfort</td>
<td>Higher Secondary</td>
<td>24</td>
</tr>
<tr>
<td>2.</td>
<td>Santhome</td>
<td>Higher Secondary</td>
<td>24</td>
</tr>
<tr>
<td>3.</td>
<td>St. Johns</td>
<td>High School</td>
<td>6</td>
</tr>
<tr>
<td>4.</td>
<td>St. Peters</td>
<td>High School</td>
<td>10</td>
</tr>
<tr>
<td>5.</td>
<td>St. Marks</td>
<td>High School</td>
<td>18</td>
</tr>
</tbody>
</table>

Within the practice of qualitative interviewing it should be recognized that there may exist some difference between the responses of an interviewee and the reality that these responses were intended to capture. This might be perceived as an issue of validity, that is, whether an account accurately represents certain features of a phenomenon that it is intended to describe, explain, or theories (Hammersley, 1992, p. 69). As Gomm (2004, pp.152-153) notes, validity in interviews might be compromised where respondents do not know the information required, where they choose to answer inaccurately, where they are unwilling to answer the question or where a different interpretation of the question may have been made. It would be naïve to dismiss the possibility that such occurrence might have compromised the validity of aspect of the subsequent data on staff risk narratives.

Some of the issues addressed in the interview were sensitive, such as the use of pornography by the young student, the possibility existed that teachers might only say politically sound risk narratives while repressing their own opinions. To avoid this such possible problems time was spent in schools to build up rapport with staff, who were guaranteed that all research data was confidential. It was recognized that the objectivity might be compromised through engagement teachers. Yet, disengagement is not always a realistic, or, some would argue, desirable, possibility in qualitative research and is perhaps best understood as a process constructed after the event.

B. Teacher's perception of risk from student's use of Internet

As already stated perception of risk may not necessarily correlate with actual dangers, yet understanding expressed fears can provide an insight into potential hazards. Importantly, these risk perceptions need to be understood on a hermeneutic level or any attempt to access actual risk will potentially be flawed. In exploring staff risk perception issues relating to the status of student, the cultural construction of risk narratives, otherness will be considered.

Of the 42 staff interviewed, 26 expressed concern about online pornography, 9 focused on grooming and 7 on the copyright infringement.

C. Digital literacy

All the teachers interviewed labelled poor online education resources as risk and they wanted infusion of responsible computing to be taught in school and added in the curriculum. Teachers anticipate that the more digitally literate or skilled children become, the more they will gain from the internet while also being better prepared to avoid or cope with online risks. While digital literacy is generally defined as including a broad range of skills and competences, digital safety skills represent a specific subset of digital or media literacy

Moreover few teachers stated that the risks of concern to children often are not those that lead to adult anxiety. Also, it appears that the more children go online to gain the benefits, the more they may encounter risks, accidentally or deliberately. A staff stated that

*Risks may arise when children are sophisticated, confident or experimental internet users, as observed in ’high use, high risk’ or when, as in ’new use, new risk’.*

Children gain internet access in advance of an infrastructure of awareness-raising, parental understanding, regulation and safety protection.

D. Unsuitable online material

The major issues surrounding technology ethics can be categorized into three areas: privacy, property, and appropriate use. There are three areas of staff concern of risk were around pornography images, experimental with drugs and explosives, and meeting strangers (grooming).
E. Pornographic images

Twenty six of the 42 teachers interviewed expressed concerns about students accessing pornographic images. A strong distinction was made between accidentally accessing pornographic material and intentionally finding such images. Teacher in Marks school stated that

Pornography is not easy to define. It may or may not be harmful to those exposed to it. In terms of the classification of risks it constitutes a content risk, positioning the child as receiver of what is, generally, mass produced content distributed via the internet.

Here the concern is that young student might accidently access pornographic material. Those staff who saw Student as being at risk from online pornography invoked a narrative of innocence, also remarked that they can be easily influenced and needed to be protected. Regarding the perceived risk outcome was that young people viewing pornography might be psychologically affected. But most of the high school teachers invoked narratives of ‘youth’, suggestion that certain male students were of age where they would seek out and find such material. In this context the teachers argued that students are old enough to understand what constituted appropriate Internet use. There were no concern expressed about the students being at risk from accidently accessing pornographic images; after all, they were not seen as ‘innocent’ children but rather as youths.

F. Copyright violation

Overall, seven of the staff interviewed expressed concern that there might exist a risk of copyright infringement. It was recognized in the primary schools that students tend to copy and print images from the web with little awareness of copyright laws. It was difficult explaining to young children why they could not copy certain images. Rather, students tended to cut and paste whatever online material they want without awareness of copyright laws. Teacher of Monfort School stated that One thing most commonly done by students is downloading music and movies, now the problem with that for me is there are licensing issues, which of course the student are not interested in.

Indeed four of the seven teachers who discussed copyright issues expressed that there are several other ethical issues to be considered. Concepts like plagiarism, hacking are not understood by students in a proper sense but by youth narratives the teachers say that the student consider it to heroic and more knowledgeable when they crack codes. This illustrates how changes in legal cultures can have an effect upon risk perspectives.

G. Other risk discussed were

Regarding to the other type of the unsuitable online material the teacher of Santhom school mentioned that the dangers of bomb-making websites. Materials which promoted experimentation with drugs, alcoholic or explosives have two main aspects. First are they will promote these content and the second aspect is they will try to manufacture it for fun.

H. Staffs risk perception and Youth

Student age was an important issues in understanding the process by which staff labelled students as at risk and dangerous. With reference to internet pornography, sexually explicit online conversation, network security and copyright violation, teachers predominately interpreted the inappropriate activities of older students as threats to authority and institutional images to schools that have internet access. In labeling them dangerous teachers argued that they were old enough to know better and understand of their actions for others and intentionally misused the Internet. Additionally, staff talked about youth as having already been exposed to possible corrupting influences, whether it was online pornography accessed at home or the use of unsuitable language. In contrast, staff tended to view younger students as ‘impressionable’ and therefore potentially at risk from the Internet. Indeed, in the primary schools no member of staff described student online activities in terms of threats to staff or the school. Significantly, staff in secondary schools also labelled their younger students as innocents and impressionable. Yet it would be wrong to suggest that younger student were simply perceived as being at risk, whereas older students, youths were seen as dangerous. Rather, youth were also labelled as being at risk from certain materials such as drugs and bomb-making.

Teachers perceive older student using internet as potentially dangerous the youth were not always seen as a homogenous body. A student age was a vital factor in the construction of the internet risk narratives, it was not the sole influence as teachers drew upon their own experience and knowledge of students when interrelating situations.

Perception of risks and their levels of acceptability are the cultural constructs much like language (Douglas). Thus consensus might exists as to what should be regarded as risk but views may differ as to what actually constitute that risk. While teachers broadly agreed that online pornographic material was a risk, questions were raised as to what should be regarded as pornographic. Such ambiguity should be understood in hermeneutic level. A teacher of St John’s stated that Once I noticed students bring daily papers containing images of semi-nude, they were punished for same if they had accessed in school internet.

Drawing from cultural perspective, it becomes apparent that this is not just an issue of the nature of the images themselves but also the context in which they are viewed. It must be recognized that even where consensus exists regarding what risk to focus upon, there may be interpretative ambiguity in deciding what should actually be labelled as an element of these risks.

The concept of youth can be perceived as liminal, describing a transitional stage between ‘innocent’ childhood and ‘mature’ adulthood. Yet, when discussing school internet risks staff did not always define youths in terms of liminality. Rather upon occasion, they labelled students as displaying a certain maturity more often associated with adulthood.

Staff reserved the concept of ‘otherness’ for strangers using chat lines, identifying them as the most serious risk on the internet. This related to the perception that ‘other’ in cyberspace were somehow beyond social control. Interpreting staff risk narratives within the cultural the cultural perspective, it would appear that liminal youths were not seen to be as great a threat as external ‘others’.

III. CONCLUSIONS

It is to be recognized that this study has implication for both practice and theory. With regard to educational practice, staff risk narratives can be seen as highlighting risks that need to be treated seriously. While other staff concerns such as student accessing the website featuring bomb-making might appear to be
less urgent. They should not be dismissed. Rather, staff needs to be made aware of the risk surrounding the internet use so that they could reflect on them. As already suggested the foundation of the effective amelioration policy is a hermeneutic understanding of the actual nature of the risk. The research being conducted fully supports the changes in teaching styles and tools brought about as a result of the technology (Bennett 2001). These are necessary skills to be gained to prepare students to enter the workforce in the future. I contend that we have to ask what role education plays in where students are learning their online behavior, to make sense of this new education age. This is the behaviour that will be used, as their way of decision-making as events occur while they surf the net for communication and learning. The research in progress investigates the behaviour that the student currently possesses and examines how and whether cyber ethical behavior can be developed to provide skills required in using the new technologies. This study will also be of interest to the wider community as it relates to global cyber citizenship issues such as highlighting the dangers and consequences of cybercrime to children and young. Adults (Berkowitz 2000; cybercitizenship.org 2000; Berkowitz 2001). It also targets some of the goals of cyber citizenship such as the establishment of a broad sense of responsibility and community in an effort to develop smart, ethical and socially conscious online behavior in young people.

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[15] Hansson, S. O. (2010) Risk: objective or subjective, facts or values. Journal of Risk Research, 13(2), 231-238. In countries, shown in Annex 3, where survey administration was computer assisted (CAPI), the computer was turned to face the child for sensitive questions. In other countries, the child completed a private pen-and-paper questionnaire, putting this into a sealed envelope.


AUTHORS

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A Novel and Efficient KNN using Modified Apriori Algorithm

Ritika Agarwal, Dr. Barjesh Kochar, Deepesh Srivastava

Abstract- In the field of data mining, classification and association set rules are two of very important techniques to find out new patterns. K-nearest neighbor and apriori algorithm are most usable methods of classification and association set rules respectively. However, individually they face few challenges, such as, time utilization and inefficiency for very large databases. The current paper attempts to use both the methods hand in hand. Here, we have modified the apriori algorithm and used it to classify data for K-nearest neighbor. Modified Apriori helps in finding out only a few of the attributes that mainly define the class. These attributes are named as prominent attributes in this paper. This technique helps in improving the efficiency of KNN to a high extent.

Index Terms- Classification, association set rules, K-nearest neighbor, apriori algorithm

I. INTRODUCTION

The techniques of data mining [1][2][3][20], in the field of classification [14] and association set rules [6], i.e., KNN and Apriori algorithm had been developed many years ago. Till today, they are used to extract knowledge and draw patterns from large sets of information.

The Apriori algorithm [5][7] is an unsupervised learning technique that figures out the likelihood of A taking place if B does. It is very useful in prediction regarding supermarkets and businesses.

While KNN[8][9] on the other hand is supervised learning and is used to gather information of the location of the test samples in the entire database. Its applications lie in robotics, pattern matching and graphics.

Both KNN and Apriori are individually efficient but together they are even better.

A. Association Set Rules

[2][3][6]It is a technique in data mining that is used to implement the apriori algorithm.

Three measures are used to determine the rules. They are:

1. Support: It describes the dominance of an attribute.
2. Confidence: It describes the relationship between two attributes.
3. Lift: It is the ratio of support between two independent items.

Using these two measures, the rules are formatted. They are:

1. The frequent combination of attributes.
2. The results based on combination.

The process of association set rules is used in the market basket analysis and in businesses.

1) Apriori Algorithm,

[4][5][7]It requires numeric values of each tuple to be presented for the formation of relationships.

Minimum support and minimum confidence are found and then support for each attribute is compared with it.

This algorithm is mainly divided into two processes:

1. Scanning of the database to calculate each attribute’s support count and then rejecting the attributes with lesser values.
2. Pruning of candidate sets to remove the candidates without frequent subsets.

The method devised by the apriori algorithm faced severe problems of space and time.

B. Classification

[1][2][3][14] It is a method to find out equations from the given data that can be used to place and understand the test samples. Here, the previously unknown tuples need to be assigned a class. The already known data is utilized to complete this task. The classifiers are broadly divided into the categories of early and lazy learners.

Early learner is the one that keeps the data ready before the tuples arrive. Such as decision trees, SVM, etc. On the other hand lazy learners prepare their model last minute. Eg. KNN, etc.

1) K-nearest neighbor,

[4][8][9][12] It is a process based on learning by comparison. KNN follows the principles of classification. The closeness of tuples is measured with the test tuple. The closest K tuples are called the test tuple’s neighbors. Usually Euclidean distance is used to find out the closeness. Other distance metrics may also be used. They can be Mahalanobis, Chebychev, Correlation and many more. Choice of the distance metric can be an issue. The search of neighbors is started by giving k, a value equal to 1. [15][16][17] It generates the minimum error. Later the value is increased and it may reach infinity for large data sets. KNN has poor speed and accuracy.

II. MODIFIED APRIORI

The previous algorithm had a major problem of multiple scans through the entire data. It required a lot of space and time. [10]

The modification in our paper suggests that we do not scan the whole database to count the support for every attribute. This is possible by keeping the count of minimum support and then comparing it with the support of every attribute. The support of an attribute is counted only till the time it reaches the minimum support value. Beyond that the support for an attribute need not be known.

This provision is possible by using a variable named flag in the algorithm. As soon as flag changes its value, the loop is broken and the value for support is noted.

The pseudo code for the proposed algorithm is as follows:
Input: Database, D, of transactions; Minimum support threshold, min_sup
Output: L, frequent itemsets in D
Method:
1) \( L(1) = \text{find_frequent}_1\text{-itemsets}(D); \)
2) For each transaction \( t \) belongs to \( D \)
3) \( \text{count}_\text{items} = \text{count}_\text{items}(t); \)
4) For (\( k = 2; L(k-1) != \text{null}; k++ \))
5) \{
6) \( C(k) = \text{apriori}_\text{gen}(L(k-1), \text{min}_\text{sup}); \)
7) flag=1;
8) For each transaction \( t \) belonging to \( D \)
   Where \( \text{count}_\text{items} \geq k \)
9) \{
10) If (flag==1)
11) \{
12) \( c = \text{subset}(C(k), t); \)
13) \( c.\text{count}++; \)
14) if (\( c.\text{count} = \text{min}_\text{sup} \))
15) flag=0;
16) \}
17) if (flag==0)
18) Exit from loop
19) \}
20) \( L(k) = \{c.\text{count} = \text{min}_\text{sup}\} \)
21) \}
22) return \( L = \bigcup(k) L(k); \)

This new feature added in apriori algorithm helps us to implement it in the KNN algorithm, where the support count for every attribute is found out separately for each class.

III. IMPROVED KNN

In KNN we tried to find out the nearest neighbor by calculating the distance between the test sample and the training samples. In KNN, the samples with lesser distance are taken as neighbors. But there are possibilities that attributes with large domain and range have predominance over the other attributes and thus this leads to a wrong result, i.e. the test sample may be placed in a wrong class.

Now, we have devised that only a few attributes can be considered to check the distance between the test and trained samples, rather than all of the attributes. But, the attributes selected have to be the most appropriate ones. By appropriate we mean that they have to be sufficient for determining the class of the test sample.

Here we are trying to find out the prominent attributes of every class, using the apriori algorithm. The benefit of these prominent attributes is that only they are required to be checked with the test samples for finding their neighbors because they are the attributes that decide the class of an attribute. As usual, we are using the Euclidean distance metric to find out the distance between the training samples and the test samples.

This makes the KNN easier because now we do not have to check the distance of our test samples with every attribute of the training samples. Also, the problem of the predominance of some of the attributes due to larger values gets eradicated.

Given below is the diagram that shows the idea of the new KNN.

The above diagram represents:
X-axis - attributes
Y-axis - training samples

The rows represent the different tuples. This figure represents data for only a particular class.

Here we can clearly see that the attributes A, D, and F decide the occurrence of a sample in the class. At least two out of these three attributes is always true for every sample. Thus we can say that according to this diagram that we only need to check with these three attributes to get to know the neighbors for our training samples.

Now, to find these prominent attributes, an apriori algorithm is used [11].

The following is the flow chart of the new method:
1. The data is converted to numeric values between 0 to 1 using
   \[ \text{new} = \frac{\text{old} - \text{a}}{\text{b} - \text{a}} \]
   \[ \text{b} = \text{old max value} \]
   \[ \text{a} = \text{old min value} \]
   \[ \text{new} = \text{the new value} \]
   \[ \text{old} = \text{the value that needs to be converted} \]
2. Then it is placed according to the ascending order of the classes.
3. For each class individually,
   4. The formulae (for discrete values only)
      \[ \text{Min sup} = \frac{\text{no. of tuples}}{\text{attribute}} \]
      [It can be noted here that values that are not discrete would have to take
      \[ \text{Min sup} = \text{tuples} \times \text{max value for an attribute in that class} \]
5. If no attribute clears it, modified apriori is applied.
6. Prominent attributes are found out.
7. KNN is applied on those attributes only.

### IV. IMPLEMENTATION

The research has been applied to a dataset. A few values are shown to understand the methodology.

<table>
<thead>
<tr>
<th>Dataset</th>
<th>Zoo</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of attributes</td>
<td>18</td>
</tr>
<tr>
<td>Number of classes</td>
<td>07</td>
</tr>
<tr>
<td>Size</td>
<td>101</td>
</tr>
</tbody>
</table>

The table below shows few of the values taken from the database zoo.

<table>
<thead>
<tr>
<th>Class 1</th>
<th>aardvark, antelope, bear, boar, buffalo, calf, cavy, cheetah, deer, dolphin, elephant, fruit bat, giraffe, girl, goat, gorilla, hamster, hare, leopard, lion, lynx, mink, mole, mongoose, opossum, Oryx, platypus, polecat, pony, porpoise, puma, pussycat, raccoon, reindeer, seal, sea lion, squirrel, vampire, vole, wallaby, wolf</th>
</tr>
</thead>
<tbody>
<tr>
<td>Class 2</td>
<td>chicken, crow, dove, duck, flamingo, gull, hawk, kiwi, lark, ostrich, parakeet, penguin, pheasant, rhea, skimmer, skua, sparrow, swan, vulture, wren</td>
</tr>
<tr>
<td>Class 3</td>
<td>pit viper, sea snake, slowworm, tortoise, tuatara</td>
</tr>
<tr>
<td>Class 4</td>
<td>bass, carp, catfish, chub, dogfish, haddock, herring, pike, piranha, seahorse, sole, stingray, tuna</td>
</tr>
<tr>
<td>Class 5</td>
<td>frog, frog, newt, toad</td>
</tr>
<tr>
<td>Class 6</td>
<td>flea, gnat, honeybee, housefly, ladybird, moth, termite, wasp</td>
</tr>
<tr>
<td>Class 7</td>
<td>clam, crab, crayfish, lobster, octopus, scorpion, sea wasp, slug, starfish, worm</td>
</tr>
</tbody>
</table>

There are total 18 attributes. The first attribute is the name of the animals. Thus, it is not considered. Here, the values A.* signify the attributes. The attributes are:

| A- | Hair |
| B- | Features |
| C- | Egg |
| D- | Milk |
| E- | Airborne |
| F- | Aquatic |
| G- | Predator |
| H- | Toothed |
| I- | Backbone |
| J- | Breathes |
| K- | Venomous |
| L- | Fins |
| M- | Legs |
| N- | Tail |
| O- | Domestic |
| P- | Cat size |
| *- | Class |

The training samples 1-6 are of the animals:
There are 2 classes.
For class 1:
Min support=3
The support for each attribute is as follows:

<table>
<thead>
<tr>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
<th>G</th>
<th>H</th>
<th>I</th>
<th>J</th>
<th>K</th>
<th>L</th>
<th>M</th>
<th>N</th>
<th>O</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>3</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>4</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>5</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>6</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

Thus for adding new samples into class 1, we have to only check for the attributes A, D, H, I, J, M and P.

For class 7:
Min support=3
The support for each attribute is as follows:

<table>
<thead>
<tr>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
<th>G</th>
<th>H</th>
<th>I</th>
<th>J</th>
<th>K</th>
<th>L</th>
<th>M</th>
<th>N</th>
<th>O</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>0</td>
<td>0</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
</tbody>
</table>

Here, none of the attributes has support equal to the minimum support. Thus, we apply modified apriori.
For that, C1 (list of attributes) and L1 (their respective support value) have to be established first.
Now, new min sup=1 (value is changed for applying apriori algorithm)

Thus only these two prominent groups of variables are required to be checked with the test samples.

V. RESULT AND DISCUSSION

The earliest KNN used the distance metric directly and thus ended up into wrong classes a number of times.
Then KNNBA used association rules to provide weights to the attributes. It increased the efficiency up to 40% but there was still scope for improvement.
Our new KNN takes up only the prominent attributes to check the distance between the training samples and the test samples.
To summarize our KNN, we can generalize it using the following functions:

\[
F_{\text{new KNN}}(x, y) = \begin{cases} 
(\text{X} = \text{Y}) \text{ prominent member} \\
(\text{x} < \text{y}) \text{ modified apriori} 
\end{cases}
\]

This function explains that it is required to implement the modified apriori algorithm on all those attributes whose values are not true (maximum) in all the tuples.

2) For new Apriori
This function defines the modified apriori algorithm that states that all the attributes with support value equal to minimum support are accepted and all the others are rejected.

3) For new KNN using Modified Apriori

This function explains the novel KNN using modified Apriori algorithm. It tells us that if an attribute clears the apriori algorithm or if it has all values of an attribute as maximum, it is considered as a prominent attribute.

The above table below shows the accuracy gained by the three methods KNN, KNNBA and NKN when applied on same data.

Accuracy = no of correct placement/total placements of test samples

The above table represents the accuracy of KNN, KNNBA, and novel KNN. It must be noted that different values of minimum support and confidence are required for KNN BA. Out of them, the values yielding the best solution are taken. [11][13]

Thus, it can be seen that the efficiency of KNN has increased drastically.

VI. CONCLUSION

In this paper we have attempted to give a new perspective to the KNN classifier with the eye of a modified apriori algorithm. This algorithm is better than both of the previous methods, i.e., [8]KNN and [11][13]KNNBA. This method works perfectly for data that has been supervised, i.e., data whose classes are already known. But if the classes are not known already, then we can first take any attributes as prominent attributes and test them for modified apriori. Also, the data taken in this example is discrete and this algorithm works on numeric data.

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Traffic Generator Based Performance Evaluation of Proactive and Reactive Protocols of Mobile Ad-Hoc Networks

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Abstract - The Mobile Ad-Hoc Networks are associated with the communication channels being set up between the nodes for short duration of time. Since the duration is generally small hence maximum throughput is required in order to utilize the entire communication period. Nodes which are part of this network behave both as the host and the router for the other communicating nodes. There are several approaches in the Ad-Hoc environment, of which dynamic topology is the best one. In order to communicate well the routing algorithm needed to be the best in all the conditions and the traffic environment. A lot of research work has been done on CBR type of traffic but variable bit rate traffic, web based traffic and multimedia traffic is not researched much till date. This paper focuses on these routing protocols as well as the different traffic generators and their overall performance under different scenarios. Better the adaptability of the routing algorithms better would the performance

Index Terms - AODV, DSR, Manet routing protocol, Performance evaluation, Traffic generators, Packet delivery ratio, and performance comparison

I. INTRODUCTION

There are two distinct approaches that are widely known for enabling wireless communication between two mobile hosts. The first approach let the existing cellular network infrastructure carry both data as well as voice in the normal traditional way. The major problem lies with this approach is that of hand offs. The second approach is more practical to form an ad hoc network among all mobile users wanted to communicate with each other at a particular moment. This implies that all users comprising the ad-hoc network must be capable of forwarding data packets to ensure the delivery of packets from source to destination. Ad-hoc networks are preferred as compared to traditional cellular systems because of several advantages. These advantages are as under:

- On demand setting up of infrastructure
- High fault tolerance power
- Unimpeded connectivity

Efficient routing is the current demand of a Mobile Ad-Hoc Network over which extensive research is going on for the past several years. Since in a MANET, routing should be done very efficiently in order to route data packets to their correct destination routing plays very crucial role. A routing protocol operates in the following two ways:

1. Route Detection Phase: In this phase, route is first determined.
2. Data Forwarding Phase: In this phase, data is forwarded from source to destination over the above identified route.

The route discovery phase is the most challenging function of a routing protocol in a Mobile Ad-Hoc Network. However, data forwarding phase is abstractly uncomplicated when variety of protocols and routing tables are there to utilize.

Ad-hoc routing protocols can be classified according to different criteria. A protocol may fall under more than one class of distinction on the basis of the mechanism being employed by the routing protocol. Routing protocols for Ad-hoc networking can be classified into four broad categories [6]. These are

(i) Based on routing mechanism employed: proactive or table-driven, reactive or on-demand and hybrid protocols.
(ii) Based on the basis of temporal information: Past Temporal and Future Temporal.
(iii) Based on topology chosen for routing: Flat Topology, Hierarchical Topology
(iv) Based on the Resources being utilized: Power Aware Routing and Geographical Information Assisted Routing.

The MANETs reactive and proactive routing protocols we are going to focus in this paper are as follows:

- Ad hoc On-Demand Distance Vector (AODV)
- Dynamic Source Routing (DSR)
- Destination Sequenced Distance Vector (DSDV)

II. ROUTING PROTOCOLS

A. Ad hoc On-Demand Distance Vector (AODV)

AODV is a reactive protocol hence the route to destination is only being established when demanded. The paths which are founded are independent upon the usage of the paths by the nodes to communicate the data. This protocol avoids the count-to-infinity problem associated with distance-vector routing protocols using the route update methodology as implemented in
DSDV. This routing protocol is capable of both multicast and unicast routing.

As discussed, being the reactive protocol the routes are determined only on demand. Simple Hello messages are communicated in-order to detect and manage the neighboring nodes. During the transmission of the HELLO message the active nodes periodically broadcasts the messages so that the neighboring nodes responds accordingly.

As the HELLO message is a periodic transmission like beacons, if the node does not react to the message the communication to that node is seemed as broken or the link break is there. When the data is needed to be transmitted to a destination which is not known prior then the RREQ (Route Request) are broadcasted. To every intermediate node which responds to the RREQ the link is created [1], if it does not then the link is not created and the node is not an intermediate node from source to destination. The connecting node responds with RREP (Route Reply) message which is unicast in hop-by-hop fashion to source. As the RREP propagates through the network, each intermediary node creates a path to the destination. When source receives the RREP the node is added to the route as the intermediate node. If the multiple RREP are received then the minimum number of hop RREP is chosen. As the data is flowing from the source to destination the routes are managed along with the routing tables. If the data link break is detected then RRER (Route Error) message is sent [3], in this situation the sources reroutes the discovery of the route if necessary.

B. Dynamic Source Routing (DSR)

It is a reactive protocol used in Wireless Mesh Networks. It is similar to the AODV in the route being discovered and made on-demand. But it relies on source routing in place of routing tables being managed in the AODV at every intermediate node.

To determine the source it requires address to be accumulated at every node between the source and destination. This information being accumulated is processed by route discovering packets. The processed paths are used to route the packets. To use the source routing, each packet being transmitted contains the address of every other node the packet is going to traverse.

This might result in more overhead in case of paths having longer traversals or address like IPv6. In-order to avoid source routing the DSR also provides a flow-id option which forward packets on hop-by-hop basis.

Being the source routing protocol the information are maintained at the nodes and being constantly updated. It operates in two phases: Route Discovery and Route Maintenance. The RREP message is only generated if the message reaches the destined node; the RREQ is inserted in the RREP.

This allows the nodes to discover and maintain the routes found on-demand basis. In DSR the overhead is automatically scaled down and up depending upon the changes in the routes being established.

This protocol allows the multiple routes and enables each sender to select and control the route being used. Use of SOFT STATE routing helps in maintaining and updating the routes in the frequent changing environment. It works pretty well up to 200 nodes in the network and designed to work well with high mobility rates of nodes.

C. Destination Sequenced Distance Vector (DSDV)

This routing protocol is table-driven routing protocol for ad-hoc mobile networks which uses Bellman-Ford Algorithm for shortest path route finding. It’s main contribution being to solve the routing loop problem. Each of the nodes in the routing table contains the sequence number given even number if the link is present from one node to another else an odd number is used to present no link between the nodes. The number being generated by the destination and the intermediate node needs to update the source with this number. This routing information is distributed less frequently to the incremental updates being updated more frequently.

III. PROBLEM FORMULATION

A fundamental problem associated with the Ad-Hoc Networks is how to route data packets among mobile nodes proficiently devoid of predetermined topology or centralized administration [6], which is the main purpose of ad hoc routing protocols. Because of the ever changing topology of the Mobile networks, routing the data packets correctly between source-destination pair becomes a very challenging task. Moreover, availability of the limited resources, bandwidth and energy add extra burden on the routing process.

In the literature survey conducted so far, it is observed that most of the research work revolves around CBR traffic pattern whereas practically most of the traffic on the Internet consists of the TCP and variable bit rate type traffic. It is therefore required to study and investigate the performance of different MANET routing protocols using different types of traffic generators. In this paper, we will assess the performance of Reactive protocols (AODV and DSR) and Proactive protocols (DSDV) of mobile ad-hoc network for different traffic generators. The performance of these routing protocols is analyzed with respect to two performance parameters, throughput and packet delivery ratio (PDR %).

IV. TRAFFIC GENERATORS

A Traffic Generator models the traffic which behaves in a predefine structure and schedule manner. It sends the demand to transmit the traffic payload regardless of the state of the agent being attached at a specific time and interval. The following traffic generators are taken into consideration for the analysis:

A. File Transfer Protocol (FTP)

A FTP traffic generator creates the payload depending upon the bandwidth of the connection. It uses the entire bandwidth for the transmission.

B. Constant Bit Rate (CBR)

CBR traffic Generator creates the payload which is fixed in size and the generation of packet interval is fixed.

C. Variable Bit Rate (Exponential)

Exponential Traffic Generator creates the payloads similar to the CBR but it have the interval of ON/OFF states in which, the
ON states the traffic being generated and the OFF states the traffic being not generated in the specified time interval. The ON/OFF states of the traffic generator are exponentially distributed.

D. Pareto (Poisson)

Pareto is the traffic generator with similar feature of the exponential Traffic Generator but the ON/OFF states or the periods are dependent upon the Pareto Distribution.

E. PackMime (HTTP 1.1)

The traffic generator provides the traffic similar to the HTTP-1.1 traffic. It controls the operation of two applications in PackMime HTTP, one is server other being the client. The Client-Server type of traffic is simulated and each of the traffic generators is connected to the FULL-TCP Agent only as it supports only full TCP agents.

V. PERFORMANCE METRICS

There are two main factors over which the performance of the AODV, DSR and DSDV will be analyzed.

- Packet Delivery Ratio
- Throughput

A. Packet Delivery Ratio

Packet delivery ratio is obtained by dividing the total number of packets acknowledged by the destination through the total number of packets created or send by the application layer of the source node [6]. It also rates the packet loss which confines the network from attaining the maximum throughput. The more accurate the delivery ratio, the more absolute and correct is the routing protocol.

B. Throughput

Throughput is defined as the rate at which a network sends or receives data [6]. It is a good channel capacity of network connections and rated in terms of bits per second (bit/s).

\[
\text{Throughput} = Tp = \frac{Pa}{Pt} 
\]

Where \(Pa\) is the packets received and \(Pt\) is the amount of forwarded packets over certain time interval.

VI. SIMULATION ENVIRONMENT

The Routing protocols AODV, DSR and DSDV are taken under the analysis for this paper. The Fedora OS is used to run the Simulating Software NS2 (Network Simulator 2) version 2.35 for the performance evaluation. The performance is observed at various pause time and intervals with total number of nodes taken as 20. In this situation 20 nodes will be simulated which move randomly in 2500m X 2500 m range.

VII. SIMULATION RESULTS

The performance of three routing protocols for different traffic generators are obtained as shown below:

For CBR Traffic, all the three protocols show almost same performance with packet delivery ratio above 92%.
HTTP traffic constitutes approximately 95% of the total traffic in a Mobile Ad-Hoc Network. Therefore it deserves the best performance but unfortunately none of the routing protocols performs better for HTTP traffic.

DSDV shows 95% of performance for the multimedia traffic using Pareto analysis.

Under HTTP traffic (Packmime) all the algorithms suffered as the packet interval being not fixed and variable packet size.

Under Pareto traffic which is similar to the multimedia traffic with variable intervals and fixed packet sizes DSDV is better than the other two algorithms.

IX. FUTURE SCOPE

The future scope of the research is simulation of other modified routing algorithms so that the comparisons can be done on the larger scale. More number of nodes can be simulated so that network performance can be analyzed under stressful conditions on the routing algorithms.

REFERENCES


AUTHORS

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Factors Influencing Cropping Pattern in Bulandshahr District- With Special Reference to the Size of Land Holding

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Abstract- The adoption of cropping pattern in any region is an outcome of varied factors, which plays important role i.e. physical, social and economic factors. Some of these are changeable like prices, government policies, technology etc. and have operated very variously at different times. These factors have a combined impact on the decision making process of the farmer. Those which are not subject to much change as soil conditions, climate etc., have varied from region to region, giving rise to a land use pattern which has persisted through time. The cropping pattern and the level of crop production of a region is influenced by capital, marketing, labour, transport, economic condition of the farmer, institutional facilities etc. agriculture is an economic activity from which farmers earn their livelihood. Therefore, they first look for the economic viability of a crop within their socio-physical and political environment. In this paper an attempt has been made to analyze that which factors promote a farmer to grow any crop according to size of land holding in district Bulandshahr of western Uttar Pradesh.

Index Terms- Cropping pattern, varied factors, land holding, rabi, kharif, tehsil.

I. INTRODUCTION

The cropping pattern means the proportion of area under various crops at a point of time or regional allocation of land among different crops. An ideal crops plan should not only fulfill requirement of the local people or food for the farmers and their families, but also to meet fodder requirement of the farm animals. The choice of crops, their variety and the area under different crops obviously depend upon a number of factors, such as soil conditions, temperature and rainfall, economic factors such as price structure of different crops, availability of labour, capital marketing, transport facility, nearness of the market etc. are the factors which determines the choices of the crop grown. In the developed countries, agriculture is largely commercial, cultivated for profit. Whereas in developing countries like India, the objective for practicing agriculture is to maximize the production to meet the food requirements as well as to cater other financial obligations of the farmer’s family.

There is a close relationship between the size of land holding and cropping pattern. Farmers like to introduce such type of cropping pattern in their field which can raise their income from their limited holding. How the size of land holding in combination with other factors determines the crop choice can be seen clearly in the area. An exhaustive list of factors including cropping pattern of the Bulandshahr district, have been discussed in this paper.

II. AVAILABLE LITERATURE

As Shrestha (2006) explained that due to expansion of urbanization, introduction of advanced technology in agriculture and low returns from traditional farming system, farmers were compelled to switch over to professions other than agriculture. Farmers those, who were still engaged in agriculture, had to change their tradition farming system to moderns system for their existence.

Matsuda (1994) proposed a hypothesis on the relationship between irrigation freedom (degree of water control by farmers) and crop grown. Besides water conditions, Seetisarn (1977), pointed out that farm size would also influence cropping pattern. Moreover, market and desire for higher income among farmers were also important determining factor of cropping pattern.

Rajput Ram (1979), in his study technological Determinant and Agricultural Development, Studied the cropping pattern and productivity with special reference to technological determinants like irrigation, mechanization and High Yielding Varieties of seeds.

III. OBJECTIVES

The major objectives are
- To see the cropping pattern of the district
- To search the factors of choosing a certain cropping pattern
- To find out the behavior of the farmers according to their land holding for choosing a certain cropping pattern
- To search the choice of crops of the farmers according to their size of land holding.
- To find out the dominance factors of crop grown according to the size of land holdings.
- To find out whether the present cropping pattern or the choices of crops are in the best possible manner or not.
IV. DATA BASE AND METHODOLOGY

The data for the study gathered from secondary sources as well as from a purposeful and well structured field survey. The survey was conducted during August 2010 and February and March 2011. The sample was based on stratified random sampling and two stage sample design adopted for the purpose. In the first stage, selection of villages from the Bulandshahr district of the study area was made and eleven villages were selected. In the second stage, selections of 115 farmers were made according to their size of land holding and are as follows.

- Fifteen farmers came under the category of large holding, the total operated area was 165.99 in rabi (winter season) and 185.38 hectare in kharif (summer season), and the average size of holding was 12.36 hectare.
- Twenty farmers came under the category of medium holding, the total area was about 73.16 hectare and the average size of land holding is 3.67 hectares.
- Twenty eight farmers came under the semi medium category, and the total area was about 78.70 hectare and the average size of land holding is 2.79 hectare.
- Twenty farmers came under the category of small farmers, the total area was about 38.69 hectares and the average size of land holding was 1.93 hectare.
- Thirty two farmers came under the category of marginal farmers, the total area was about 28.9 hectare and the average size of holding was 0.88 hectares.

V. STUDY AREA

Bulandshahr, one of the important district of western Uttar Pradesh (India), lies between 28° 4' to 28° 12' north latitude and between 77° 0' to 78° 0' east longitude and located in upper Ganga – Yamuna Doab (fig 1). The river Ganga separates it from Jyoti Ba Phule Nagar and Badaun districts in east. The district is bounded by Aligarh in south, Gautam Budh Nagar in west and Ghaziabad in the north. The district has 7 tehsils, 15 blocks, and covers an area of 4353 Sq. Kms. with a population 34,98,507 (2011). The north to south length of the district is 84 km, while east to west width is 62 kms. Wheat, rice, sugarcane, maize and potato are the major crops which are grown in plenty.

VI. DISCUSSION

First of all the cropping pattern of the study area has been discussed in different crop seasons and than what factors promote the farmer to chose a certain crop according to their size of land holding has been find out.

<table>
<thead>
<tr>
<th>SIZE OF LAND HOLDING</th>
<th>NUMBER OF LAND HOLDING</th>
<th>AREA OF LAND HOLDING (hectare)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2000-01 %age of total</td>
<td>2010-11 %age of total</td>
</tr>
<tr>
<td>Large</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Medium</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Semi Medium</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Small</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Marginal</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
The percentage slightly decreased from 26.9 percent to 25.6 percent. The number of holders slightly changed. The pattern adopted by the sample farmers (table 2 and 3). The field survey shows that there are vast differences in the cropping pattern adopted by the sample farmers (table 2 and 3). The area both registered a substantial increase during this period. A decade in the category of marginal farmers, their numbers and holdings cover medium and large farmers in the district. If we compare the data of the year 2000-01 and 2010-11, we can find out that major changes have been recorded in the last decade in the category of marginal farmers. In case of the number of small farmers (1-2 hectare), the percentage of the numbers of holders slightly changed. The percentage slightly decreased from 26.9 percent to 25.6 percent in 2010-11 under this category. So in 2010-11, the total percentage of the number of small and marginal farmers is almost equal to the national average. The rest of the 13 percent of the holdings cover medium and large farmers in the district. If we compare the data of the year 2000-01 and 2010-11, we can find out that major changes have been recorded in the last decade in the category of marginal farmers, their numbers and the area both registered a substantial increase during this period.

**Cropping Pattern Adopted By the Sampled Farmers**

Field survey shows that there are vast differences in the cropping pattern adopted by the sample farmers (table 2 and 3). The farmers whether small or large they always try to make best use of their land according to their own ability and judgment. There are two main agricultural season namely, rabi and kharif. Rabi season pertain to winter season, marked by dry weather with very little rainfall in month of January through western disturbances. Wheat is the main crop of this season. The second is the kharif season, or rainy season, marked by high temperature with lot of rain and humidity and rice is the main crop. A large variety of food and non food crops are grown in both seasons. The cropping pattern of this district is largely traditional or subsistence type. Food grain accounts for over 85 percent area in rabi season and over 60 percent area during the kharif season. As the study shows that the cropping pattern is dominated by the food grains but there is certain variation in the adoption of food grains according to the size of land holding of the sampled farmers.

**Large Farmers**

During the rabi season, the entire land was under cultivation. Large farmers devote more than seventy percent area to food grain and 30 percent under non food grains. Wheat was the most favoured crop (62.3 percent of the total cropped area). Other crops like Potato covered about 16.4 %, Mustard (12.7%), barley (5.6%), and fodder (1.7 %) were grown in rabi season. During the kharif season about 96.4 percent of the total cultivated area was under cultivation and about 56% area was devoted to the cultivation of food grains, rice covered the largest area, i.e. about 47%, followed by sugarcane 41.34% area maize (5.2%), bajra/fodder (2.1%), arhar (3.5%) and other vegetables (0.76%) and other pulses respectively.

It was seen that the large farmers were devoting substantial area to food grains in which the proportion of wheat and rice was greater than other food grains, but they also devote a fairly large proportion of their land under cultivation to cash crops in which sugarcane and potato are main. Most of the large farmers concentrated more on the cultivation of food grain, while some of the large farmers engaged full time with the farming activities and devoted a large proportion of their land to cash crops i.e. sugarcane, potato, other vegetables, oilseeds, madua etc. In general, area shared by vegetables among this category is negligible. Cropping pattern of the area is partly dominated by traditional approach and partly influenced by commercial approach to fetch a better return from the market.

**Medium Farmers**

During the rabi season the entire area was under cultivation and medium farmers devoted about 62% of their land to the cultivation of food grain and 38% to the non food grain. Wheat 59.5%, potato 25.8%, mustard 10.5%, barley2.2%, and fodder 1.4% dominate the rabi cropping pattern. During the kharif season about 97.8 % of the total area was under cultivation, of which about 51% of the land was under food grains and 49 % was under non food grain. Sugarcane 45.1%, rice 33.7%, Arhar 13.7%, maize 4.4%, was the

<table>
<thead>
<tr>
<th>Size</th>
<th>&lt; 0.5</th>
<th>0.5 – 1</th>
<th>1 – 2</th>
<th>2 – 4</th>
<th>4 – 10</th>
<th>&gt;10</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>308014</td>
<td>100</td>
<td>289780</td>
<td>100</td>
<td>355664</td>
<td>100</td>
<td>290911</td>
</tr>
</tbody>
</table>
| Source: District Statistical Handbook of Bulandshahr District 2010-2011

Table 1 exhibit the distribution profile of land holding in 2000-01 and 2010-11, by size ,which shows that in 2001, 42 percent of land holding fall under the category of less than 0.5 hectare, covering an area of 9.33 percent, while in 2010-11, number of holding increased up to 43 percent and cover 11 percent of an area. Hence, the numbers of marginal farmers are increasing day by day.

In case of land holding between 0.5 hectare to one hectare, the status of holding remain almost the same, but the percentage increase is there from 14.19 percent to 16.8 percent. If we sum up the percentage of marginal farmers in the district, we can see that 68.5 percent farmers come under the category of the marginal farmers.

In case of the number of small farmers (1-2 hectare), the percentage of the numbers of holders slightly changed. The percentage slightly decreased from 26.9 percent to 25.6 percent in 2010-11 under this category.

So in 2010-11, the total percentage of the number of small and marginal farmers is almost equal to the national average. The rest of the 13 percent of the holdings cover medium and large farmers in the district.
<table>
<thead>
<tr>
<th>FARMER'S CATEGORY</th>
<th>TOTAL SURVEYED AREA (in hectares)</th>
<th>AREA UNDER RABI (in hectares)</th>
<th>MAJOR RABI CROPS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>CROPS</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>RANK</td>
</tr>
<tr>
<td>Wheat</td>
<td>1</td>
<td>103.46</td>
<td>1</td>
</tr>
</tbody>
</table>

Table 2: Cropping pattern adopted by the sampled farmers in rabi season
The entire area was under cultivation during rabi season. About 66% area was under food grains and 34% was under non-food grains. Wheat 58.4% was the most favoured crop followed by the potato 27.1%, barley 7.9%, mustard 1.7%, and fodder 4.2% and other vegetables 0.58%. During the kharif season about 96.60% of the total area was under cultivation of which 65% area was under food grains and 48 percent area was under non food grains. Rice 43.6%, sugarcane 30.12%, and maize 14.97% dominate the cropping pattern in kharif season which are followed by the fodder 2.8% and 6.6%, arhar and other pulses. Apart from these crops fodder, jowar, madua, and other vegetables are other crops adopted by this category of farmers.

It was observed that cropping pattern of the semi medium farmers differ a bit from the large and medium farmers. They first want to be secure by producing enough food grains for their subsistence requirement. Like the other categories of farmers, here also wheat in rabi and rice in kharif were the preferred crops. The farmers grow cereals for their requirement as well as selling. The area under commercial crops was lesser than the medium and the large farmers. These farmers prefer to grow food grain more than the category of the other farmers.

**Small Farmers**

The entire area was under cultivation during rabi season, of which about 73% was under food grains and 27% under non food grain. Wheat 60.4%, barley 13.5% and vegetables 7.2% were the favored crops. Other crops grown in this season were mustard 9.05%, and fodder 7.6%. During the kharif season about 90.8% percent of the total area was under cultivation of which about 79.6% was under food grains and 21% was under non-food grain. Rice 35.9%, maize 31.3%, arhar 12.4%, sugarcane 5.6%, fodder and bajra 11.9%.vegetables 2.7% were the dominant crops.

It was noticed that small farmers grow largely food grains for their subsistence requirements. They do not have the resources to invest for costly inputs in their farm, which are required for the cash crops. They also cannot take the risk of crop failure. They grow cash crops also for their personal requirement. The only crops which they grow for the market are vegetables. So the
cropping pattern of the small farmers is subsistence type and the farming method is traditional.

Marginal Farmers
The entire area was under cultivation during rabi season and of this, 74 percent is under food grains and 26% under cash crops. Wheat (66.9%) and vegetables (16.4%) are the dominant crops while the mustard (3.2%), barley (7.5%) and pea are the other crops of rabi season. During kharif season about 99.5 percent of the total area was under cultivation, of which 56% was under food grain and 55% was under non food grains. Maize (34.9%) was the most favoured crop followed by vegetables (33.8%), rice (17.2%), bajra (7.3%), arhar (3.9%). While under the non food grain crops vegetables, sugarcane and fodder crops are the main crops.

It was noticed that because of little piece of land, most of the farmers preferred to grow the food grains crops in their field. These farmers engaged in the animal husbandry so they also grow fodder for their animals. Their methods of farming were primitive because they cannot afford the new technology so the yields obtained by these farmers were the lowest. These farmers cannot take risk of the crop failure in growing cash crops so they prefer to grow vegetables to earn their livelihood.

Table 3: Cropping pattern adopted by the sampled farmers in kharif season

<table>
<thead>
<tr>
<th>FARMER'S CATEGORY</th>
<th>TOTAL SURVEYED AREA (in hectares)</th>
<th>AREA UNDER KHARIF (in hectares)</th>
<th>CROPS</th>
<th>RANK</th>
<th>Area shared (in hectares)</th>
<th>Percent to total area</th>
</tr>
</thead>
<tbody>
<tr>
<td>Large Farmers</td>
<td>185.38</td>
<td>178.7</td>
<td>Rice</td>
<td>1</td>
<td>84.03</td>
<td>47.00</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Sugar</td>
<td>2</td>
<td>73.85</td>
<td>41.32</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Millet</td>
<td>3</td>
<td>9.38</td>
<td>5.24</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Alur</td>
<td>4</td>
<td>6.31</td>
<td>3.53</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Bajra Fodder</td>
<td>5</td>
<td>3.81</td>
<td>2.12</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Other Vegetables</td>
<td>6</td>
<td>1.36</td>
<td>0.76</td>
</tr>
<tr>
<td>Medium Farmers</td>
<td>73.46</td>
<td>71.85</td>
<td>Sugar</td>
<td>1</td>
<td>32.47</td>
<td>45.19</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Rice</td>
<td>2</td>
<td>24.28</td>
<td>33.79</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Millet</td>
<td>3</td>
<td>9.96</td>
<td>13.72</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Alur</td>
<td>4</td>
<td>3.21</td>
<td>4.46</td>
</tr>
<tr>
<td>Semi-medium Farmers</td>
<td>78.38</td>
<td>75.72</td>
<td>Bajra Fodder</td>
<td>5</td>
<td>1.02</td>
<td>1.41</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Other Vegetables</td>
<td>6</td>
<td>1.01</td>
<td>1.40</td>
</tr>
<tr>
<td>Small Farmers</td>
<td>38.69</td>
<td>35.14</td>
<td>Rice</td>
<td>1</td>
<td>22.81</td>
<td>30.12</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Sugar</td>
<td>2</td>
<td>11.32</td>
<td>14.84</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Millet</td>
<td>3</td>
<td>5.03</td>
<td>6.64</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Alur</td>
<td>4</td>
<td>2.81</td>
<td>3.81</td>
</tr>
<tr>
<td>Marginal Farmers</td>
<td>28.96</td>
<td>28.818</td>
<td>Bajra Fodder</td>
<td>4</td>
<td>4.21</td>
<td>11.98</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Sugar</td>
<td>5</td>
<td>2.00</td>
<td>5.69</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Other Vegetables</td>
<td>6</td>
<td>0.95</td>
<td>2.70</td>
</tr>
<tr>
<td>Total Surveyed Area</td>
<td>404.87</td>
<td>390.32</td>
<td>Rice</td>
<td>1</td>
<td>159.96</td>
<td>26.72</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Sugar</td>
<td>131.19</td>
<td>159.96</td>
<td>26.72</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Millet</td>
<td>44.96</td>
<td>44.96</td>
<td>13.3</td>
</tr>
</tbody>
</table>

Source- Field Survey Conducted During August 2010, and February and March 2011

The cropping pattern adopted by the farmers of the study region shows that that it is influenced by the subsistence farming. Technology is not very high. Degree of commercialization is greater only in large and medium farmers but they also prefer to grow food grains. The farmers from large to semi-medium holdings specialized in wheat, rice and sugarcane. The area under pulses and oilseeds was very less and in vegetables was negligible. Small and marginal farmers prefer to grow food grains for their family requirement and the vegetables for earning money and fodder for their cattle. On the other hand the farmers from the large to the semi medium holdings prefer to grow sugarcane, potato, madua and fodder for selling or for getting quick money.
### Table 4: Ranking of the Factors Influencing the Cropping Pattern of the Sampled Farmers According to the Size of Land Holding (2010-11)

<table>
<thead>
<tr>
<th>Rank</th>
<th>Factors</th>
<th>Number of farmers</th>
<th>Rank</th>
<th>Factors</th>
<th>Number of farmers</th>
<th>Rank</th>
<th>Factors</th>
<th>Number of farmers</th>
<th>Rank</th>
<th>Factors</th>
<th>Number of farmers</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Price</td>
<td>13 (86%)</td>
<td>1</td>
<td>Price</td>
<td>14 (70%)</td>
<td>1</td>
<td>Personal requirement</td>
<td>18 (64%)</td>
<td>1</td>
<td>Personal requirement/tradition</td>
<td>21 (65.6%)</td>
</tr>
<tr>
<td>2</td>
<td>Yield</td>
<td>11 (73%)</td>
<td>2</td>
<td>Yield</td>
<td>12 (60%)</td>
<td>2</td>
<td>Tradition</td>
<td>14 (50%)</td>
<td>1</td>
<td>Financial problems</td>
<td>18 (90%)</td>
</tr>
<tr>
<td>2</td>
<td>Personal requirement/tradition</td>
<td>11 (73%)</td>
<td>2</td>
<td>Personal requirement/tradition</td>
<td>12 (60%)</td>
<td>2</td>
<td>Crop prospect</td>
<td>14 (50%)</td>
<td>2</td>
<td>Crop prospect</td>
<td>15 (75%)</td>
</tr>
<tr>
<td>3</td>
<td>Crop prospect</td>
<td>9 (60%)</td>
<td>2</td>
<td>Irrigation facilities</td>
<td>12 (60%)</td>
<td>2</td>
<td>Irrigation</td>
<td>14 (50%)</td>
<td>3</td>
<td>Irrigation facilities</td>
<td>13 (65%)</td>
</tr>
<tr>
<td>4</td>
<td>Irrigation facilities</td>
<td>7 (46%)</td>
<td>3</td>
<td>Crop prospects</td>
<td>9 (45%)</td>
<td>3</td>
<td>Yield</td>
<td>10 (35%)</td>
<td>4</td>
<td>Financial problems</td>
<td>10 (50%)</td>
</tr>
<tr>
<td>5</td>
<td>Government policies</td>
<td>6 (40%)</td>
<td>4</td>
<td>Physical factors</td>
<td>7 (35%)</td>
<td>4</td>
<td>Availability of H.Y.V. seed</td>
<td>9 (32%)</td>
<td>5</td>
<td>Yield</td>
<td>9 (45%)</td>
</tr>
<tr>
<td>6</td>
<td>Physical factors</td>
<td>4 (26.6%)</td>
<td>5</td>
<td>Financial problems</td>
<td>6 (28%)</td>
<td>5</td>
<td>Availability of H.Y.V. seeds and fertilizers</td>
<td>9 (45%)</td>
<td>5</td>
<td>Physical factors</td>
<td>7 (21.8%)</td>
</tr>
<tr>
<td>7</td>
<td>labour</td>
<td>3 (20%)</td>
<td>6</td>
<td>Labour</td>
<td>4 (20%)</td>
<td>6</td>
<td>Physical factors</td>
<td>5 (17%)</td>
<td>6</td>
<td>Availability of H.Y.V. seeds and fertilizers</td>
<td>6 (30%)</td>
</tr>
<tr>
<td>8</td>
<td>Availability of H.Y.V. seeds and Fertilizers</td>
<td>1 (6.6%)</td>
<td>7</td>
<td>Availability of H.Y.V. seeds and fertilizers</td>
<td>3 (15%)</td>
<td>7</td>
<td>Physical factors</td>
<td>3 (21%)</td>
<td>7</td>
<td>Government policies</td>
<td>3 (15%)</td>
</tr>
<tr>
<td>8</td>
<td>Financial problems</td>
<td>1 (6.6%)</td>
<td>8</td>
<td>Government policies</td>
<td>1 (5%)</td>
<td>8</td>
<td>Labour</td>
<td>1 (5%)</td>
<td>8</td>
<td>Government policies</td>
<td>1 (3%)</td>
</tr>
<tr>
<td>Total surveyed</td>
<td></td>
<td>15 (100)</td>
<td>20 (100)</td>
<td>28 (100)</td>
<td>20 (100)</td>
<td>32 (100)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Source: Field Survey Conducted During August 2010, and February and March 2011

### Table 5: Factors Influencing the Total Numbers of Farmers

<table>
<thead>
<tr>
<th>Factors</th>
<th>Prices</th>
<th>Yield</th>
<th>Irrigation</th>
<th>Crop prospect</th>
<th>Availability of HYV and fertilizers</th>
<th>Labour</th>
<th>Government policies</th>
<th>Physical factors</th>
<th>Financial problems</th>
<th>Personal requirements</th>
</tr>
</thead>
</table>

Source: www.ijsrp.org
Several factors influence the decision-making process of the farmers in the selection of crops grown by them, but some factors may be more dominating than others in a particular region. It varies from region to region, from farm to farm and even from farmer to farmer. The author is trying to investigate the important factors influencing the cropping pattern of the sample farmers in the study area. Most of the farmers insisted that only one factor is not responsible but more than one factor is responsible for the adoption of cropping pattern by the farmer. These factors have been discussed below—

**Prices**— Generally, the sample farmers consider harvest prices before making any decision regarding the selection of the crops. These prices are the average whole prices at which the commodity is disposed off by the producer to the trader at the village level during the specified marketing period of the total sampled farmers. 65.1 percent were influenced by the prices. Large, medium, and semi-medium farmers were the most responsive to price and they gave first preference to it. The small and marginal farmers were also fairly responsive to it. They put it on third and fourth rank. The farmers prefer to grow those crops which are profitable to them, which give them higher income. The farmers generally expect that they will get higher benefit. Prices of the crops were influencing the cropping pattern of mostly those farmers who are socially and economically strong because these farmers can invest on costly inputs and they can also take the risk of changing their cropping pattern.

**Yield**—Yield of the crop emerged to be the other important factor influencing the cropping pattern of 45.5 percent of the total sampled farmers. Farmers of all the categories of farm size were concerned; they prefer to grow those crops which give them better yield that is why farmers do not prefer to grow pulses because of their low yield. This again shows that farmers these days try to maximize their income from their land.

**Irrigation facilities**—Availability of irrigation facilities, mode of irrigation, cost of irrigation, timeliness, and adequate supply of irrigation water etc. were taken into consideration. Irrigation facilities were influencing 57.1 percent of the total sampled farmers. The cropping pattern of all the farmers was equally affected by irrigation facilities.

**Crop Prospects**—The farmers generally expect that they will get a certain quantity of produce from the crops they grow. But some crops are more susceptible to pest, diseases, and climatic changes, and the risk of crop failure in these crops are high. So farmers prefer growing those crops in which the risk of crop failure is low.

In the selection of crops farmers kept an eye on the prospects of that particular crop and this factor was influencing 58 percent of the total sampled farmers. Semi-medium, small, and marginal farmers are more cautious about the selection of crop for cultivation.

**Availability of HYV of Seeds and Chemical Fertilizers**—Timely availability of high yielding varieties of seeds and chemical fertilizers was the most important consideration for 23.2 percent of the total sampled farmers. The semi-medium and small farmers were very much influenced by this factor. Especially the small and marginal farmers do not put their attention on the HYV of seed because of their poor economic conditions; they can not purchase these inputs from the market. The government gives subsidies on these inputs but it was observed that almost all these facilities were availed by the large and medium farmers because they are economically and politically strong. So the small and marginal farmers have local seeds and manure which results in low returns from their land.

**Financial problems**—With the developing of new agricultural technology, indeed the cost of production has increased. But these inputs are quite expensive and apart from the economically well-off farmers, it is very difficult for most of the farmers to invest heavily for their crops.

The financial problems were influencing the cropping pattern of 41 percent of the total sampled farmers. The small and marginal farmers are worst affected by it. These farmers belong to the economically backward classes of the society. They cannot provide the necessary input in their farm and cannot take the risk of crop failure, so they do not shift their agriculture toward commercialization. Large farmers are not affected by financial problems, while medium and semi-medium farmers are marginally affected by this factor.

**Tradition**—Indian farmers are bound with their tradition, and they hesitate to make any change in their cropping pattern. Tradition and personal requirement was affecting the cropping pattern of 67.8 percent of the total sample farmers. Farmers cultivate crops according to their tradition and taste. Almost all the categories of the farmers were almost equally affected by their tradition of cropping pattern.

**Physical factors**—As we know that agricultural land use pattern is outcome of physical factors. In the study area physical factors affecting the cropping pattern of 24.1 percent of the total surveyed farmers. The district has best alluvial soil and good climatic factors so that is why the farmers have not given much importance to this factor. This region is favourable for wheat, sugarcane, and rice cultivation. Somewhere we find the problem of salinity and alkalinity and water logging in this district.

**Labour**—Availability of labour at peak season was a major problem and affecting 12.5 percent of the total sampled farmers. Large farmers were most affected followed by the medium and semi-medium farmers. The farmer’s require hired labour because they themselves are not full time associated with farm and they hold large pieces of land, their family size is not much large and also do not work in the field, so to manage their large holding, they have to depend on hired labour. On the other hand small and
marginal farmers are not at all affected by the labour because they have small piece of land but a large family size to work in the field. Every working person whether women or children, engaged in agricultural activity.

Government policies--- in the district 10.7 percent of the farmers to the total sampled farmers were influenced by the government policies. Government policies regarding distribution of loan, giving of subsidies on fertilizers and high yielding variety of crops, improving in irrigation system, land development policies etc. are for the benefit of small and marginal farmers. These policies influenced the decision of cropping in their field.

VIII. CONCLUSION

The above study of the 115 sampled farmers of all the categories and farm size shows that there is a close relationship between the socio-economic status of the farmers and cropping pattern adopted by them.

The large farmers by and large belong to the high economic status. They are strong, wealthy, educated and are politically well connected. They have a greater capacity to invest their resources, and to take risk. They are in a position to own agricultural implements, apply prescribed doses of fertilizers, high yielding varieties of seeds, pesticides, insecticides and even maintaining a permanent work force. They can take risk in changing their cropping pattern and they grow those crops which give them higher monetary benefits. Although their cropping pattern is dominated by food grains but they also specialized in the cultivation of non food grains. Wheat is the most favored food grain, which covered the bulk of the area during the rabi season, while rice and sugarcane dominated the cropping pattern during the kharif season. Apart from these crops, large farmers devote substantial area to other crops like mustard, arhar, maize etc.

The most important factor influencing the cropping pattern of the large farmers was price. The next two important factors influencing their cropping pattern were yield and tradition. Other factors which influencing the cropping pattern were crop prospects and labour. The availability of labour at peak season is very difficult. There is not a large difference between the large and medium farmers. Medium farmers have also great invest their own resources, greater capacity to take risk, better access to credit, information, education and better wealth position. There is slight difference between the large and medium farmers. Medium farmers have greater access to technology and more concentration on their farms. The intensity of cropping is highest on these farms.

The cropping pattern of the medium farmers is also dominated by food grains. In rabi season cropping pattern of these farmers is same as the large farmers but in kharif they give priority to sugarcane than rice and arhar crops.

There is no difference between the cropping pattern of the medium and semi medium farmers. The only difference is that, there is intensive utilization of land and the family members work in the fields. They generally do not hire the labour. Again the cropping pattern is dominated by food grains. Wheat during the rabi and rice and maize during the kharif season are dominant crops. Among the non-food grains sugarcane and mustard was the preferred crops. Among this category of farmers, we find that factors like irrigation facilities, availability of High Yielding Variety of seeds and chemical fertilizers and financial problems are gaining importance which shows the difference in socio-economic status of these farmers.

The small and marginal farmers generally belong to the economically under privileged section of the society. They are socially and economically backward and belong to the category of rural poor. They do not have the access to credit, technical know-how, information, education and skills etc. they do not have their own irrigation facilities and are unable to invest on input like high yielding seeds, chemical fertilizers and pesticides etc. these farmers grow food grains basically for their self consumption. There cropping pattern also dominated by food grains. In rabi season wheat and in kharif season maize and bajra are dominant crops. The only cash crop is vegetable cultivation which provides them seasonal income for sustainability. These crops are preferred because it requires low investment and also because they are growing these crops a part of their tradition. So these farmers cultivate vegetables for the market which fetches them quick money for their daily needs.

The cropping pattern of the small and marginal farmers was influenced by financial problems. But the overall study shows that farmers understand profit, so they always to maximize their profit whether belong to the large, medium, small or marginal category of land holdings.

Finally for more judicious, proper, profitable use of land and a scientific approach is advisable. District soil mapping with its condition and characteristics is to be done and the choices of the crops should be decided in combination with other factors accordingly.

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www.ijsrp.org
Comparison of Image Compression using Wavelet for Curvelet Transform & Transmission over Wireless Channel

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Department of Electronics Engineering
GHRCE Nagpur, India

Abstract- For image compression, it is very necessary that the selection of transform should reduce the size of the resultant data as compared to the original data set. In this paper, a new lossless image compression method is proposed. Image Compression is a widely addressed research area. Many compression standards have been in place. But still there is a scope for higher compression with quality reconstruction. The introduction of wavelets gave a different dimension to the compression. But there are some limitations of wavelets while handling the line and curve singularities in the image. There are transforms beyond wavelets namely – Curvelet Transforms. This paper aims at the analysis of compression using Curvelet & Wavelet Transform. The Curvelet Transform gives better performance in terms of PSNR. Wavelet performs the least and is also affected by the blocking artifacts. By selecting proper thresholding method, better results for PSNR have been obtained. Again This paper presents an efficient scheme to transmit JPEG coded images over wireless channels. The compressed image is protected against various channel effects of wireless channel using Reed solomon block code and transmitted over wireless channel.

Index Terms- Image compression, Curvelet transform, Wavelet Transform, Wireless channel effect

I. INTRODUCTION

Image compression means reducing the volume of data for representing an image. The main aim of image compression is to reduce both spatial and spectral redundancy to store or transmit data in a proper manner. After the compression of an image, it is reconstructed at the receiver to reproduce the original image. Various compression techniques are used for this purpose. In lossless image compression, some form of entropy coding is used, while in lossy compression transform coding and predictive coding is used. This paper is connected with lossy image compression using two transforms- Curvelet & Wavelet. Objective Metrics for Compression are:

1. Compression Factor (CF) = (size of input stream) / (size of output stream)
2. Mean squared error (MSE) = 1/kΣ (Pi-Qi)²
3. Root mean squared error (RMSE) = √MSE

Where Pi – Original image data, Qi – Reconstructed image data, k – size of image.

4. PSNR = 20 log₁₀{max(pi)/RMSE}[17].

II. WAVELET TRANSFORM

Wavelets are functions defined over a finite interval and having an average value of zero. The basic idea of the wavelet transform is to represent any arbitrary function (t) as a superposition of a set of such wavelets or basic functions. These basic functions or baby wavelets are obtained from a single prototype wavelet called the mother wavelet, by dilation and translation operation. Discrete Wavelet Transform of a finite length signal s(n) having N components, for image is expressed by an N x N matrix. [1][12]

A. Wavelet Filter Decomposition and Sub-Band Coding

1) Wavelet Filter Decomposition

For the designing of filters, sub-band coding is used. Sub-band coding is a coding strategy that tries to isolate different characteristics of a signal in a way that collects the signal energy into few components. This is referred to as energy compaction. Energy compaction is desirable because it is easier to efficiently encode these components than the signal.

The most commonly used implementation of the discrete wavelet transform (DWT) consists of recursive application of the low-pass/high-pass one-dimensional (1-D) filter bank successively along the horizontal and vertical directions of the image. The low-pass filter provides the smooth approximation coefficients while the high-pass filter is used to extract the detail coefficients at a given resolution. Both low-pass and high-pass filters are called sub-bands. The number of decompositions performed on original image to obtain sub bands is called sub-band decomposition level. The high pass sub-band represents residual information of the original image, needed for the perfect reconstruction of the original image from the low-pass sub-band while the low pass sub-band represents a down sampled low-resolution version of the original image. It is used for computer and human vision, musical tone generation, FBI fingerprint compression.

The filtering step is followed by a sub-sampling operation that decreases the resolution from one transformation level to the other. After applying the 2-D filter bank at a given level n, the detail coefficients are output, while the whole filter bank is applied again upon the approximation image until the desired maximum resolution is achieved. Fig.1 shows wavelet filter decomposition. The sub-bands are labeled by using the following symbols [4][8].
1. \(LL_n\) is the approximation image at resolution (level decomposition) \(n\), resulting from low-pass filtering in the vertical and horizontal directions.

2. \(HL_n\) represents the vertical details at resolution \(n\), and results from vertical low-pass filtering and horizontal high-pass filtering.

3. \(LH_n\) represents the horizontal details at resolution \(n\), and results from horizontal low-pass filtering and vertical high-pass filtering.

4. \(HH_n\) represents the diagonal details at resolution \(n\), and results from high-pass filtering in both directions.

A new multi-resolution transform was developed by Candés and Donoho [13] in 1999 known as curvelet transform as a result of motivation to take away the drawbacks associated with wavelet transform. The transform that is a two-dimensional anisotropic extension of wavelet, originally designed to represent edges and other singularities along curves much more efficiently than traditional wavelet transforms. Although curvelets is an extension of wavelets but there exists a correspondence between curvelet and wavelet subbands. The basic flaw that wavelet transform exhibits, is its inability to represent edge discontinuities along curves. Less number of coefficients is required in compression process but several wavelet coefficients are used to reconstruct edges properly along the curves. This is due to the reason that in a map of large wavelet coefficients, edges repeat at scale after scale. There was a need of a transform that handle two dimensional singularities along the curves sparsely. This led to the birth of new multi-resolution curvelet transform. Curvelet basis elements possess wavelet basis function qualities but these also oriented at a variety of directions and so represent edge discontinuities and other singularities well than wavelet transform [7].

Curvelet transform is a special member of the multiscale geometric transforms [15, 16, 17]. It is a transform with multiscale pyramid with many directions at each length and scale. Curvelets will be superior over wavelets in following cases:

i) Optimal sparse representation of objects with edges.

ii) Optimal image reconstruction in severely ill-posed problems.

iii) Optimal sparse representation of wave propagators.

Curvelets are initially introduced by Candes and Donoho [16].

Suppose we have a function \(f\) which has a discontinuity across a curve, and which is smooth otherwise, and consider approximating \(f\) from the best \(m\) terms in the Fourier expansion.

The squared error of such an \(m\)-term expansion obeys:

\[
\| f - \hat{f}_m \|^2_2 \approx 1/m, \quad m \to +\infty
\]

In a wavelet expansion, we have

\[
\| f - \hat{f}_m \|^2_2 \approx 1/m, \quad m \to +\infty
\]

\((\hat{f}_m\) is the approximation from \(m\) best Wavelet coefficients \(\) In a curvelet expansion (Donoho and Candes, 2000), we have

\[
\| f - \hat{f}_m \|^2_2 \approx m^{-2} \log(m), m \to +\infty
\]

\((\hat{f}_m\) is the approximation from \(m\) best Curvelet coefficients \(\)

This shows that the mean squared error will be reduced in curvelets.

A fast and accurate discrete curvelet transform operating on digital data is required to use curvelet transform in various applications. This Fast Discrete Curvelet Transform (FDCT) is described in [15]. Fig.2 indicates the Curvelet tiling.

Contrary to wavelets’ isotropic principle where length and width of support frame is of equal size, in curvelet transform the width and length are related by the relation \(width \approx length^2\) that is known as parabolic or anisotropic scaling [14]. Moreover, frame elements in curvelets indexed by scale, location and orientation parameters in contrast to wavelets where elements have only scale and location parameters.

The basic flaw that wavelet transform exhibits, is its inability to represent edge discontinuities along curves. Less number of coefficients is required in compression process but several wavelet coefficients are used to reconstruct edges properly along the curves. This is due to the reason that in a map of large wavelet coefficients, edges repeat at scale after scale. There was a need of a transform that handle two dimensional singularities along the curves sparsely. This led to the birth of new multi-resolution curvelet transform. Curvelet basis elements possess wavelet basis function qualities but these also oriented at a variety of directions and so represent edge discontinuities and other singularities well than wavelet transform [7].

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Curvelets are initially introduced by Candes and Donoho [16].
\[ k = (k_1, k_2) \in \mathbb{Z}^2 \]
and the Curvelets are defined (as a function of \( x = (x_1, x_2) \)) at scale \( 2^{-j} \), orientation angle \( \theta \) and position.
\[
R_{\theta} = k_1 2^{-j}, k_2 2^{-j/2}
\]
by
\[
\Psi_{j,k}(x) = \Psi_j(R_{\theta}(x - k_1 2^{-j}, k_2 2^{-j/2}))
\]
where \( R_{\theta} \) is the rotation by \( \theta \) radians.

A curvelet coefficient is the inner product between an element \( f \in L^2(\mathbb{R}^2) \) and a curvelet \( \Psi_{j,l,k} \),
\[
c(j,l,k) = \int_{\mathbb{R}^2} f(x) \overline{\Psi_{j,l,k}(x)} \, dx
\]

This theory is explained in detail in [13]. Curvelet transform obeys a anisotropy scaling relation,
\[
\text{length} \approx 2^{-j/2}, \text{width} = 2^{-j}, \Rightarrow \text{width} \approx \text{length}^2
\]

This is also called as a Curve scaling law [15]

Fast digital curvelet transforms can be implemented via two methods i) using Unequispaced FFTs ii) using Wrapping. This paper makes use of the method using unequispaced FFTs [13].

### IV. EXPERIMENTATION USING CURVELET TRANSFORM

The experimentation is based on three transforms namely, Curvelet, Wavelet and Ridgelet Transform. The images are selected from the set of standard images. The image is compressed with ‘sym4’ filter. The transform is invertible, non-redundant and computed via fast algorithms. Further, this construction experimentation is done on many images. But the results of only five images are given here. Similar trend is observed in other images too.

Results for Compression metrics, the Root Mean Square Error (RMSE) and Peak Signal-to-noise Ratio (PSNR) are tabulated. Specific thresholding method (hard thresholding) is used in each of the transform. Details are indicated below in each of the cases. MATLAB computation platform is used with necessary tool boxes.

i) Curvelet Transform:
Number of scales used is **three** in both the transforms. Flowchart for the method is given in Figure 3, \( v \) indicates threshold value.

Since the effect of transform on compression is the emphasis of this paper, the stages of entropy coding and decoding is not discussed. Other methods are expressed using algorithms.

### V. WIRELESS TRANSMISSION CHANNELS AND THEIR EFFECTS

Nowadays, wireless communications have captured a great attention. Due to multipath effects of wireless channel the received signal is equal to the sum of attenuated, delayed, and phase-shifted replicas of the transmitted signal. The transmission of JPEG images over noisy channels can lead to severe consequences on decoded visual information. The reason for such high error sensitivity is the Variable Length Coding schemes. Thus designing a system for image transmission over wireless channel remains a major issue. A number of solutions have already been designed for image transmission over wireless channels. Optimized product codes consisting of Turbo codes and Reed- Solomon code have been implemented for JPEG transmission. RS code is tested over an AWGN and Rayleigh fading channel [9] [10]. RS codes provide highly reliable performance in the mobile environment.

### VI. RESULTS

The RMSE and PSNR for both the transforms is tabulated. The PSNR values using curvelets are better. The PSNR in wavelet case is the least. Table I gives the comparison of compression performance. Compression Factor (CF) is calculated as the ratio of number of Input pixels to number of retained coefficients. The CF itself is called as Compression Ratio in the Figures.
VII. CONCLUSION

In this work, we have presented a comparison of image compression using two transforms i.e. wavelet & curvelet transform. Curvelet Transform gives the best performance for PSNR. But the subjective visual inspection shows that the Curvelet is the best for Compression out of two transforms. This can be seen from the images given below in Figure 4. Even though the most significant subband is retained in case of wavelet, its performance is poor and has annoying blocking artifacts when the numbers of retained coefficients is low (higher compression factor).

This shows that the Curvelet Transforms are more suitable for the image data to represent the singularities over geometric structures in the image, than the Wavelet counterpart. Curvelet is designed to age data to represent handle the singularities on curves. Wavelets are effective for point singularities.

Transmission over wireless channel remains a major issue. Many techniques have been proposed for the transmission of images over wireless networks.

<table>
<thead>
<tr>
<th>Table 1: Compression Performance</th>
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<td><strong>Transform</strong></td>
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</tr>
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<tr>
<td>Curvelet</td>
</tr>
<tr>
<td>Wavelet</td>
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<td>Curvelet</td>
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<td>Wavelet</td>
</tr>
<tr>
<td>Curvelet</td>
</tr>
<tr>
<td>Wavelet</td>
</tr>
<tr>
<td>2. F1 - cameraman.tif, Size - 256 x 256</td>
</tr>
<tr>
<td>Curvelet</td>
</tr>
<tr>
<td>Wavelet</td>
</tr>
<tr>
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</tr>
<tr>
<td>Curvelet</td>
</tr>
<tr>
<td>Wavelet</td>
</tr>
</tbody>
</table>

Figure 4: A Few Result Images with their Reconstruction for different Compression Factors CF – Compression factor.
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AUTHORS

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Analysis & Proposed Model of Maintenance & Replacement Policies in Fleet Management System Using Data Mining

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Abstract- One of the major issues in Intelligent Transport System is Fleet Management. Patterns and categorization of record data is very essential for effective decision creation. Timely prediction of latest up-and-coming trends is also required in business. Sales and maintenance patterns from inventory data indicate market trends, maintenance behaviour respectively and can be used in prediction which provides help in effective decision support system, contriving and analyzing market trends. Main accusative in this research is to craft an effective fleet management approach that includes policies and procedures on acquisition, maintenance, replacement and disposal of vehicles. So that cost effectiveness and efficiency of a locality's fleet operation can be improved.

Index Terms- Fleet Management System, Fleet Performance, K-means clustering, Knowledge discovery Database (KDD).

I. INTRODUCTION

The computerization of marketing operations, global connectivity and the automated software’s support has completely altered the main basic concept of business and the way the various business operations are being carried out. Fleet management is not an exception to it. Fleet Management System has also witnessed a tremendous change in the way the various Fleet Management operations are carried out. The computerization of Maintenance may be seen as an action for retaining or restoring a piece of equipment, machine, or system to the specified operable condition to achieve its maximum useful life Fleet requirements sometimes involve modification of commercial vehicles.

1.1 Changing role of fleet managers

New organizational structures and expanded computing options have dramatically changed the nature of fleet management. Twenty years ago, maintaining equipments generally the only responsibility that the maintenance manager had and he did this within a budget allocated to him by upper management. Today, the role of the fleet manager has expanded from "fleet only" to total maintenance management. Fleet managers must not only complete tasks but must also take responsibility for outcomes. The role of a fleet manager has changed:

• From operations specialists to marketing and communications experts
• From hoarding resources to sharing resources.
• From a total focus on cost to total customer satisfaction.
• From a focus on downtime to one on reliable availability.
• From shop mechanic to computer technician.
• From total ownership of all equipment to the maximization of capital and technology.

Fleet management systems allow for planned and scheduled maintenance. Planned or scheduled maintenance is considerably less expensive than running repairs performed in response to in-service failures. Industry consultants estimate that planned maintenance can effectively reduce per-incident maintenance costs by 50%. Shops that take a proactive approach to this work by proper planning and scheduling can improve overall productivity by as much as 15% to 20%.

1.2 Data Mining:

Generally, data mining is the process of analyzing data from different perspectives and summarizing it into useful information - information that can be used to increase revenue, cuts costs, or both. Data mining is one of a number of analytical tools for analyzing data. It allows users to analyze data from many different dimensions or angles, categorize it, and summarize the relationships identified. Technically, data mining is the process of finding correlations or patterns among dozens of fields in large relational databases. Through the use of automated statistical analysis (or "data mining") techniques, businesses are discovering new trends and patterns of behavior that previously went unnoticed. Once they've uncovered this vital intelligence, it can be used in a predictive manner for a variety of applications.

Results of Data Mining Include:

• Forecasting what may happen in the future.
• Classifying groups by recognizing patterns.
• Clustering groups based on their attributes.
• Associating what events are likely to occur together.
• Sequencing what events are likely to lead to later events.

II. LITERATURE SURVEY

Today's fleet management systems have evolved into powerful, high-tech tools that impact both the day-to-day operation of a maintenance department and the overall performance of a transit agency. Fleet financial data once important only to the accounting department is now generating profit-and-loss information at the repair-shop level. Data that was once difficult to access is now at one's fingertips and can easily be manipulated into a variety of management formats. This paper
contributes to the humanitarian logistics literature and to the incentives alignment literature.

In fleet operations management the extant literature on humanitarian logistics follows a classical optimization approach. Most of the research examines relief systems for disaster preparedness disaster response or for timely dispatching problem. Typically, those papers apply operations research techniques to relief operations or to the vehicle route management taking a central planner approach. The objective can be equity or cost-efficiency oriented. Data Mining algorithm can be better understand in the work of Wu X., Yang Q., Motoda H[1].

Works regarding K-Mean implementation algorithm can be found in work of Thangavel et al [3] as he used the K-means clustering algorithm to analyze. K-means Cost-based objective functions are often represented either via monetary cost or via travel distance. Cost minimization can be found in the work of Beamon and Kotleba [7]. Works regarding the analyzing of large database through expert system can be well understand in the work of Nassar K. [6]. Analysis of management algorithms is studied from the work of Mazurkiewicz, Tomasz and Walkowiak [14].

III. PROBLEM FORMULATION

Now a days most of the concept of Fleet Management has been moved to centralized database which has made fleet management system technically strong and more beneficiary for satisfaction of customer. In the present scenario, the huge amount of electronic data is being maintained by various fleet oriented agencies. The huge size of these database records makes it difficult or even impossible for the fleet manager to analyze these databases and to obtain useful facts/results as per the need of the fleet manager. Most of the fleet manager generally uses concept of Management Information System, through which fleet managers are generating various kinds of reports, which are then presented and analyzed for the decision making related to various traits of fleet with in the agency. However these reports available in the summarized form can be used by the governing authorities. While dealing with fleet management sector is quite cumbersome task. The fleet managers at present generate reports from the periodic paper reports and the statements as lay down by various constitue units. Such reports have a high extent of error, due to data being recorded and clarified by variety of parties at variety of levels.

The solution seems to be in incorporating the thought of data warehousing and data mining. Due to the enormous growth of the perspective of the data and its multivariate uses, the agencies and the individuals are feeling requirement for various centralized data management and retrieval system. The centralization of the data is necessary fundamentally for better processing and in turn facilitating the user access and analysis. So for analyzing these centralize data and to extract knowledge hidden from these databases we use the concept of Data Mining. The focus of our research is to craft an effective fleet management system that includes policies and procedures on acquisition, maintenance, replacement and disposal of vehicles at the optimum stage, so that cost effectiveness and efficiency of a locality’s fleet operation can be improved which is different from the prior researched works.

3.1 Use of k-means Algorithm:
The k-means algorithm is an evolutionary algorithm that clusters observations into k groups, where k is provided as an input parameter. It then assigns each observation to clusters based upon the observation’s proximity to the mean of the cluster. The cluster’s mean is then recomputed and the process begins again. Here’s how the algorithm works:

- The algorithm arbitrarily selects k points as the initial cluster centres (“means”).
- Each point in the dataset is assigned to the closed cluster, based upon the Euclidean distance between each point and each cluster center.
- Each cluster center is recomputed as the average of the points in that cluster.

Steps 2 and 3 repeat until the clusters converge. Convergence may be defined differently depending upon the implementation, but it normally means that either no observations change clusters when steps 2 and 3 are repeated or that the changes do not make a material difference in the definition of the clusters.

Mathematically, algorithm aims at minimizing and objective function, in this case a squared error function. The objective function-

\[
J = \sum_{j=1}^{k} \sum_{i=1}^{n} ||x_i^{(j)} - c_j||^2
\]

Where \( ||x^{(j)} - c_j||^2 \) is a chosen distance measure between a data point \((j) i x \) and the cluster center \( j c \), is an indicator of the distance of the n data points from their respective cluster centers.

IV. PROPOSED WORK

In this paper we proposed an a model for mining patterns of huge stock data to analyse the factors affecting the fleet’s maintenance and depreciation. In the first phase, we filter out the data from the database, OLTP and flat files in three different clusters by applying some preprocessing filters. On the basis of the preprocessing filter result we will design the algorithm to get the results in different clusters i.e. Low-Maintenance (LM), Medium -Maintenance (MM) and High-Maintenance (HM) using K-means algorithm. In the second phase we have proposed Most Frequent Pattern (MFP) algorithm to find frequencies of property values of the corresponding items to analyse the factors such as Maintenance system and Depreciation system so that on the basis of the results we can easily analyse and can get the cost effective decision making.
Clustering Segment by-segment sales forecasting can produce very useful information. The forecasting can be categorized as per according to the use VIP category, common category, and rarely used category. However, it is also very useful to understand the different vehicle’s performance in real market and also helps in comparison in terms of their maintenance and depreciation value. Effective inventory management enables an organization to meet or exceed User’s expectations of Comfort while maximizing net profits and minimizing costs during the usage life time of the vehicle as used by the user. Only through data mining it is possible to extract useful pattern and association from the stock data.

V. CONCLUSION AND FUTURE WORK

In this paper, a clear analysis of the different vehicles performance in terms of their maintenance and depreciation is done and user can evaluate the useful results. Content state of different vehicles standard is being defined. Also, a functional proposed model of fleet management system is presented here. The exchange of system workflows is also being defined in this paper. Fleet management standard as defined provides categorisation of vehicles under different categories based upon their resulting cluster values and on the basis of that resulting value final result will be manipulated using decision making analysis.

The database usage data mining technique is described in this paper, which is a non-trivial process of extracting useful and previously unknown patterns from the use of Web. The future goal of this research is to develop a new model, by combining the most desirable traits of what currently exists and implementing some new ideas, which is optimal for developing fleet mileage management systems so that mileage related performance of various vehicles can be analysed for wider analysis.

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Each of us is endowed with preferred mode of thinking that plays a predominant role in neural reception and processing of information. A simple model developed by William "Ned" Herrmann (1922 - December 24, 1999) a Nobel scholar in creative thinking, and brain dominance theory which classifies four impressions to illustrate how brain perceives and processes information. Four designated mode of thinking are: 1) analytical thinking, 2) sequential thinking, 3) interpersonal thinking; 4) imagination thinking. Interestingly, as against the phenomenon of whole brain thinking perspective, human beings have an innate proclivity for a particular mode of thinking which governs and dictates their domain of thought process to a limited periphery. We may infer that obsessive preference for a particular mode of thinking results in to involuntary divorce from other modes of thinking patterns.

In pursuance to the subject matter of this paper, inexorably in the context of 21st century whole brain thinking perspective is a key to organizational success. The conscious adoption of whole brain thinking perspective has limitless potential to give organization the plethora of opportunities to widen an otherwise parochial canvass of rudimentary and monotonous thinking, the novel way of assimilating the opportunities and problems, to usher in cutting edge world class practices, to build and retain intellectual human capital, to escalate agility for faster adoption of changes so as to give new lease of life to the organization, to ameliorate the psychological health of the organization, to scale up the standards of performance and to have unique competitive edge, to name a few. Using whole brain thinking essentially means to be able to utilize the thinking preference of each of the four quadrants: upper and lower part of left and right brain.

The quality of strategic decision making ultimately determines the longevity and fate of the organization. The application of whole brain dominance perspective can be a beckon of hope for such organizations enamored for obsessed fractured and volatile decisions. Most decisions can be benefited from the process of reviewing kaleidoscopic multiple options and perspectives. Thinkers can review situation with more flexibility with all four quadrants which can contribute to a better choice of decision and avoid going back to drawing board time and over again and unpleasant surprises.

Another use of whole brain dominance perspective is in problem solving process. Each of four quadrants is under review in order to troubleshoot the problem from different perspective of view. More so applications of whole brain dominance perspective are to improve the team interactions and performance. Whole brain thinking can help a team to acknowledge the differences among team members and then use those differences to make the most of the ideas of each team member. After all successful business is nothing but minting of novel ideas.

Innovate or fall behind and perish: the competitive imperative for virtually all businesses today is a concrete reality of knowledge economy. Achieving it is hard; however, innovation can take place when different ideas, perceptions, and ways of processing and judging information collide. That, in turn, often requires collaboration among various players who see the world in inherently different ways. The collusion of psychedelic ideas can be converted into commercial reality and the citadel of organizational uniqueness can be built by the dint of collaborative whole brain thinking culture. Nonetheless, in this context we can ill afford to turn a blind eye on the issue of handling a human resource.

Generally, managers have two responses to this phenomenon. On the one hand, managers who dislike conflict—or value only their own approach—actively avoid the clash of ideas. They hire and reward people of a particular stripe, usually people like themselves. Their organizations fall victim to what we call the comfortable clone syndrome: coworkers share similar interests and training; everyone thinks alike. Because all ideas pass through similar cognitive screens, only familiar ones survive. For example, a new-business development group formed entirely of employees with the same disciplinary background and set of experiences will assess every idea with an unvarying set of assumptions and analytical tools. Such a group will struggle to innovate, often in vain.

On the other hand, managers who value employees with a variety of thinking styles frequently don’t understand how to manage them. They act as if locking a group of diverse individuals in the same room will necessarily result in a creative solution to a problem. They overlook the fact that people with different styles often don’t understand or respect one another, and that such differences can fuel personal disagreements. The "detail guy" dismisses the "vision thing"; the "concept man" deplores endless analysis; and the individualist considers the demands of a team an utter waste of time. They simply can’t work together without help.

The manager successful at fostering innovations figures out how to get different approaches to grate against one another productively, in a modern management parlance it is called as creative abrasion. Such a manager understands that different people have different thinking styles: analytical or intuitive, conceptual or experiential, social or independent, logical or values driven. He deliberately designs a full spectrum of approaches and perspectives into his organization—whether that organization is a team, a work group, or an entire company—and he understands that cognitively diverse people must respect the
thinking styles of others. He sets ground rules congenial ambience for working together to nurture the creative process. Above all, the manager who wants to encourage innovation in organization needs to examine what he ought to do to promote and ought not to do to inhibit creative abrasion.

What we call cognitive differences are varying approaches to perceiving and assimilating data, making decisions, solving problems, and relating to other people. These approaches are preferences (not to be confused with skills or abilities). For instance, you may prefer to approach problems intuitively but in fact may be better trained to approach them analytically. Preferences are not rigid: most people can draw on a mixture of approaches and do not live their lives within narrow cognitive boundaries. We often stretch outside the borders of our preferred operating modes if the conditions are right and the stakes are high enough. That said, we all tend to have one or two preferred habits of thought that influence our decision-making styles and our interactions with others—for good or for ill.

The most widely recognized cognitive distinction is between left-brained and right-brained ways of thinking. This categorization is more powerful metaphorically than it is accurate physiologically; not all the functions commonly associated with the left brain are located on the left side of the cortex and not all so-called right-brained functions are located on the right. Still, the simple description does usefully capture radically different ways of thinking. An analytical, logical, and sequential approach to problem framing and solving (left-brained thinking) clearly differs from an intuitive, values-based, and nonlinear one (right-brained thinking).

Cognitive preferences also reveal themselves in work styles and decision-making activities. Take collaboration as opposed to independence. Some people prefer to work together on solving problems, whereas others prefer to gather, absorb, and process information by themselves. Each type does its best work under different conditions. Or consider thinking as opposed to feeling. Some people evaluate evidence and make decisions through a structured, logical process, whereas others rely on their values and emotions to guide them to the appropriate action.

Left-Right Brain theory jumped from cocktail party conversation to credible science in the past decade. Functional Magnetic Resonance Imaging (fMRI), the latest testing technology, has allowed scientists to open up the hood and peak into the machinery of the human brain. Here’s how it works - a researcher guides your thoughts in a specific direction and monitors changes in blood flow within your brain. Each lobe of the brain functions to “process” different kinds of information. The Left Brain processes speech, time, and sequential information. The Right Brain recognizes pictures, faces and spatial concepts. For simplicity sake, we can think of the Left Brain as a logical, analyzing, and computer like organ. Our Left Brain understands calculations, realizes time measurements, and gathers objective data. At the same time, our Right Brain sees pictures, picks up on voice inflections, senses emotion and things like body language.

The successful managers they tend to toss ideas around in their mind, waiting for the magic solution or next brilliant idea. No doubt, it will come - but then what? Most managers will come up with more than one great idea and they merge in the brain to confuse, overwhelm and produce frustration. Making lists of your ideas is a good way to get them out of your mind but doesn't offer much opportunity for exploration and expansion of your concept. How can we take our ideas, goals, and problem solving to the next level is a crucial aspect.

The “Information Age” is giving way to a whole new world where right brain thinkers and whole mind thinking are the power weapons necessary to create success. People and companies are recreating themselves, learning to think differently, becoming more creative, empathetic and purpose-driven. Most of information and technology companies have a “greater purpose” for running a successful business, a purpose that takes them beyond the profits. Here we can cite the examples of Apple and IBM giants as innovative companies.

Mind Mapping can be an effective tool which gives us an opportunity to engage right brain thinking. It's a creative process that is easy for the brain to follow, expand upon, and the key to mind mapping is asking the next question, drilling down and then drilling down some more.

On the flip side when an organization becomes right-brain dominated it tends to become chaotic and inconsistent, failing to produce coherent offerings that make sense to the marketplace. Often, former glories are overshadowed by flashy, complicated products and services that are pale imitations of their predecessors. As new releases fail to make market attraction, resources become scarce and desperation sets in.

Creativity is looked to as a lifeline, but more creativity is not the answer. It’s more likely the left-brained guy in the corner with his arms folded tightly that holds the answers.

The solution to an organization dominated by the right-brain (feel, imagine, instinct, belief, fantasy, risk and possibility) is to open the door to the left brain (logic, details, facts, know, science, reality and safe). Success lies in balance, coordination and in that great 80s management concept: synergy.

A belief that if only more organizations had KPIs, budgets and comprehensive business plans, then they would soar to the lofty heights of greatness. Analysis, research and evidence: these are the faces of the triune god of the left-brainer.

Just as the right-brain dominated organization is likely to explode supernova-style, so the left-brain dominated organization is destined to implode and die; a big boring black hole.

Left-brain dominated organizations have more than their fair share of problems, and they tend to revolve around being stale. As with the right-brain dominated organizations, the strategic plan will be a good barometer to start with.

The left-brain organization will embrace strategic planning because it has become conventional business wisdom, and the left-brain oriented value precedent very highly - it mitigates risk. The strategic plan will be full of business jargon and will probably be a lengthy document. It will be detailed, rational and coherent. It will also tend to be dull and uninspiring, lacking humanity. The strategic plan will often be used as a bastion of the tried and true, as a justifier of repetition of existing business models and outputs. The strategic plan will be a tool for stifling creativity and innovation because the An organization that is left-brain dominated will probably be seeing some worrying trends. Revenues are likely to be primarily from products and services that have been in the market for some time. Revenue from new products and services (a KPI for companies like Hewlett-
Packard) is likely to be minimal. Many inside the organization will likely be concerned that market share is shrinking as more innovative competitor products steal customers away.

This organization, focused on analysis and safety, on patch-protection and conventionality, will find it very difficult to sustain a competitive advantage. By now competitors will have worked out what it does well and will, in most cases, have figured out how to short-circuit or render irrelevant this competitive advantage.

Left-brain dominated organizations tend to start life more balanced than they end up. They do good research, good analysis and come up with a well-thought-out product. Then they get scared.

They cling to this success, minimize risk and make typically small, incremental changes to products and services regardless of the pace of change the market is experiencing. Customers that start out loyal grow, over time, increasingly frustrated that the company they felt so good about has become detached from the market. They persevere for a while based on the initial goodwill generated by the original offerings, then they shrug and move on to a more balanced competitor.

It is probably more difficult to identify the left-brain dominated organization than its right-brain counterpart, because it can look so solid from the outside. The proverbial ducks are normally in a very tidy and orderly row.

There is no chaos or obvious disorganization. There are processes, systems and policies.

There are not the obvious external injuries of the right-brain dominated organization, but rather a slow internal bleed.

Those with new ideas find their creativity stifled by a slew of stage-gates, proofs of concept and contradictory precedents. Those wishing to take a risk by doing something new find themselves struggling up an unassailable hill.

The status quo is religiously and skillfully protected by the left-brain dominated. It is safe and knowable and, despite the risks of staying where you are, to the left-brainers those risks are preferable to venturing into the unknown.

The problem in addressing these issues is that the left-brain dominated organization is inherently suspicious of new ideas. Suggesting a paradigm shift, a re-balancing of how business and design is done, is likely to be met with a frosty reception.

So the key here is good evidence and a solid argument. Left-brain dominated organizations won’t change because someone happens to think that’s a good idea. They’ll need to be persuaded.

The key to unlocking the potential of the left-brain dominated organization and producing more inspiring and compelling market offerings is to embrace design principles that demand more creativity.

Design industry for example has crafted a set of Ten Design Principles that ensure that the creative and the analytical are kept in balance. In this article we are dealing with the principles that are focused on upholding the ‘softer’ values that the left-brained are inclined to neglect.

The left-brained organizations have blindfolded obsession that is bound by precedent. When thought processes skip creativity and jump to obvious conclusions, opportunities are lost.

It is during this phase that the right-brain must be released to roam free. This is the domain of possibility and imagination, of helping and growing and ‘what ifs’. The left–brain dominated organization must embrace the discipline of diversity in order to succeed. This means that dissent must not be just encouraged but demanded. Alternatives to any new idea must be generated whether they are desired or not, just to break the mould of ‘beige thinking’.

The concept of nonlinear thinking has produced miraculous results it is about rejecting isolationism or insularity. It is about sourcing a diverse range of inputs to stimulate non-traditional and non-linear thinking. It’s about getting out and walking amongst the people, reading books and magazines from unrelated fields.

Eclecticism is another way which means broadening your horizons for sources of inspiration. An accountant may come up with a new idea for a service by visiting a fast food restaurant. A computer expert may come up with a new mouse by watching a child stroke a real mouse.

While many of these ‘accidents’ may happen serendipitously, it’s amazing how many connections one can make when one looks for them. Smart organizations ensure that those involved with design of products and services look outwards to the world for inspiration. Left-brain dominated organizations need this even more.

Contextuality is the enemy of precedent. Contextuality acknowledges that each product and service design must intimately match the particular characteristics of its target market. Simply because an idea or strategy worked for Company A doesn’t mean we can transplant it into Company B and make it work. Creativity cannot be outsourced in this way.

The left-brain dominated organization must re-attach itself to its target markets and understand how the contexts in which their customers operate change. A product or design that was contextually appropriate last year may now be contextually inappropriate if that context has changed.

Left-brain dominated organizations can tend to forget that business is not revenue targets, market segments and rational decision-making. Business is the interaction of emotional human beings with goals, aspirations, needs and insecurities.

User-focus is about designing products and services that make an emotional connection with the end-user. Those products that win loyalty are those that intuitively understand how the user wants to feel and interact with them.

Apple has so many raving – and sometimes irrational – fans because it gets this right. It reaches out to the user with its products and says ‘I get you. I know about your life and what you want to do and I have just the thing for you.

Left-brain dominated organizations, not surprisingly, perilously struggle in this department. They tend to distance themselves from end-users to the point of alienating them. They can be aloof and project arrogance and give customers every encouragement to try out the competitor’s wares.

A left-brain dominated organization has so much right in terms of consistent systems, rigorous analysis and evidence-based management.

It doesn’t act impulsively but is measured, cautious and skeptical, all critical elements in uncertain times.

But the world changes fast and people change fast and the left-brainers can find themselves relegated to has-beens if they do not stay in touch with what’s going on. The left-brain dominated
organization will, if it fails to generate new ideas and exercise creative product and service development, steadily become more and more irrelevant. It will lose market share, see revenues drop and eventually become a cautionary case-study.

Only by embracing the ‘frightening’, ‘uncontrollable’ and ‘wild’ tendencies of the right-brain perspective will the left-brain dominated organization correct its imbalance and protect its future.

The age old scales are tipping away from what it used to take for people to get ahead—logical, linear, left-brain, and spreadsheet-type abilities—in favor of abilities like artistry, empathy, and big-picture thinking, which are becoming more valuable.

Left-brain skills are still absolutely necessary in our complex world. They’re just not sufficient anymore. Advertising industries are right brained organizations we can cite the phenomenal success of an advertising firm of global repute and no one in the global ranking

Besides advertising, another example is the motion picture industry, which is about narrative, or story-telling. Increasingly fast moving consumer products companies are also tapping into right-brain skills for ex. Hindustan lever limited.

Procter & Gamble, for instance, is relying more and more on design. And Target is competing successfully against Wal-Mart, not on the left-brain dimension of price, but on the right-brain dimension of design.

The grocery chain, like Big Bazar is an interesting example. The retail grocery industry is a low-margin, cutthroat business. And yet, Big Bazar can extract premium prices by appealing to customers using the right-brain sensibility of wholeness and the back stories of products as a differentiator.

The success of Wall mart is phenomenal. The figures are impressive on every dimension—number of stores opened, revenue, profits, and stock price. In a business where the typical strategy is to go for economies of scale, cut costs, and eke out a tiny bit more of a margin, Wall mart has taken a different tack.

The focus of Wall mart is on the customer’s grocery shopping for the family as a holistic experience. It’s about wellness, and doing something good for the world on a small scale. That approach may seem touchy-feely, but Wall mart is outperforming every other grocery chain in America.

At a shareholders’ meeting, former GM Vice Chairman Bob Lutz said, “What we’ve got at GM now is a general comprehension that you can’t run this business by the left, intellectual, analytical side of the brain. You have to have a lot of right side, creative input. We are in the arts and entertainment business, and we’re putting a huge emphasis on world-class design.”

That was a 70-year-old former Marine saying we tried running the company in a left-brain way and it didn’t work. We have to start running it in a right-brain way. Lutz is a serious figure in the automotive industry. When GM is in the arts business, we’re all in the arts business.

Hiring people who have the kind of right-brain abilities that can’t be outsourced or automated, and that satisfy some of the non-material needs of this abundant age is a need of the hour. If you peel that back, what you want is people who are intrinsically motivated. That is, they are doing what they love. And it tends to be right-brain activities that generate that kind of motivation.

For instance, people don’t become designers because they want to make a gazillion dollars, but because they love it. They’re almost compelled to do it. Same thing is true with story-telling and even empathy. These abilities are part of our nature—the things that we’re motivated to do, not for the extrinsic rewards, but for internal fulfillment, joy, and challenge.

Now it turns out happily enough that these abilities increasingly confer an economic advantage. So hire people who are intrinsically motivated. They will end up doing great work, and they display abilities that have enormous value in a world where so many other skills can be outsourced or digitized.

Many people went into the professions out of a sense of economic need, which made perfect sense. But maybe they weren’t naturally motivated in that direction. We can see an increasing congruence between the talents that confer an advantage in labor markets and what people are intrinsically motivated to do.

In the past, people “dropped out” of the corporate rat race to do what they really loved. Doing what you love is the best way to reach your professional goals.

The counsel to do what you love is actually very hardheaded advice right now. It’s not just an idealistic notion. I think it’s the best way to get ahead today. And that was not necessarily true in 1950.

There’s a study that shows fewer and fewer young people want to become computer programmers. Partly that’s a reaction to what they perceive to be labor market signals because they see so many stories about programming jobs going overseas.

But the other thing people are saying is that a lot of computer programming is fairly routine, or rote. People are, in some cases, willing to do routine work. If it generates a high income, people are willing to make that trade off.

But work that is routine has the potential for off shoring or automation. And so, people may be saying, it’s not that fun or creative to begin with, but it also doesn’t confer reliable rewards. What confers the greatest rewards and what we want to do anyway is the stuff that taps greater artistry, empathy, creativity, and big-picture thinking.

We need to allow people a certain measure of autonomy to do great work but also hold them accountable. You’ve got to have deadlines and measures of accountability. You can’t just have a free-for-all where everyone sits around and paints all day and no one actually serves customers.

So, in general, promote autonomy and relinquish a measure of control. And to the extent it’s possible, create a context that allows people’s intrinsic motivation to flourish and that makes the work part of something larger than the individual.

Organizations that provide a sense of purpose, that connect individuals’ talents and aspirations to a larger goal are the ones that are going to succeed. You already see that in a remarkable way with a lot of companies. Google, for example, talks about wanting to do great things for the world even if it means sacrificing some short-term profits.

Jeff Immelt, CEO of GE, speaks about meaning and purpose. He says that the reason people want to work for GE is that they want to be about something larger than themselves.
We can see the emergence of companies that you might call not-only-for-profit. They’re profit driven, but that’s not their only driving force. They want to be about something beyond making their quarterly numbers and returning wealth to shareholders.

This is different from the TATA’S socially responsible kind of company. GE is making a monumental investment in green technologies in part because it’s a good thing, in part because it’s a lucrative thing. It’s the same with Google. Google’s mission is to democratize information and to put facts and knowledge at people’s fingertips. But that’s good business too.

Creating not-only-for-profit companies that plug people’s individual talents into a larger purpose becomes very important, particularly for baby boomers.

The professional services business has traditionally been left-brained. they need to think through the same imperatives: Are you doing something that someone overseas can’t do cheaper, or that a computer can’t do faster? Does what you do satisfy some of the spiritual, emotional, or esthetic needs of our society?

Our ability to draw on right-brain skills has become much more important. For instance, that design has become a fundamental literacy in business, particularly for consultants. Whether it’s its industrial design, graphic design, environmental design, or even fashion design, a good consultant must be literate in that now to go into an organization and offer useful advice.

More companies, partly out of enlightened self-interest, are going to morph into not-only-for-profits. And they’re going to need guidance to change from left-brained companies in the pursuit of making those quarterly numbers to companies that are more right-brained—companies that can attract talented, intrinsically motivated people. That’s a tough transition for companies to make, and consultants could help with that.

The best career move is to find what you love to do, what you’re great at, and pursue that. One will be more valuable in the workforce.

The people especially from developing economies like India who pursue careers because their parents, teachers, or spouses give them outdated advice and they’re dutifully marching into careers they don’t really care about because they think it’s the way to make money. Not only is that bad for their individual self-actualization but it’s a bad career move, too in the context of creative 21st century.

The list of top 10 innovative companies of India according to fast magazine survey. Obviously more of right brained.

1. Indian Premier League: If Cricket took its baby steps towards globalization with twenty-twenty cricket, IPL have induced steroids and propelled cricket to the global scenario. Everything about it was the most talked about story. It started with the auctions, then the broadcast rights then came the cheerleaders and it never ceases to amaze. Now the world doesn’t have an excuse of ‘but nobody wins’ to not follow cricket.

2. VNL: A Swedish Indian company which has a novel solution for India’s perennial power problems. VNL runs solar powers mobile towers. It also uses wind energy wherever possible. Power or diesel is the biggest cost of running a mobile tower and VNL makes it easy to run a tower in areas with scantly or no electricity. A novel solution for last mile connectivity.

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I. INTRODUCTION

India lives in villages and among the total village, a large number are situated in remote areas where little developmental activities have taken place because of several factors viz, illiteracy, poverty, lack of information facilities etc. The development of rural areas is the first challenge for the nation builders. The major thrust of rural development has been towards changing behavior of village people in terms of knowledge, skills and attitudes.

Contribution of women in modern times in unlimited both at home and farm. They have been a definite strength in the nation's building process. Women possess have knowledge of the latest technologies which could be made possible with use of various mass communication channels. In Our country we have a vide range of mass media ranging from satellite broadcast to the print media. These media include newspaper, magazines, books, radio, television etc.

Mass media could enter the calculus of development and offer the great possibilities for effective action through its capability of disseminating technical expertise and useful knowledge among millions of villagers, particularly cultivators living in far off areas. It aims at promoting national integration, dissemination of message, educating people, providing healthy entertainment and dissemination of essential knowledge to stimulate agricultural production.

Mass media is undoubtedly an important tool in bringing about large scale directed social change and modernization in developing nation for transmitting knowledge, disseminating facts and directing various emotional appeals to influence public opinion. The mass media has assumed vital importance in the economic, social development of the nation. The simplest effect of the mass media is to make people aware of the events, persons or possibilities beyond their direct experiences. Efforts with all the possible media of communication are being made in order to reach rural masses with varied characteristics, living in different parts of the country.

Mass media have been termed as hidden persuades which selectively reflect social reality and thereby create a reality in the minds of audience.

Among the mass media, radio is the cheapest, fastest and farthest reaching mass medium, successfully cutting the barriers of literacy and distance.

Television is now a very popular and effective means of information, communication, entertainment and instruction.

Reading literature is an important part of self study, newspaper/farm magazine are the commonly used media for dissemination of news and current events. They also serve as educational and entertainment media apart from disseminating agricultural information to the farmers. Mass media play a significant role in development. It can establish the climate in which development can take place. It plays a vital role in making the people in the urban as well as rural areas to realize the need for adopting new practices.

Thus, mass media bring the voice of the nation to the village, creating a sense of working towards common economic and national goals; they spread literacy and new skills, they promote an attitude of mind conducive to economic growth, which involves the orientation of future prosperity. A good amount of work is though available regarding impact of Mass media on farmer's attitude, gain of knowledge, but very few researches are available on mass media utilization by rural women and this type of study is new to this area. Women have a key position in the family. Hence transfer of appropriate home and farm technologies to rural women is of immense importance. Although there has been tremendous development and expansion of mass media, we still do not know to what extent rural women utilize these media, thus present study is an effort/attemp to assess mass media exposure of farm women and factors associated with it.

II. OBJECTIVES OF THE STUDY

- To document the availability of important mass media in the villages under study.
- To assess the utilization pattern of the mass media by the respondents.
- To measure the association between the utilization pattern of mass media by the respondents and the selected independent variables.
- To study the reasons for not using the mass media by the respondents.

III. METHODOLOGY

100 farm women from five villages namely, charakda, Himatsar, Madia, Somalsar and Mukam of five Gram Panchayats charakda, Himatsar, Bikasar, Mukam and Somalsar of Nokha Panchayat Samiti of bikaner district, Rajasthan, India were selected randomly for the study.

Interview method was used for data collection. Interview schedule was developed consisting of structured questions keeping in view the objectives of the study. Background information was collected through an interview schedule which includes information about age, education, landholding, income, family type, social participation and source of information of the respondents. Other section of the tool dealt with the questions to obtain information regarding the availability of mass media, the utilization pattern and reasons of not using the mass media by the farm women in relation to the mass media, namely newspaper, magazine, radio and television. Data was collected by conducting personal interview at the residence of the subjects.
IV. RESULTS AND DISCUSSION

The results are presented in the following headings:

a) **Background information**
   1. Majority of the respondents were of younger age group (40%) and were illiterate (60%).
   2. Majority (56%) of the respondents has marginal land holding. (56%), belong to low income group (50%), having joint families (56%), and had no membership in any organization.
   3. Thirty Six percent of the respondents get information/ have neighbours as source of information.

b) **Availability of mass media**
   1. Majority of the respondents (60%) possessed radio sets. Only 25% of respondents subscribe newspapers (Dankan Bhaskar) of Hindi language, 30% were having T.V. and only doordarshan channel was available.
   2. Magazine was not subscribed by any respondent as they were very busy in their farm and home from morning to evening. The respondents reported that they were illiterate and they can't make use of them.

c) **Utilization pattern of Mass Media**
   1. Majority (56%) of respondents ranked regular regular use of mass media at first position, followed by never (40%), sometimes (30%) and occasionally (25%).
   2. Regarding the purpose of using mass media, entertainment was ranked highest (89%), followed by time pass (50%), seeking new information and entertainment (26%) and only for seeking information (10%).
   3. Majority of the respondent gave highest rank to seeking agriculture information as the main reason for using mass media (53%), followed by exchange of information (51%), it has become a necessity (49%), and knowledge increase (38%).
   4. Majority of the respondents ranked non-availability of free time at first position regarding the constraints in using mass media (98%).

d) **Association between the utilization pattern and selected independent variables.**
   1. Education and social participation had significant relationship with utilization pattern of newspaper whereas age, land holding and family type has no significant correlation with the utilization pattern of newspaper.
   2. Age, education, land holding, family type and social participation had non- significant correlation with the utilization pattern of both Radio and Television.

e) **Reasons for not using the mass media**
   1. Majority of the respondents (39%) do not feel the need to use the newspaper, whereas 13% of the respondents feel that it is wastage of time to use Radio.
   2. However, Television was not used by majority of the respondents (20%) as it was not available at their residence.

V. CONCLUSION OF THE STUDY

On the basis of the above results obtained from the study, it can be concluded that most of the respondents were of younger age group, illiterate having marginal land holding and have no social participation in any organization.

Majority of the respondents possessed radio sets (60%) and only 30 percent were having T.V. newspaper was subscribed by (25%) of the respondents.

Regarding the utilization pattern of the mass media, half of the respondents were categorized as medium utilizers and on an average 20% respondents were among the high utilizers of all mass media under study. Entertainment related programs were ranked highest by the majority of the respondents.

Major constraints in using mass media was non-availability of free time, followed by use of technical word and language.

VI. REVIEW OF LITERATURE

| Findings of a Study conducted by Hasan and Sharma A, (2011), reported that 90% of urban women read newspaper for taking information, news and for the entertainment. Almost 65% of the respondents read magazine sometimes and 10% read it regularly. |
| Study conducted by Roy et. al (2010), revealed that more than half of the respondents were found to view television regularly, 38% and 44% of the rural youth listened to all India Radio programs regularly and occasionally respectively. Farm demonstration, extension materials (leaflets, posters) and farm journals were rarely consulted by rural youth. |
| Findings of the Study of Emmanuel (2010), revealed that among the rice farmers, radio was used by 83%, T.V. was used by 39% and mobile phones were used by 55% of the respondents. |
| Findings of Study by Singh (2002) reported that channels which were most utilized by the farmers were group discussion, television, radio and newspaper respectively. He further reported that majority of farmers used neighbours (83%), private agencies (25%) and friends (50%) as source of information. |
| A study done by Mittal (2002), reported that there was a significant impact of age on viewer ship of T.V. and duration of viewing. There was also significant impact of type of family and type of house on T.V. viewing pattern and frequency of T.V. viewing. |
| Prameela and Ravichandran (2001), in their study found that lack of interest (68.66%), domestic responsibility (61.33%), small type farms (58.66%), and cultural norms (53.33%) were expressed as barriers for not using the mass media. Lack of skill in operating T.V. and radio (18.66%), lack of communication amenities (13.33%), lack of regularity in getting farm magazines (15.33%) and lack of education (8.66%) were the barriers for less than one-third of the respondents. |
| Results of a Study of Shukla (2000) reported that the major source of information for rural people is the radio (87%). About 95% people reported that they are used to listening the radio either regularly or occasionally, urban masses use all types of channels of information but television and newspapers are the tow most important but television and newspapers are the two most important sources of information. |
Study by Jangir (1999) revealed that the personal characterization viz, age, education and size of land holding were significantly associated with the knowledge of level of respondents, whereas size of family was found to be associated non-significantly with knowledge level of respondents.

Khurana and Kapoor (1998), while studying "Krishi Darshan" (Rural telecast) found that rural women did not let their household work suffer at the cost of T.V. viewing. Evening social interaction of the respondents (84.4%) was a deep rooted habit and Krishi Darshan was not appealing enough to alter there daily routine.

Srivastava et. al (1996), concluded that most of the respondents were daily reader of newspapers and magazines, listeners of radio and viewing of T.V. Mass Media exposure had helped in changing old values of women and improving their social status.

Findings of a Study done by Gupta (1992), on "Mass Media and Social Change", revealed that the maximum number of respondents preferred the radio listening (73.33%), than reading the newspapers (66.67%) and television viewing (60.00%).

According to a Study done by Patil and Namasivayam (1990), revealed that about 83% of the respondents subscribe newspaper and 17% do not subscribe. The high percentage of newspaper purchase indicates that the level of literacy is high.

A Study done by Bette et al. (1990) reported that radio broadcasts and general farm magazines were the two marketing information sources most frequently cited as useful. Radio and T.V. broadcasts were more frequently cited as the most useful source of marketing information by older farmers and operators of small farms.

REFERENCES


Voice Synthesis Using Wavelet Transform

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Sam Higginbottom Institute of Agriculture Technology & Sciences
Allahabad, India

Abstract - The human voice communication through GSM is general part of life. Voice speech requires encoding & decoding of signal, which determine the quality of the recovered speech & the capacity of the system. To make voice speech at lower bit rate as well as making coder complexity simpler, waveform coding has been used. Waveform coding of signal is able to represent any signal in time and frequency simultaneously. Since voiced speech is low frequency of speech, waveform coding is able to interpret all low frequency content and suppressing higher frequency content which is unvoiced speech of signal and other residual. The Code Excited Linear Predictor (CELP) speech coder and a new Wavelet transform method is used to compress speech.

Index Terms - CELP, GSM, Wavelet Transform

I. INTRODUCTION

One of the most effective means of human communication is through speech. Modern technology clearly illustrates this fact by using various techniques to transmit, store, manipulate, recognize and create speech. The generic term for this process is called speech coding. Speech coding or speech compression is the process through which, compact digital representations of voice signals are obtained for efficient transmission and storage [1], [2]. There are several ways to transmit speech to form an efficient communication channel.

An efficient speech coder represents speech with the minimum number of bits possible and produces reconstructed speech which sounds identical to the original speech [5]. The basic function of any speech coder would be to first convert the pressure waves (acoustic speech) to an analog electrical speech signal with the help of transducers such as microphones. This analog speech signal (for telephone conversations) is usually band limited to be between 300 – 3400 Hz. The analog signal is sampled at 8000 Hz according to Nyquist sampling rate. The actual coding of speech operates only on the digitized speech and not on the analog speech. Hence the analog speech is converted to digital speech using an A/D converter.

According to the way speech coders compress speech signals, they can be classified under various categories. Speech coders are broadly classified into two categories: Waveform coders and Vo-coders.

Comparison of the speech quality of Code Excited Linear Predictor (CELP) speech coder with a new Wavelet method to compress speech are shown in this paper.

The rest of the paper is organized as follows: we have described CELP with linear prediction (LPC) in section II and wavelet transform in section III. Results and analysis are explained in section IV after then conclusion in section V.

II. CELP SPEECH CODER

Code-excited linear prediction (CELP) is a speech coding algorithm [1], [5]. The CELP technique is based on three ideas:

1. The use of a linear prediction (LP) model to model the vocal tract [3].
2. The use of (adaptive and fixed) codebook entries as input (excitation) of the LP model.
3. The search performed in closed-loop in a “perceptually weighted domain”.

2.1 Linear Prediction (LPC) Analysis:

In LPC analysis of order p, the current speech sample s(n) is predicted by a linear combination of p past samples s(n):

\[ \hat{s}(n) = \sum_{k=1}^{p} a(k) s(n-k) \]  

(2.1)

Where \( \hat{s}(n) \) is the predictor signal and \{a(1),...a(p)\} are the LPC coefficients. The value \( \hat{s}(n) \) is subtracted from s(n), giving the residual signal e(n):

\[ e(n) = s(n) - \hat{s}(n) = s(n) - \sum_{k=1}^{p} a(k) s(n-k) \]  

(2.2)

Taking the z-transform of equation (2.2) gives

\[ E(z) = S(z) + A(z) S(z) \]  

(2.3)

Where \( S(z) \) and \( E(z) \) are the transforms of the speech signal and the residual signal respectively and \( A(z) \) is the LPC analysis filters of order p:

\[ A(z) = 1 + \sum_{k=1}^{p} a(k) z^{-k} \]  

(2.4)

This filter is used to remove the short term correlation of the input speech signal, giving an output \( E(z) \) with approximately flat spectrum. The short term power spectral envelope of speech signal can there for be modeled by the all-poles synthesis filter

\[ H(z) = 1/A(z) = 1/(1 + \sum_{k=1}^{p} a(k) z^{-k}) \]  

(2.5)

Equation (2.3) is the basis for the LPC analysis model. Conversely the LPC synthesis model consist of an excitation source \( E(z) \), providing input to the spectral shaping filter \( H(z) \), to yield a synthesized output speech \( S(z) \):

\[ S(z) = H(z) E(z) \]  

(2.6)

\( E(z) \) and \( H(z) \) are chosen following certain constraints, so that \( S(z) \) is as close as possible to some sense to the original speech.

In low-bit rate speech coding, the LPC coefficients are widely used to encode spectral envelope. In forward LPC-based coders,
the LPC coefficients are calculated from the original speech input, quantized and transmitted frame-wise. The transmission of these coefficients has a major contribution to the overall bit rate. Thus, it is important to quantize the LPC coefficients using as few bits as possible without introducing excessive spectral distortion and with reasonable complexity. A very important requirement is that the all-pole synthesis filter \( H_P(z) \) remains stable after quantization [4] [6] [7].

III. WAVELET TRANSFORM

The wavelet transform wavelet analysis is probably the most recent solution to overcome the shortcomings of the Fourier transform. In wavelet analysis the use of a fully scalable modulated window solves the signal-cutting problem. The window is shifted along the signal and for every position the spectrum is calculated. Then this process is repeated many times with a slightly shorter (or longer) window for every new cycle [10].

Wavelet transform converts the signal into a series of wavelets [9]. Wavelets can also be constructed with rough edges to stable after quantization [4] [6] [7].

A continuous-time wavelet transform [8] of \( f(t) \) is defined as:

\[
\psi(x, s) = \frac{1}{\sqrt{s}} \psi\left(\frac{x - \tau}{s}\right)
\]

Where \(*\) denotes complex conjugation. This equation shows how a function \( f(t) \) is decomposed into a set of basis functions \( \psi_{s, \tau}(t) \), called the wavelets. The variables \( s \) and \( \tau \), scale and translation, are the new dimensions after the wavelet transform. The wavelets are generated from a single basic wavelet \( \Psi(t) \), the so-called mother wavelet, by scaling and translation:

\[
\psi_{s, \tau}(t) = \frac{1}{\sqrt{s}} \Psi\left(\frac{t - \tau}{s}\right)
\]

In (4.2) \( s \) is the scale factor, \( \tau \) is the translation factor and the factor \( \frac{1}{\sqrt{s}} \) is for energy normalization across the different scales.

3.1 Wavelet properties

The most important properties of wavelets are the admissibility and the regularity conditions [29] and these are the properties which gave wavelets their name. It can be shown that square integral functions \( \Psi(t) \) satisfying the admissibility condition,

\[
\int_{-\infty}^{+\infty} |\Psi(\omega)|^2 d\omega<\infty
\]

can be used to first analyze and then reconstruct a signal without loss of information. In (3.3) \( \Psi(\omega) \) stands for the Fourier transform of \( \Psi(t) \).

IV. RESULT AND ANALYSIS

There are several ways to compare the performances of speech coders. They can be compared according to their, Bit rate, Quality and Coder complexity. The perceived quality depends on various factors like speech content, background noise, listener etc. In this case both the speech coders are made to have similar compression ratios for all the signals used and for computational complexity; CELP is definitely computationally more complex than the wavelet method as CELP involves more exhaustive search procedures than the wavelet method. Speech coders are usually designed for use in cellular telephone applications, military applications etc.

A total of 4 test signals were used. In which 2 was of men and rest for women. They were divided into two major groups,

- (a) Clean signals,
- (b) Clean signals with simulated noise

The objective analysis of original speech and synthesis speech for “man” and “women” are presented for obtaining the result;

4.1 Speech synthesis process using CELP

In this synthesis, first we show the original signal as clean and their synthesis signal, then we show original signal with artificial noise added.

These are certain wave forms shown to differentiate between the original and synthesized speech of man and woman.
Figure 4.2 Error plot for speech synthesis in figure(4.1)

Figure 4.3 Example of speech synthesis of woman using LPC algo without noise

Figure 4.4 Error plot for speech synthesis in figure(4.3)

Figure 4.5 Example of speech synthesis of man using LPC algo with noise

Figure 4.6 Example of speech synthesis of woman using LPC algo without noise
4.2 Speech synthesis process using Wavelet Transform

In this synthesis, first we show the original signal as clean and their synthesis signal, then we show original signal with artificial noise added.
Figure 4.10 Error plot for speech synthesis in figure(4.9)

Figure 4.11 Example of speech synthesis of Man using Wavelet with noise

Figure 4.12 Error plot for speech synthesis in figure(4.11)

Figure 4.13 Example of speech synthesis of Women using Wavelet without noise
Figure 4.14 Error plot for speech synthesis in figure(4.13)

Figure 4.15 Example of speech synthesis of women using Wavelet with noise

Figure 4.16 Error plot for speech synthesis in figure(4.15)

Table 4.1 Error producing using LPC and Wavelet analysis by above observed plot:

<table>
<thead>
<tr>
<th>Man/Woman</th>
<th>Max error using LPC</th>
<th>Max error using Wavelet</th>
</tr>
</thead>
<tbody>
<tr>
<td>Man speech(clean)</td>
<td>.497</td>
<td>.061</td>
</tr>
<tr>
<td>Man speech(noisy)</td>
<td>.48</td>
<td>.063</td>
</tr>
<tr>
<td>Women speech(clear)</td>
<td>.38</td>
<td>.07</td>
</tr>
<tr>
<td>Women speech</td>
<td>.62</td>
<td>.1</td>
</tr>
</tbody>
</table>

4.3 Analysis for Coder Complexity

Coder complexity of a system is known by number of addition, multiplication and division are performed. CELP coder is more complex due to vector quantization than wavelet transform using sub-band coding. In this work, to know the coder complexity, we have taken 30 second of Man and Woman speech of clean and artificial noisy. MATLAB inbuilt command “tic-toe” has been used for to know the run-length time of each coder. We have processed 30 sec of speech.
V. CONCLUSION

The respective quality presentation of Wavelet transform with Federal Standard like CELP. The interesting quality result was found in noisy environments. This suggests that wavelet transform consider noise as redundancy parameter. This process could be used as post-filtering for the synthesis speech via CELP process. Most of the time speech coder and channel coder are presented simultaneously. Speech coding often affect the channel coding so Wavelet transform based technique could also be implemented leading to channel encoder via speech coder. Wavelet function gives a better scale and dilation, so using different wavelet with voice speech, a particular wavelet function can be decided for speech signal.

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Survey on Consumption of Insecticides for Control of Mosquito as Vector (Order: Diptera) In Vadodara, Gujarat, India

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Abstract- Present study shows that in spite of availability of “biorational” alternative in Vadodara for the control of mosquito species people are still dependent on conventional insecticides. In which maximum synthetic pyrethroid was used followed by organophosphate.

Index Terms- Biorational alternative, Organophosphate, Synthetic pyrethroid, Mosquito, Conventional Insecticides

I. INTRODUCTION

In world currently 300 mosquito species are identified from 39 genera and 135 subgenera (Remia and Logaswamy, 2010). Out of which Aedes spp., Culex spp. and Anaphelous spp. as an important vectors causing dengue hemorrhagic fever (DHF), chikungunya, malaria, filariasis in human (RinguPerez et al., 1997; Melrose, 2002). The present seen shows no proper vaccine available for control of these vector born diseases (Malaviga et al., 2004). So, it encourages the use of conventional pesticides for its reduction by directly killing the mosquito species. So objective of the present survey was:

To do an extensive survey of the pesticide markets of Vadodara and interviews with the pest control service agencies and locals, regarding the use of insecticides for controlling mosquito. Hence it give an information on the number of conventional insecticides as well as other ecofriendly control agents present in Vadodara market and used by common peoples in Vadodara residential areas.

II. METHODOLOGY

Survey was conducted in all parts of Vadodara having pesticides shops/ agencies (Table-I). During survey the residential area located near these pesticides shops/ agencies were selected randomly to take the personal interview for the control measures used against mosquito.

III. RESULT AND DISCUSSION

The outcome of survey shows that 38 product of synthetic pyrethroid were present in the Vadodara market out of which 13 products which are low in cost are used by common peoples (Table II). Whereas organophosphate chemicals products are only 17 none are familiar among selected residential area peoples (Table III). Only one product was found from carbamate and benzamide chemical group which are not in used among urban people (Table IV and V). Thus, Vadodara market shows the presence of 57 conventional insecticides belonging to different chemical group (Table VII). This shows the dominance of synthetic insecticides in Vadodara. Although there is presence of biological insecticides which is easy to apply, biodegradable, not harmful to non target animal as well as important tool in resistant management for control of mosquito (Table VI) but its popularity and practicability is hinder due to lack of awareness among common people.

Therefore the chemical control is still the main approach for the control of vector and pests of public health importance (Chavasse and Yap, 1997; Lee and Yap, 2003; Yap et.al., 2001). Due to indiscriminate use of insecticides mosquito start showing resistance to these insecticides (Howard et al., 2011). 50 species of Anaphelous are reported to the resistatnce to insecticides like pyrethroid shows the major concern for human health (Hemingway and Ranson, 2000; Ranson et al., 2010). Similarly, Culex and Aedes spp. are showing resistant towards organophosphates (Hamdon et al., 2005). Despite of this side effect household insecticide products are a common and popular mode of personal protection against household insect pests in all parts of the world. These products are including aerosols, mosquito coils, fumigation mats, liquid vaporizer and baits. These products are intended for daily indoor use, and inhalation exposure is therefore a particular concern for users (Pauluhn, 1996). These household insecticides was linked to a number of adverse effects like neurological damage and acute upper respiratory tract irritation (Glaser, 2005; Pauluhn and Mohr, 2006) and immune system weakening in human body (Hall, 2002; Kolaczinski and Curdis, 2004).

Thus this kind of survey work can be related to common men as well as a scientific community both by spreading the awareness to both scientific and non scientific community about the extraordinary uses of chemicals and their health hazards.
IV. CONCLUSION

Insect pests are an intimate part of every home. In the air, carpet, counter or cupboard, every home shares its resources with these tiny, often unseen invaders. A range of household insecticides products are available to combat these insect pests. But nearly all insecticides have the potential to significantly alter ecosystem; many are toxic to humans and other living organisms. So it is necessary to balance the needs with environmental and health issues when using insecticides. Anybody and everybody who is working with an insecticide or using it for killing the insect should very well understand that they are handling an extremely expensive poison. There is much more in the world of pesticide then what we see with our own eyes. As an entomologist we feel that in this 21st century we are taking less care with regards to use of pesticide. Small house, working parents and more money in a small family system has made general public insensitive towards the very high cost of pesticide. The pesticides are used indiscriminately within homes, the observation shows that there was no protocol and no norms regarding the use of any insecticide is implemented. Homes with children, old people and patients with respiratory problems were simply being when exposed to insecticides. Homes with pregnant women were also not spared. So need of the hour is to make everybody aware of the side effects of these insecticides and emphasis should be on use of natural non-toxic control measures. To reduce reliance on pesticides an integrated approach is needed. Integrated Vector management (IVM) programmes are the best implemented measures to control insect pests and result in significant health and environmental benefits. It is necessary to create awareness among people about integrated approaches to control insect pests and the need of management. So health education and community participation are need of the hour and thus can result in significant reduced health risk and better living standard.

ACKNOWLEDGMENT

Authors sincerely thank UGC for grants provided under RFSMS scheme.

Table I: Below given is the table shows the list of pesticide shops and pest control service agencies covered for fulfilling the above objectives, in different areas of Vadodara city.

<table>
<thead>
<tr>
<th>SR.NO.</th>
<th>AREA</th>
<th>NAME OF THE SHOP/AGENCY</th>
<th>POSTAL ADDRESS</th>
<th>DISTANCE FROM The M. S. University of Baroda (Km)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Kothi</td>
<td>Gayatri Pest Control</td>
<td>Gayatri Pest Control B/S. Kuber Bhavan, Surat Blood Bank bldg., Kothi, Vadodara-1. (m): 9825460572</td>
<td>1.5</td>
</tr>
<tr>
<td>2</td>
<td>Vasna</td>
<td>Instar Pest Control</td>
<td>Instar Pest Control, D-49, shivam tenaments, opp.yamuna nagar, “iskon” road, harinagar, Baroda-390015. Ph.: 322892, (M): 9824066387</td>
<td>7</td>
</tr>
<tr>
<td>3</td>
<td>GIDC Makarpura</td>
<td>Ambachem Industries</td>
<td>Ambachem Industries Plot no. 272, GIDC Makarpura, Vadodara-390010. (O): 0265-2651846, 2642378</td>
<td>8</td>
</tr>
<tr>
<td>4</td>
<td>Alkapuri</td>
<td>Devi Dayal Sales LTD.</td>
<td>Devi Dayal Sales LTD. 33, Alkapuri society, baroda-390007. (O): 0265-2357797, 2352871, 2359617.</td>
<td>1</td>
</tr>
<tr>
<td>6</td>
<td>Lehripura</td>
<td>Gujarat pest control</td>
<td>Gujarat pest control in fatepura, opp. Nyay mandir, khajuri market, lehripura road, Fatepura- 390006</td>
<td>3</td>
</tr>
<tr>
<td>No.</td>
<td>Location</td>
<td>Name and Services</td>
<td>Address</td>
<td>Contact Information</td>
</tr>
<tr>
<td>-----</td>
<td>--------------</td>
<td>------------------------------------------</td>
<td>-------------------------------------------------------------------------</td>
<td>---------------------</td>
</tr>
</tbody>
</table>
| 7   | Baroda dairy | Pest World                              | Pest World, 12th-ground floor, Annapurna bhavan, silver coin, near aagan tower, Makarpura three way, Manjalpur.  
(M): 9825017622 |                     |
| 8   | Vasna        | Roas terminators pest management services | Roas terminators pest management services, B-17, vraj-vihar, nr. Sant vihar society, vasna road, vidhyunasar p.o., vadodara- 390015. |                     |
| 9   | Gorwa        | Ideal Pest Control Services              | Ideal pest services in gorwa, 3-2, bakul park, b/h sahyog society, G.R. Road, Gorwa, Vadodara- 390016  
Ph: 2391480, 2395391 |                     |
(O):0265-2437019 |                     |
(Ph): 0265-2974713,  
(M): 9727473737. |                     |
(O): 0265-2426066,  
(M): 9898329290 |                     |
(O): 0265-2424507 |                     |
(O): 0265-2431893 |                     |
| 15  | Khanderao Market | Shreeji Pesticides | Shreeji Pesticides Laxminarayan bhavan, b/h khenderao market, Vadodara- 390001.  
(O): 0265-2433779 |                     |
(O): 0265-2433355, 2433292  
(M): 9898139649 |                     |
| 17  | Alkapuri     | Intensive pest control PVT. LTD.         | Intensive pest control PVT. LTD. 510, 511, 512, 5th floor, premier chamber, near LIC Office building, alkapuri  
(O): 0265-2432239, 2343856  
(M): 9825029556 |                     |
(O): 0265-2339118, 2344179  
(M): 9426374504 |                     |
<table>
<thead>
<tr>
<th>SR.NO.</th>
<th>PRODUCT/INSECTICIDE</th>
<th>CHEMICAL COMPOSITION</th>
<th>MANUFACTURED BY</th>
<th>QUANTITY/COST (Rs.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Allout high power (mat)*</td>
<td>Prallethrin 1.0%</td>
<td>M/S ICON Household Products(P) Ltd.</td>
<td>Rs.45/30 mats</td>
</tr>
<tr>
<td>2.</td>
<td>Goodknight silver power (mat)*</td>
<td>Prallethrin 1.2%</td>
<td>Godrej Sara LEE Ltd.</td>
<td>Rs.50/30 mats</td>
</tr>
<tr>
<td>3.</td>
<td>Mortein power booster electric liquid (Electric liquid vaporizer)*</td>
<td>Transfluthrin 0.88%</td>
<td>Zobele India Pvt. Ltd.</td>
<td>Rs.37/45ml</td>
</tr>
<tr>
<td>4.</td>
<td>Goodknight silver refill (Electric liquid vaporizer)*</td>
<td>Transfluthrin 0.88%</td>
<td>Godrej Sara LEE Ltd.</td>
<td>Rs.49/45ml</td>
</tr>
<tr>
<td>5.</td>
<td>Allout double power (Electric liquid vaporizer)*</td>
<td>Prallethrin 1.6%</td>
<td>SC Johson Products Pvt. Ltd.</td>
<td>Rs.48/35ml</td>
</tr>
<tr>
<td>6.</td>
<td>Goodknight maha jumbo coil (Coil)*</td>
<td>d-transAllethrin 0.1%</td>
<td>Godrej Sara LEE Ltd.</td>
<td>Rs.25/10coil</td>
</tr>
<tr>
<td>7.</td>
<td>Mortein power booster (Coil)*</td>
<td>d-transAllethrin 0.1%</td>
<td>Barat Box Factory Ltd.</td>
<td>Rs.25/10coil</td>
</tr>
<tr>
<td>8.</td>
<td>New Tortoise Activ (Coil)*</td>
<td>Transfluthrin 0.03%</td>
<td>Bombay Chemicals Pvt. Ltd.</td>
<td>Rs.20/10coils</td>
</tr>
<tr>
<td>9.</td>
<td>Goodknight advanced mosquitoes and flies spray (spray)*</td>
<td>d-transAllethrin 0.25%</td>
<td>Godrej Sara LEE Ltd.</td>
<td>Rs.75/225ml</td>
</tr>
<tr>
<td>10.</td>
<td>Baygon water based flying insect kiler (Aerosol spray)*</td>
<td>Cyfluthrin 0.025% + transfluthrin 0.04% + adjuvants</td>
<td>Midas Care Pharmaceuticals Pvt. Ltd.</td>
<td>Rs.72/250ml</td>
</tr>
<tr>
<td>11.</td>
<td>Pest Seal (Aerosol spray)</td>
<td>Deltamethrin 0.02% + allethrin 0.13% + dichloromethane + odourmasking agent + de-odorised kerosene + propellant gas</td>
<td>Pest Control India Pvt. Ltd.</td>
<td>Rs.114/320ml</td>
</tr>
</tbody>
</table>

Table II: Insecticides products belongs to synthetic pyrethroid available in the market of Vadodara city to combat mosquito and their indigenous manufacturer
<table>
<thead>
<tr>
<th>No.</th>
<th>Product Name</th>
<th>Active Ingredient(s)</th>
<th>Manufacturer</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>12</td>
<td>Dash (Powder)</td>
<td>Alphacypermethrin 5% W.P.</td>
<td>Megmani Organics Ltd.</td>
<td>Rs.45/50g</td>
</tr>
<tr>
<td>13</td>
<td>NT-QUITO (Liquid)</td>
<td>Deltamethrin 2.5%</td>
<td>Chemet wets &amp; Flows P. Ltd.</td>
<td>Rs.70/50ml</td>
</tr>
<tr>
<td>14</td>
<td>Pest Seal (Liquid)</td>
<td>Deltamethrin 0.02%</td>
<td>Pest Control India Pvt. Ltd.</td>
<td>-</td>
</tr>
<tr>
<td>15</td>
<td>Cyper CID-25 (Liquid)</td>
<td>Cypermethrin 25% EC</td>
<td>Bharat Insecticide Ltd.</td>
<td>Rs.105/250ml</td>
</tr>
<tr>
<td>16</td>
<td>Kokron multipurpose insect killer (Liquid)*</td>
<td>Deltamethrin 0.05% + allethrin + dichloromethane + deodorized kerosene</td>
<td>Vimson’s Aerosol</td>
<td>Rs.60/250ml</td>
</tr>
<tr>
<td>17</td>
<td>Swal home (Liquid)</td>
<td>Bifenthrin 2.5%</td>
<td>United Phosphorous Ltd.</td>
<td>Rs.325/500ml</td>
</tr>
<tr>
<td>18</td>
<td>K-Othrine 2.5% WP (Liquid)</td>
<td>deltamethrin</td>
<td>Bayer Environmental Science</td>
<td>Rs. 1,250/1L</td>
</tr>
<tr>
<td>19</td>
<td>Solfac 050 EW (Liquid)</td>
<td>Cyfluthrin 5%</td>
<td>Bayer Environmental Science</td>
<td>Rs. 1,900/1L</td>
</tr>
<tr>
<td>20</td>
<td>Moscon 5WP (Powder)</td>
<td>Alphacypermethrin 5% WP</td>
<td>A. Saj Agricare Pvt. Ltd.</td>
<td>Rs. 1,7000/20Kg</td>
</tr>
<tr>
<td>21</td>
<td>Responsar SCO 25 (Liquid)</td>
<td>Betacyfluthrin</td>
<td>Bayer Environmental Science</td>
<td>Rs.740/1L</td>
</tr>
<tr>
<td>22</td>
<td>Olyset Net (Incorporated in net fabric)</td>
<td>Permethrin 2%WP</td>
<td>Sumitomo Chemical India Pvt. Ltd.</td>
<td>Rs.525/100X 180X 150X</td>
</tr>
<tr>
<td>23</td>
<td>TATA Sentry (Powder)</td>
<td>Lambda- cyhalothrin 10% WP</td>
<td>Rallis a TATA Enterprise</td>
<td>Rs.200/625g</td>
</tr>
<tr>
<td>24</td>
<td>Gokilah-S 5EC (Liquid)</td>
<td>cyphenothrin</td>
<td>Sumitomo Chemical India Pvt. Ltd.</td>
<td>Rs.840/L</td>
</tr>
<tr>
<td>25</td>
<td>King fog ULV (Thermal fog)</td>
<td>Deltamethrin+ diesel oil or kerosene</td>
<td>Bayer Environmental Science</td>
<td>Rs. 1,700/L</td>
</tr>
<tr>
<td>26</td>
<td>Mortein deep reach action mats (mat)*</td>
<td>Prallethrin 1% w/w red mat + adjuvants</td>
<td>Reckin benckiser (India) Ltd.</td>
<td>Rs.40/30mats</td>
</tr>
<tr>
<td>27</td>
<td>New HIT more power (spray)*</td>
<td>dtrans-allethrin 0.25% + synergist(PBO) 0.50% + perfume 0.20% w/w + deodorized kerosene + propellant gas(LPG) 60.00%w/w</td>
<td>Godrej Sara LEE Ltd.</td>
<td>Rs.75/250ml</td>
</tr>
<tr>
<td>28</td>
<td>Makad bomb 007 (powder)</td>
<td>Prallethrin</td>
<td>Raju product, Fatehpura, baroda</td>
<td>Rs.30/250g</td>
</tr>
<tr>
<td>SR.NO.</td>
<td>PRODUCT/ INSECTICIDE</td>
<td>CHEMICAL COMPOSITION</td>
<td>MANUFACTURED BY</td>
<td>QUANTITY/COST (Rs.)</td>
</tr>
<tr>
<td>--------</td>
<td>----------------------</td>
<td>----------------------</td>
<td>-----------------</td>
<td>---------------------</td>
</tr>
<tr>
<td>1.</td>
<td>TATA ROGOR (Liquid)</td>
<td>Dimethoate 30% EC + solvents- xylene, aromex + stabilizer</td>
<td>Rallis a TATA Enterprise</td>
<td>Rs.93/250ml</td>
</tr>
<tr>
<td>2.</td>
<td>Navigator (Liquid)</td>
<td>Chloropyriphos 20% EC</td>
<td>Gharda Chemical Ltd.</td>
<td>Rs.230/L</td>
</tr>
<tr>
<td>3.</td>
<td>Anaconda (Liquid)</td>
<td>Chloropyriphos 50% + Cypermethrin 5%</td>
<td>NDR &amp; CO.</td>
<td>Rs.75/100ml</td>
</tr>
<tr>
<td>4.</td>
<td>Chlorguard (Liquid)</td>
<td>Chloropyriphos 20% EC</td>
<td>Gharda Chemical Ltd.</td>
<td>Rs.240/L</td>
</tr>
<tr>
<td>5.</td>
<td>Decent (Liquid)</td>
<td>Dichlorvos 70% EC</td>
<td>Hindustan Pvt. Ltd.</td>
<td>Rs.60/100ml</td>
</tr>
<tr>
<td>6.</td>
<td>Bloom (Liquid)</td>
<td>DDVP (dichlorvos) 76 % EC</td>
<td>Insecticides (India) Ltd.</td>
<td>Rs.60/100ml</td>
</tr>
<tr>
<td>7.</td>
<td>Lethal super 505 (Liquid)</td>
<td>Chloropyriphos Al 50% + cypermethrin Al 5% EC</td>
<td>Insecticides (India) Ltd.</td>
<td>Rs.75/100ml</td>
</tr>
<tr>
<td>8.</td>
<td>Larcon SG</td>
<td>Temephos 1%</td>
<td>A. Saj Agricare Pvt.</td>
<td>Rs.3125/25Kg</td>
</tr>
<tr>
<td>SR.NO.</td>
<td>PRODUCT/ INSECTICIDE</td>
<td>CHEMICAL COMPOSITION</td>
<td>MANUFACTURED BY</td>
<td>QUANTITY/COST (Rs.)</td>
</tr>
<tr>
<td>--------</td>
<td>----------------------</td>
<td>----------------------</td>
<td>-----------------</td>
<td>---------------------</td>
</tr>
<tr>
<td>9.</td>
<td>Larcon EC (Liquid)</td>
<td>Temephos 50% EC</td>
<td>A. Saj Agricare Pvt. Ltd.</td>
<td>Rs. 12500/5L</td>
</tr>
<tr>
<td>10.</td>
<td>Baytex Granules (Granules)</td>
<td>Fenthion 82.5%</td>
<td>Bayer Environmental Science</td>
<td>Rs. 5,093/25Kg</td>
</tr>
<tr>
<td>11.</td>
<td>Baytex 1000 EC (Liquid)</td>
<td>82.5% fenthion</td>
<td>Bayer Environmental Science</td>
<td>Rs. 1,785/1L</td>
</tr>
<tr>
<td>12.</td>
<td>Devimalt</td>
<td>Malathion 50% EC</td>
<td>Devi Dayal Sales Ltd.</td>
<td>Rs.250/1L</td>
</tr>
<tr>
<td>13.</td>
<td>Devigon 30</td>
<td>Dimethoate 30%EC</td>
<td>Devi Dayal Sales Ltd.</td>
<td>Rs.</td>
</tr>
<tr>
<td>14.</td>
<td>Devithion 50EC</td>
<td>Methyl parathion 50 EC</td>
<td>Devi Dayal Sales Ltd.</td>
<td>Rs.450/L</td>
</tr>
<tr>
<td>15.</td>
<td>Devithion 2%DP (dust powder)</td>
<td>Malathion 5% DP</td>
<td>Devi Dayal Sales Ltd.</td>
<td>Rs.35/Kg</td>
</tr>
<tr>
<td>16.</td>
<td>Nolar 500EC</td>
<td>Temephos</td>
<td>Chemet chemicals Pvt. Ltd.</td>
<td>Rs.1100/L</td>
</tr>
<tr>
<td>17.</td>
<td>Tempest/ Abate</td>
<td>Temephos 50%EC</td>
<td>Kalyani Industries.</td>
<td>Rs.1500/5L</td>
</tr>
</tbody>
</table>

Table IV. Insecticides products belong to carbamate available in the market of Vadodara city to combat mosquito and their indigenous manufacturer

<table>
<thead>
<tr>
<th>SR.NO.</th>
<th>PRODUCT/ INSECTICIDE</th>
<th>CHEMICAL COMPOSITION</th>
<th>MANUFACTURED BY</th>
<th>QUANTITY/COST (Rs.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Flyco 20 EC (Liquid)</td>
<td>Propoxur 20% W/W</td>
<td>A. Saj Agricare Pvt. LTD</td>
<td>Rs.12500/5L</td>
</tr>
</tbody>
</table>

Table V-Insecticides products belong to benzamide available in the market of Vadodara city to combat mosquito and their indigenous manufacturer

<table>
<thead>
<tr>
<th>SR.NO.</th>
<th>PRODUCT/ INSECTICIDE</th>
<th>CHEMICAL COMPOSITION</th>
<th>MANUFACTURED BY</th>
<th>QUANTITY/COST (Rs.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Bi-Larv 25 WP (Powder)</td>
<td>Diflubenzuron 25% WP</td>
<td>Bayer environmental science</td>
<td>Rs.23450/5Kg</td>
</tr>
</tbody>
</table>

Table VI -Insecticides products belong to biological insecticides available in the market of Vadodara city to combat mosquito and their indigenous manufacturer

<table>
<thead>
<tr>
<th>SR.NO.</th>
<th>PRODUCT/ INSECTICIDE</th>
<th>CHEMICAL COMPOSITION</th>
<th>MANUFACTURED BY</th>
<th>QUANTITY/COST (Rs.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Vecto Bac 12 AS (Liquid)</td>
<td>Bacterium- Bacillus thuringiensis israelensis (Bti) H-14. Viable Bti H-14 endospores + delta endotoxin crystals</td>
<td>Sumitomo Chemical India PVT. LTD</td>
<td>Rs.23500/10L</td>
</tr>
</tbody>
</table>
### Table VII: The status of insecticides used

<table>
<thead>
<tr>
<th>SR.NO.</th>
<th>GROUP OF INSECTICIDE</th>
<th>NUMBER OF PRODUCTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>SYNTHETIC PYRETHROIDS</td>
<td>38</td>
</tr>
<tr>
<td>2.</td>
<td>ORGANOPHOSPHATES</td>
<td>17</td>
</tr>
<tr>
<td>3.</td>
<td>CARBAMATE</td>
<td>1</td>
</tr>
<tr>
<td>4.</td>
<td>BENZAMIDE</td>
<td>1</td>
</tr>
<tr>
<td>TOTAL</td>
<td></td>
<td>TOTAL=57</td>
</tr>
</tbody>
</table>
REFERENCES


AUTHORS

First Author (Corresponding author) – Dr. Anita Singh, Research Fellow (Ph.D.), Division of Entomology, Department of Zoology, The Maharaja Sayajirao University of Baroda, Vadodara-390002, Gujarat, INDIA and anita.singh282@gmail.com

Second Author – Suchi Gandhi, Project Fellow (M.Sc.), Division of Entomology, Department of Zoology, The Maharaja Sayajirao University of Baroda, Vadodara-390002, Gujarat, INDIA and suchi.gandhi1988@gmail.com
Compact Notch Loaded Microstrip Patch Antenna for Wide Band Application

Saurabh Sharma, Anil Kumar, A.K. Jaiswal, Ashish Singh

Abstract – In this paper, compact notch loaded microstrip antenna is analyzed using Zeland IE3D simulator and circuit theory concept. Analysis on varying thickness, dielectric constant, length and width of the notch has been reported. The bandwidth obtained by the proposed antenna is about 41.8%.

Index Words: Wide band, Microstrip Patch Antenna, Return Loss, Dielectric Substrate

I. INTRODUCTION

The development of the modern wireless communication leads to the need of wideband antennas. Wideband antennas have found wide spread application in wireless communication industry due to their attractive features like easy fabrication, low cost, linearly and circularly polarized radiation characteristics. Due to these attractive features wideband antennas are used in many wireless applications such as Wi-Fi, Bluetooth, GSM and GPRS. In previous years many researchers have tried to improve the bandwidth (2-3%) of the microstrip antennas, they have reported numerous method like aperture coupling[1], use of shorting pins and walls [2-4], stacking [5-7] etc. to enhance the bandwidth of the microstrip antenna.

In this paper we have proposed simple geometry of wideband antenna that give 41.8% of the bandwidth while previous researcher have reported complicated geometry having wideband operation[8,9]. The parameters of the antenna are analysed using Zeland IE3D simulator.

II. THEORETICAL CONSIDERATIONS

The geometry of proposed microstrip patch antenna is shown in Fig.1.

A. Analysis of Rectangular Patch Antenna

A simple rectangular microstrip patch antenna can be considered as a parallel combination of resistance ($R_p$), inductance ($L_p$) and capacitance ($C_p$) as shown in Fig.2.
The value of $\text{Fig.2. Equivalent circuit of the rectangular patch.}$

The value of $R_F$, $L_F$, and $C_F$ can be given as [10]

$$C_F = \frac{\varepsilon_F \varepsilon_0 L_W}{2 \pi} \cos^2 \left(\frac{\pi d}{L}\right)$$  \hspace{1cm} (1)$$

$$L_F = \frac{1}{\omega^2 C_F}$$ \hspace{1cm} (2)$$

$$R_F = \frac{R_0}{\omega C_F}$$ \hspace{1cm} (3)$$

Where,

$L$ = length of the rectangular patch.
$W$ = width of the rectangular patch.
$y_p$ = location of feed point.
$h$ = thickness of the substrate material.

And

$$Q_{tr} = \frac{\varepsilon_F}{4\pi}$$

Where,
$c$ = speed of light
$f$ = design frequency
$\varepsilon_F$ = effective permittivity of the medium [10]

$$\varepsilon_F = \frac{\varepsilon_0 + \frac{\varepsilon_r}{2}}{2} + \frac{\varepsilon_0 - \frac{\varepsilon_r}{2}}{2} \left(1 + \frac{4\pi h}{\lambda_F}\right)^{-1/2}$$ \hspace{1cm} (4)$$

Where,

$\varepsilon_r$ = relative permittivity of the substrate material.

Therefore for Fig.2 input impedance of the rectangular patch is given by.

$$Z_{input} = \frac{1}{j\omega C_F j\omega R_F + R_F}$$ \hspace{1cm} (5)$$

B. Analysis of Notch Loaded Rectangular Patch Antenna.

The notch is loaded along one side of the rectangular patch; this causes an additional series capacitance $C_0$ and inductance $L_0$ as shown in Fig.3.

$$\text{Fig.3. Equivalent circuit of notch loaded patch antenna}$

Thus,

$L_T = L_F + L_0$ \hspace{1cm} (6)$$

The value of $L_T$ and $C_T$ can be calculated can be calculated as [11, 12].

$$L_T = \frac{\mu_0 H_0}{f} \left(\frac{L_0}{f_L}\right)^2$$

$$C_T = \left(\frac{C_0}{L_0}\right) C_s$$

Where,

$\mu = 4\pi \times 10^{-7} \text{ H/m}$
$L_0$ = length of the notch.
$C_s$ = gap capacitance [13].

$$Z_{match} = \frac{j\omega L_0}{j\omega C_0 - \frac{R_0 L_0}{\omega} C_0}$$ \hspace{1cm} (7)$$

C. Analysis of Shorted Wall Rectangular Patch Antenna.

The shorting wall is used along one side of the rectangular patch this causes additional inductance $L_s$ and resistance $R_s$.

$$\text{Fig.4. Equivalent circuit of the shorted patch antenna.}$

$$Z_{short} = \frac{R_0 j\omega}{L_F j\omega + \frac{R_0}{L_F} \frac{L_0}{L_F} L_s + R_l}$$ \hspace{1cm} (7)$$

Where, $L_s = \frac{L_0}{L_F}$
Where, \( L_s \) = Shorting wall inductance \[10\]
\[
L_s = 0.2 \, h \left[ \frac{2.3}{(\varepsilon + t)} + 0.2235 \frac{(\varepsilon + t)}{h} + 0.5 \right]
\]

S= length of the shorting wall.
h = thickness of the dielectric substrate.
t= thickness of the shorting wall.

D. Analysis of notch loaded shorted rectangular patch antenna.

\[
\frac{Z_{notch}}{Z_{short}} = L_m
\]

Fig.5. Equivalent circuit of coupled notch loaded shorted patch antenna.

The total input impedance of the notch loaded shorted patch antenna as shown in Fig.5 is given as,

\[
Z_{total} = Z_{notch} + \frac{\varepsilon_{notch} Z_{notch}}{\varepsilon_{short} Z_{short}}
\]

Where, \( Z_m = (j\omega L_m + \frac{1}{j\omega C_m}) \)

\( L_m \) and \( C_m \) are the mutual inductance and mutual capacitance between two resonant circuit \[14\].

\[
L_m = \frac{c_0^2 L_0 (2 - L_2) + \sqrt{(c_0^2 L_0 (2 - L_2)^2 + 4 c_0^2 L_0 (2 - L_2) L_2)} L_2}{2 (2 - L_2)}
\]

\[
C_m = \frac{-2 (c_0^2 + g_2) + \sqrt{(c_0^2 (1 - g_2)^2 + 4 c_0^2 g_2 (1 - g_2)^2)}}{2 (2 - 2 g_2)}
\]

Where, \( c_0 = \frac{1}{\sqrt{\varepsilon_0 \varepsilon_r}} \) and \( g_0 \) and \( g_2 \) are quality factor of the two resonant circuits.

III. DESIGN SPECIFICATION

Table 1. Design specifications for the notch loaded shorted patch antenna.

<table>
<thead>
<tr>
<th>Substrate material used</th>
<th>RT-duroid 5880</th>
</tr>
</thead>
<tbody>
<tr>
<td>Relative permittivity of the substrate ( ( \varepsilon_r ) )</td>
<td>2.20</td>
</tr>
<tr>
<td>Length of the patch ( ( L ) )</td>
<td>42 mm</td>
</tr>
</tbody>
</table>

IV. RESULTS AND DISCUSSION

Fig.6. Variation of return loss with frequency for proposed antenna.

The variation of the return loss with frequency for notch loaded shorted patch antenna is shown in Fig.6 it is observed that the antenna has the bandwidth of 41.80%.

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Fig. 7. Variation of return loss with frequency for different dielectric substrate.

Fig. 8. Variation of return loss with frequency for different thickness of dielectric substrate.

Fig. 9. Variation of return loss with frequency for different notch length ($L_n$).
Table 2: Calculated value of the bandwidth for different dielectric substrate

<table>
<thead>
<tr>
<th>S.No</th>
<th>Product</th>
<th>Dielectric Constant ((\varepsilon_r))</th>
<th>Frequency band (GHz)</th>
<th>Center Frequency (GHz)</th>
<th>Bandwidth</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Duroid5880</td>
<td>2.20</td>
<td>1.68612-2.57729</td>
<td>2.131705</td>
<td>41.80%</td>
</tr>
<tr>
<td>2.</td>
<td>Duroid5870</td>
<td>2.33</td>
<td>1.64669-2.48265</td>
<td>2.06467</td>
<td>40.49%</td>
</tr>
<tr>
<td>3.</td>
<td>Ultralam2000</td>
<td>2.40</td>
<td>1.62303-2.44322</td>
<td>2.033125</td>
<td>40.34%</td>
</tr>
<tr>
<td>4.</td>
<td>Duroid6002</td>
<td>2.94</td>
<td>1.48896-2.14353</td>
<td>1.816245</td>
<td>36.04%</td>
</tr>
<tr>
<td>5.</td>
<td>RO4003C</td>
<td>3.38</td>
<td>1.40221-1.96215</td>
<td>1.68218</td>
<td>33.29%</td>
</tr>
</tbody>
</table>

On increasing the dielectric constant (\(\varepsilon_r\)) has decreasing effect on bandwidth which shifts towards lower side Fig.7.

Table 3. Calculated value of the bandwidth for different thickness of the dielectric substrate (h).

<table>
<thead>
<tr>
<th>S.No</th>
<th>Dielectric thickness (h)</th>
<th>Frequency band (GHz)</th>
<th>Center frequency (GHz)</th>
<th>Bandwidth</th>
</tr>
</thead>
</table>

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1. On increasing the thickness of the dielectric ($h$) has increasing effect on bandwidth which shifts towards upper side Fig.8.

<table>
<thead>
<tr>
<th>S.No.</th>
<th>Notch length ($L_n$)</th>
<th>Frequency band (GHz)</th>
<th>Center frequency (GHz)</th>
<th>Bandwidth</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>8 mm</td>
<td>1.78076-2.64038</td>
<td>2.21057</td>
<td>38.88%</td>
</tr>
<tr>
<td>2.</td>
<td>9 mm</td>
<td>1.68612-2.57729</td>
<td>2.131705</td>
<td>41.80%</td>
</tr>
<tr>
<td>3.</td>
<td>10 mm</td>
<td>1.5836-2.5142</td>
<td>2.0489</td>
<td>45.42%</td>
</tr>
<tr>
<td>4.</td>
<td>11 mm</td>
<td>1.4653-2.44322</td>
<td>1.95426</td>
<td>50.04%</td>
</tr>
<tr>
<td>5.</td>
<td>12 mm</td>
<td>1.33912-2.35647</td>
<td>1.847795</td>
<td>55.05%</td>
</tr>
</tbody>
</table>

On increasing the notch length ($L_n$) has increasing effect on bandwidth which shifts towards lower side Fig.9.

<table>
<thead>
<tr>
<th>S.No</th>
<th>Notch length ($W_n$)</th>
<th>Frequency band (GHz)</th>
<th>Center frequency (GHz)</th>
<th>Bandwidth</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>9</td>
<td>1.73344-2.64038</td>
<td>2.18691</td>
<td>41.47%</td>
</tr>
<tr>
<td>2.</td>
<td>10</td>
<td>1.70978-2.60883</td>
<td>2.159305</td>
<td>41.63%</td>
</tr>
<tr>
<td>3.</td>
<td>11</td>
<td>1.68612-2.57729</td>
<td>2.131705</td>
<td>42.27%</td>
</tr>
<tr>
<td>4.</td>
<td>12</td>
<td>1.66246-2.55363</td>
<td>2.108045</td>
<td>42.27%</td>
</tr>
<tr>
<td>5.</td>
<td>13</td>
<td>1.64669-2.52997</td>
<td>2.08833</td>
<td>42.30%</td>
</tr>
</tbody>
</table>

On increasing the notch width ($W_n$) has increasing effect on bandwidth which shifts towards lower side Fig.10.
V. CONCLUSION
From the analysis, it is found that the bandwidth of the proposed antenna depends upon dielectric substance, thickness of the substrate and dimension of the notch, proposed antenna can be utilized for various wireless applications.

VI. REFERENCES

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DATA SECURITY IN CLOUD

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Abstract - Cloud computing is a new computational paradigm that offers an innovative business model for organization to adopt IT without upfront investments. Despite the potential gain achieved from the cloud computing. It is clearly one of today’s most enticing technology area due, at least in part, to its cost-efficiency and flexibility.

Cloud computing moves the application software and database to the large data center where the data management and services may not be fully trustworthy. In this article our major discussion on the cloud data storage security. The security is an important aspect of quality of services. To ensure the correctness of user data in cloud. We propose an effective and flexible distribution scheme two way handshakes based on token management. By utilizing the homomorphic token with distributed verification of erasure-coded data, our scheme achieves the integration of storage correctness insurance and data error localization i.e., the identification of misbehaving server(s).

Index Terms - Cloud computing, data security, privacy, security

I. INTRODUCTION

Today, the 14th largest software company by market capitalization (salesforce.com) operates almost entirely in the cloud, the top five software companies by sales revenue all have major cloud offerings, and the market as a whole is predicted to grow to $160 Billion by 2011 (source: Merrill Lynch). Yet despite the trumpeted business and technical advantages of cloud computing, many potential cloud users have yet to join the cloud, and those major corporations that are cloud users are for the most part putting only their less sensitive data in a cloud. Lack of control in the cloud is the major worry. One aspect of control is transparency in the cloud implementation – somewhat contrary to the original promise of cloud computing in which the cloud implementation is not relevant. Transparency is needed for regulatory. [3]

Cloud computing represents a recent paradigm shift for the provision of computing infrastructure which outsources computation and storage requirements of applications and services to a managed infrastructure. Cloud computing inevitably poses new challenging security threats for number of reasons.

• Cryptographic primitives for the purpose of data security protection cannot be directly adopted due to the users’ loss control of data in cloud computing. The problem of verifying correctness of data storage in cloud is becomes even more challenging.

• Cloud computing is not just a third party data warehouse. The data stored in the cloud may be frequently updated by the users, like deleting, modification, insertion, recording, etc. to ensure storage correctness under dynamic data update, this dynamic feature also makes traditional integrity insurance technique futile and entails new solutions.

In this paper, we propose an effective and flexible distributed scheme with explicit dynamic data support to ensure the correctness of users’ data in the cloud. We rely on erasure correcting code in the file distribution preparation to provide redundancies and guarantee the data dependability. This construction drastically reduces the communication and storage overhead as compared to the traditional replication-based file distribution techniques. By utilizing the homomorphic token with distributed verification of erasure-coded data, our scheme achieves the storage correctness insurance as well as data error localization: whenever data corruption has been detected during the storage correctness verification, our scheme can almost guarantee the simultaneous localization on data errors, i.e., the identification of the misbehaving server(s) [3].

II. LITERATURE

Cloud Computing

Cloud computing is a very young concept and there is no consensus on a formal definition at the time of writing most experts agree that the cloud computing is a buzz which encompasses a variety of services. Other focus on the business model which is typically a pay-as-you-go services

The following definition approaches cloud computing from a broad conceptual level:

Cloud computing represents a broad array of web-based services aimed at allowing users to obtain a wide range of functional capabilities on a “pay-as-you-go” basics that previously required tremendous hardware/software investments and professional skills to acquire. Cloud computing is the realization of the earlier ideals of utility computing without the technical complexities or complicated deployment worries.

Although most definition do not use such generalized concepts, these generalizations are often implied as a base for other definitions. This makes the definition above highly applicable. As an addendum to the definition above, these key technical concept are often associated with (bt not requires of)
cloud computing: instantaneous and on-demand resource scalability, parallel and distributed computing, and virtualization.

**Uses of Cloud Computing**

Various authors have proposed three different tiers of systems employed by cloud service provider. These tiers make up the different levels of technologies used in cloud computing.

**Infrastructure as a Service (IaaS)**

This level represents the most computational and storage (e.g., Microsoft, Google, Amazon) manage a vast set of computational and storage resources. Depending on the provider, end users may have direct access of the hardware resources or access to a set of virtual resources. Clouds typically utilize virtual resources and grid applications typically have direct access to hardware. Application and service built upon virtual resources sets are not hardware dependent and can be deployed seamlessly across different cloud platforms. This service is best representing by services like Amazon EC2, a virtual machine platform.

**Platform as a Service (PaaS)**

At the next level of services are presented to users as a software /application platform instead of hardware. Typically this layer consists of application frameworks that make up the basis of the SaaS layer describe next. The Google APP Engine and Microsoft Azure both offer a large set of programming tools at this level.

**Software as a Service (SaaS)**

This is the highest level of services provided by cloud platforms. This level provides applications that end users interact with. Examples include Google Docs, Microsoft Office live, Google Maps and Facebook.

**Security issues and challenges**

There are three general models of cloud computing (IaaS, SaaS, PaaS). Each of these models possesses a different impact on application security where an application is hosted in a cloud, there are two security problems are arise are:

1. How secure is Data?
2. How secure is code?

Security Availability and Reliability are the major concerns of cloud service users.

**ENSURING CLOUD DATA STORAGE**

In cloud data storage system, users store their data in the cloud and no longer possess the data locally. Thus, the correctness and availability of the data files being stored on the distributed cloud servers must be guaranteed. Our main scheme for ensuring cloud data storage is presented in this section. The first part of the section is devoted to a review of basic tools from coding theory that is needed in our scheme for file distribution across cloud servers. Then, the homomorphic token is introduced. The token computation function we are considering belongs to a family of universal hash function, chosen to preserve the homomorphic properties, which can be perfectly integrated with the verification of erasure-coded data. Subsequently, it is shown how to derive a challenge-response protocol for verifying the storage correctness as well as identifying misbehaving servers. Finally the procedure for file retrieval and error recovery based on erasure-correcting code is also outlined.

**File distribution preparation**

It is well known that erasure-correcting code may be used to tolerate multiple failures in distributed storage systems. In cloud
data storage, we rely on this technique to disperse the data file $F$ redundantly across a set of $n = m + k$ distributed servers. An $(m, k)$ Reed-Solomon erasure-correcting code is used to create $k$ redundancy parity vectors from $m$ data vectors in such a way that the original $m$ data vectors can be reconstructed from any $m$ out of the $m + k$ data and parity vectors. By placing each of the $m + k$ vectors on a different server, the original data file can survive the failure of any $k$ of the $m + k$ servers without any data loss, with a space overhead of $k/m$. For support of efficient sequential I/O to the original file, our file layout is systematic, i.e., the unmodified $m$ data file vectors together with $k$ parity vectors is distributed across $m + k$ different servers.

Let $F = (F_1, F_2, \ldots, F_m)$ and $F_i = (f_{1i}, f_{2i}, \ldots, f_{mi})^T$ ($i \in \{1, \ldots, m\}$). Here $T$ (short hand for transpose) denotes that each $F_i$ is represented as a column vector, and $l$ denotes data vector size in blocks. All these blocks are elements of $GF(2^p)$. The systematic layout with parity vectors is achieved with the information dispersal matrix $A$, derived from an $m \times (m+k)$ Vandermonde matrix[7]:

$$
\begin{bmatrix}
1 & 1 & \ldots & 1 & 1 & \ldots & 1 \\
\beta_1 & \beta_2 & \ldots & \beta_m & \beta_{m+1} & \ldots & \beta_n \\
\vdots & \vdots & \ddots & \vdots & \vdots & \ddots & \vdots \\
\beta_1^{m-1} & \beta_2^{m-1} & \ldots & \beta_m^{m-1} & \beta_{m+1}^{m-1} & \ldots & \beta_n^{m-1}
\end{bmatrix}
$$

where $\beta_j$ ($j \in \{1, \ldots, n\}$) are distinct elements randomly picked from $GF(2^p)$. After a sequence of elementary row transformations, the desired matrix $A$ can be written as

$$
A = \begin{pmatrix}
1 & 0 & \ldots & 0 & P_{1j} & P_{12} & \ldots & P_{1k} \\
0 & 1 & \ldots & 0 & P_{21} & P_{22} & \ldots & P_{2k} \\
\vdots & \vdots & \ddots & \vdots & \vdots & \ddots & \vdots & \vdots \\
0 & 0 & \ldots & 1 & P_{mj} & P_{m2} & \ldots & P_{mk}
\end{pmatrix}
$$

Where $I$ is a $m \times m$ identity matrix and $P$ is the secret parity generation matrix with size $m \times k$. Note that $A$ is derived from a Vandermonde matrix, thus it has the property that any $m$ out of the $m + k$ columns form an invertible matrix.

By multiplying $F$ by $A$, the user obtains the encoded file:

$$
G = F \cdot A = (G^{(1)}, G^{(2)}, \ldots, G^{(m)}, G^{(m+1)}, \ldots, G^{(n)}) = (F_1, F_2, \ldots, F_m, G^{(m+1)}, \ldots, G^{(n)}),
$$

Where $G^{(j)} = (g^{(j)}_1, g^{(j)}_2, \ldots, g^{(j)}_l)^T$ ($j \in \{1, \ldots, n\}$).

noticed, the multiplication reproduces the original data file vectors of $F$ and the remaining part ($G^{(m+1)}$, $\ldots$, $G^{(n)}$) are $k$ parity vectors generated based on $F$.

IV. CHALLENGE TOKEN PRE-COMPUTATION

In order to achieve assurance of data storage correctness and data error localization simultaneously, our scheme entirely relies on the pre-computed verification tokens. The main idea is as follows: before file distribution the user pre-computes a certain number of short verification tokens on individual vector $G(j)$ ($j \in \{1, \ldots, n\}$), each token covering a random subset of data blocks. Later, when the user wants to make sure the storage correctness for the data in the cloud, he challenges the cloud servers with a set of randomly generated block indices. Upon receiving challenge, each cloud server computes a short “signature” over the specified blocks and returns them to the user. The values of these signatures should match the corresponding tokens pre-computed by the user. Meanwhile, as all servers operate over the same subset of the indices, the requested response values for integrity check must also be a valid codeword determined by secret matrix $P$.

Algorithm 1

Token Pre_computation

1: procedure
2: Choose parameters $l$, $n$ and function $f$, $\phi$;
3: Choose the number $t$ of tokens;
4: Choose the number $r$ of indices per verification;
5: Generate master key $K_{prp}$ and challenge key $k_{chal}$;
6: for vector $G(j)$, $j \leftarrow 1$, $n$ do
7: for round $i \leftarrow 1$, $t$ do
8: Derive $\alpha_i = f(k_{chal}(i))$ and $k_{prp}$ from $K_{prp}$
9: compute
10: end for
11: end for
12: store all the vis locally
13: end procedure

Suppose the user wants to challenge the cloud servers’ times to ensure the correctness of data storage. Then, he must pre-compute $t$ verification tokens for each $G(j)$ ($j \in \{1, \ldots, n\}$), using a PRF $f(\cdot)$, a PRP $\phi(\cdot)$, a challenge key $k_{chal}$ and a master permutation key $K_{prp}$. Specifically, to generate the $j^{th}$ token for server $j$, the user acts as follows:

1) Derive a random challenge value $\alpha_j$ of $GF(2^p)$ by $\alpha_i = K_{chal}(i)$ and a permutation key $K_{prp}(i)$ based on $K_{prp}$
2) Compute the set of $r$ randomly-chosen indices:

$$
\{I_q \in \{1, \ldots, l\} | 1 \leq q \leq r\}, \text{where} \ I_q = \phi_{k_{prp}}(i)(q).
$$
3) Calculate the token as:

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\[ V_i^{(j)} = \sum_{q=1}^{r} a_i^q \cdot G^{(j)}[I_q] \text{, where } G[I_q] = g_{eq}^{(i)} \]

After token generation, the user stores token locally to obviate the need for encryption and lower the bandwidth during dynamic data operation.

V. CORRECTNESS VERIFICATION AND ERROR LOCALIZATION

Our scheme outperforms those by integrating the correctness verification and error localization in our challenge-response protocol: the response values from servers for each challenge not only determine the correctness of the distributed storage, but also contain information to locate potential data error.

Specifically, the procedure of the i-th challenge-response for a cross-check over the n servers is described as follows:

1) The user reveals the \( a_i \) as well as the i-th permutation key \( k_{prp}^{(i)} \) to each servers.

2) The server storing vector \( G(j) \in \{1, \ldots, n\} \) aggregates those \( r \) rows specified by index \( k_{prp}^{(i)} \) into a linear combination

\[ R_i^{(j)} = \sum_{q=1}^{r} a_i^q \cdot G^{(j)}[\Phi_{k_{prp}}^{(i)}(q)] \cdot \]

3) Upon receiving \( R_i^{(j)} \) from all the servers, the users takes away blind values in \( R_0^{(j)}(j \in \{m=1, \ldots, n\}) \) by \( R_i^{(j)} \leftarrow R_0^{(j)} \cdot \sum_{q=1}^{r} f_{k_q} \cdot s I_q \cdot j \cdot a_i^q \cdot I_q = \Phi_k^{(i)}(q) \cdot \)

4) Then the user verifies whether the received values remain a valid code word determined by secret matrix \( P \):

\( (R_i^{(1)}, \ldots, R_i^{(m)}, P = (R_i^{(m+1)}, \ldots, R_i^{(n)}) \)

Because all the servers operate over the same subset of indices, the linear aggregation of these \( r \) specified rows \( (R_1^{(i)}, \ldots, R_i^{(n)}) \) has to be a codeword in the encoded file matrix. If the above equation holds, the challenge is passed. Otherwise, it indicates that among those specified rows, there exist file block corruptions.

Once the inconsistency among the storage has been successfully detected, we can rely on the pre-computed verification tokens to further determine where the potential data error(s) lies in. Note that each response \( R_i^{(j)} \) is compute exactly in the same way as token \( v_i^{(j)} \), thus the user can simply find which server is misbehaving. [10]

Algorithm 2 Correctness Verification and Error Localization

1: procedure CHALLENGE \( (i) \)
2: Recompute \( a_i = f_{k_{chal}(i)} \) and \( k_{prp}^{(i)} \) from KPRP
3: Send \( \{a_i, k_{prp}^{(i)}\} \) to all the cloud server
4: Receive from servers:

\[ \{R_i^{(j)} = \sum_{q=1}^{r} a_i \cdot G^{(j)}[\Phi_{I_q}(i)(q)]\ 1 \leq j \leq n \} \]

5: for \( j \leftarrow m + 1, n \) do
6: \( R_i^{(j)} \leftarrow R_i^{(j)} - \sum_{q=1}^{r} f_{k_j} \cdot s I_q \cdot j \cdot a_i \cdot I_q = \Phi_k^{(i)}(q) \)
7: end for
8: if \((R_i^{(1)}, \ldots, R_i^{(m)}) \cdot P = (R_i^{(m+1)}, \ldots, R_i^{(n)}) \) then
9: Accept and ready for the next challenge.
10: else
11: for \( j \leftarrow 1, n \) do
12: if \((R_i^{(j)} = v_i^{(j)}) \) then
13: return server \( j \) is misbehaving.
14: end if
15: end for
16: end if
17: end procedure

VI. CONCLUSION

In this paper, we investigate the problem of data security in cloud data storage, which is essentially a distributed storage system. To achieve the assurances of cloud data integrity and availability and enforce the quality of dependable cloud storage service for users, we introduce a new two way handshaking scheme based on token management. By utilizing the homomorphic token with distributed verification of erasure-coded, our scheme achieves the integration of storage correctness insurance and data error localization, i.e., whenever data corruption has been detected during the storage correctness verification across the distributed servers, we can almost guarantee the simultaneous identification of the misbehaving server(s).

We believe that the data storage security in computing an area full of challenges and of paramount importance is still in its infancy now, and many research problems are yet to be identified.

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THE CONCEPT OF NADA AND BINDU IN TIRUMANTIRAM

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Abstract- Indian philosophy gives a significant position to the sound. Saivism, one of the prominent branches of Indian religious philosophy, put forward the key phonematic representations as Nada and Bindu. Saivite doctrines of monism and dualism differs each other with regard to the nature and function of sound. Here is an attempt to analyze the earliest dualistic Saiva text—Tirumantiram in connection with the discussion of the aforementioned vital sound principles.

Index Terms- Sound- Nada- Bindu- Saivite dualism- Tirumantiram

I. INTRODUCTION

Sound plays an important role in the world of every sentient being. Indian knowledge system, comprised of religion, philosophy, metaphysics, theology etc., considers this as a significant matter of discussion. There are many speculations about the cosmogonist and magic power of word (sound) in the texts deal with phonetics, grammar and philosophy. Philosophico-linguistic approach of sound could found in the earliest written elements as well as in the various thought systems of India, where a linguistic theology has been evolved throughout the ages. Saivism, one of the prominent branches of philosophy, propounds the concepts of Bindu and Nada—the basic phonemic representations. This paper is a search, for roots of Saiva theory of meaning in the work Tirumantiram.

The study of sacred sound must be able to incorporate material various sources such as Vedic and Tantric texts. The Sakta tantras talks about the sound as goddess srividya and goddess Kali. Vaisnava and Pancaratra texts consider as the energy of Visnu while in Saivism, it is the energy of Siva. The status of sacred sound in Saivism is one of the subordination to the supreme deity, Siva. The important thing to be mentioned here is the dualistic and nondualistic doctrines of saivism differs each other with regard to the nature and function of sound. So the discussion about the monistic doctrine seems to be better before entering into the nondual Saivite thought.

II. NADA AND BINDU IN MONISTIC SAIVISM

Nada usually signifies a subtle sound form which is the first resonance of the supreme word (para vak), of the vibration (spanda) which gives like to the primary principle. Jayaratha, in the commentary on Tantraloka, describes the level of Nada as consciousness transcending the universe and self-awareness.

According to him Nada is an unstruck (anahata), almost unmanifest, sound (dhvani) for there the phonemes are not differentiated. Sometimes it is referred to by the term phoneme (varna), as Abhinavagupta says:

\begin{equation}
\text{eko nadatmakno varnah sarvatvarnavibhagavan}
\end{equation}

Nada is also considered to be as cit, the level of Sadasiva: the ontic level, where the phonematic emanation is projected into the energy and where consonants begin to arise. “From Sakti, in effect, the sound energy becomes first Nadanta, then Nada, then Nirodhini, next comes Bindu, itself preceeding ardhacandra”. Bindu is one of the most significant terms in the speculations about the word and energy. Saradatilaka defines thus:

\begin{equation}
\text{saccidanabvahavatsakalatparamesvarat}
\end{equation}

Bindu is the drop or point in which the energy is collected, and as known the ‘mass formed by the union of Siva and Sakti’ (Sivasaktimithunapinda). Bindu, plays a role in awakening kundalini, and at the time of cosmic resorption, it is the point within which the universe is reabsorbed as it merges into the energy gathered upon itself.

Word is the origin of all things inclusive not only of the world of speech but also that of sense or meaning, and the language is the basic tool for the experience of itself, and of all the other categories. Language is based; of course, on the sound (Nada). This is perhaps Saivasiddhanta insight in postulating the category of Nada, the essence of language and speech as the first evolve of pure, unmixxed (suddha) maya. It is familiar that nondual saivism of Tamilnadu is based upon the traditional treatises like Tirumurais and Saivagamas. Many of the Saivagama literature contain metaphysical and cosmological discussions about Nada, Bindu, the thirty six principles, Bija, matrika and the origin of alphabet. But Saivasiddhanta accepts the basic Agama categories of Nada, Bindu etc., differing from it.

In its cosmogony, there is a nine fold progression from unmanifest to manifest in descending order-Siva, Sakti, Nada, Bindu. Tirumantiram refer to in different parts, about Nada and Bindu. As an authoritative Saivasiddhanta text, Tirumantiram only mentions the basic theories from which later thinkers developed meaning theory.
Most of the discourses in this text are said to be related with the yoga practice of various kinds. The philosophical principle of Nada Bindu principle hence is having limitations in the conveyance of the sound theory. Also the compendium of concepts under dualist and non-dualist beliefs make the obscurity in the area. "Paramasiva is in unvoiced sound (Nada) in (sound of) either, in (gross sound of) mantras (that express Siva himself), in anus, in the sound units (of the seeds) and in the end (sound such as the final nasalization of the seed syllable om)."

The ultimate primal one, who created the vast universe by pure consciousness, is Sadasiva who is not distinct from Sakti. The process of creation depends on Nada and Bindu from the union of which Siva and sakti appear. Maya and maan (mahat) Sakti are the other important things in creation. Jnana originated from Siva aforementioned, Kriya from Sakti and Icchā arises from Bindu. Maya is the product of Sakti. The Anavasakti acts on the material sphere known as maan or mahat from which five elements evolves, five gods born and perform five acts. Maya with the union of Bindu produces all the celestials, space, air, fire, water, sound, mind, etc. It also says that Bindu as well as Mayasakti born of Nada. Such confusing nature disappears only after the discussion of the Paraparam and Parabindu. Tirumular describes the four states in creation process. Parabindu and Parabindu evolve from the transcendental sphere and in turn, evolve Parasivam and Parai. Along with these four (Paranada, Parabindu, Parasivam and Parai) ,the paraparam and Parai is conjoining to make the six transcendental categories. From Parabindu and Paranada, Siva, Sakti, Aparabindu and Aparanada evolve and then lead to the chain of creation process. Nada and Bindu have role in the attainment of supreme reality. The ultimate reality according to Tirumular is Siva the lord. The end of Nada is grand Yoga, divine sakti, and the final goal where the god seated. The primal sound Nada and god are one in consciousness which should be reached with the help of raising the kundalini. The practises of candrayoga, erolica kra, tarakacakra, ajnacakra etc., are also based the sound principles Nada and Bindu.

Tirumular’s theology gives emphasis to the recital of pancakasara and omkara as all Saivasiddhanta treatises do. When the manifestation of the self as an object is considered as a movement of sakti, Nada and bindu are to be said as the stages of that. Bindu and Nada produce Bija:

Vinduvum nadamum okka vishuntitil
Vinduvum nadamum okka viriyatam
Vindirkurintitvad nadam ezhuntitil
Vinduvai enmati kondatu visame.

From Bindu and nada, the fifty letters evolved, and from these letters, cakra was formed. The letters are mantras and the supreme mantra pranava, seated in the eyebrow centre is to be expanded into namahsivaya-the pancakasari.

Even though the Tirumurais in Tamil are the fundamental treatises of siddhantasivaism, there happened many changes in the literary sources of latter origin. Pauskaragama (its commentary by Umapati Sivam) and Nadakarika are the works deal with developed theories of sound with the help of Agamic and external influences. Metaphysical representations of Nada and Bindu have not a gulf of distance from the early Siddhanta treatises. Pauskara proposes the that the power or capacity (nada,sakti) of phonemes (varna or arna)denotes meaning. The Sabda arising from Bindu produce varna. Varnas are fifty in number, and Bindu is their material cause, Isvara is effective cause and human effort is the auxiliary cause. The meaning is known through the power (samskara) of varna and the verbal transaction occurs:

"yatha varnah pura jnatah kramenaiva tatha punah samvahanti ca samsaramste tatha smrtibodhata"

Only Nada, manifested by the gross (and inaudible) varnas is the denote of meaning. Kiranatantra postulates the theory as : “Paramasiva is in primal unvoiced sound (Nada) ,in almost gross sound (Bindu) ,in (sound of) either, in (gross sound of) mantras (that express Siva himself), in anus, in the power (which controls those) , in the seed(syllables such as om), in the sound units(of the seeds) and in the end(sound such as the final nasalization of the seed syllable om)."

The idea of sound (sacred) becomes a serious philosophical thesis only after the discussion of the connection between word and meaning. The discussion (in Saivasiddhanta) is to be believed that originated after the influence of grammatical philosophy of language. That is why the earlier texts like Tirumantiram don’t deal with the same. Also this analysis strikes on the subject of the dualistic nature of Saivasiddhanta. An assumption should be postulate as the dualism comes under the treatises which created after the merging of Saivagamic pluralism and not in the earlier Tamil works. The dualistic nature makes the Sakti distinct from supreme Siva and hence the Nada becomes the power of Sakti. Tirumantiram impartially explains sound both as Siva and Sakti.

In sum, there is reversal and contradictory status of nada and Bindu in the Siddhanta school of Saivism according to the different approaches of the texts of different time periods. Salvation has a central role in this system of philosophy and hence the theories and practises of all kinds in Tirumantiram are related with the attainment of supreme goal. So the primal phonemic principles are discussed here only in the dimension of their salvific roles. The later theoreticians incidentally teach the theory of word and meaning in the occasions like the transmission of sacred texts (tantravatara). The findings should be postulated as:

- According to the variance in originating time of different treatises, status of the concepts- Nada and Bindu is contradictory in Saivasiddhanta.
- The discussion about the connection between word and meaning is originated only after the influence of grammatical philosophy of language.

Dualism comes under the literature created after the pluralistic amalgamation of Saivagamas is not in the earlier Tamil works.
NOTES

[1] Tirumantiram written by Sage Tirumular (5th century AD) is believed as the primary text of the Saivasiddhanta, eventhough there an earliest text named Nandivathakarika exists.


[6] Nadanta is the very point where the resonance ultimately merges into energy, the end of Nada.

[7] The obstructress-subtle level of sound; also known as Nirodhika.


[9] Ibid., p. 86, n.2.

[10] This is somewhat related to the concept of Yamala or Sanghatta.


[12] Ibid., p. 6.


[15] Ibid., p.16.

[16] This first stage is not referred to in some of the later works on Saivasiddhanta. They present the creative process as starting with the nine evolutes of pure spirit.


[18] Ibid., p. 225.


[22] Here cakra represents the Nadacakra

[23] Here cakra represents the Nadacakra

[24] The reference of letter is added only because of description of Mantra-a means to liberation.


REFERENCES


A Study of Road Traffic Noise Annoyance on Daily Life in Agartala City Using Fuzzy Expert System and Multiple Regression Analysis

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Abstract- Noise has many ill effects on living beings as well as non-living things. The adverse effects of noise may include noise induced hearing loss, sleep disruption, speech interference, reduction in human work efficiency and annoyance. In this paper, an effort has been made to develop a fuzzy expert system based model to study the annoyance among the road side dwellers, employees working on road side offices, organizations, etc. due to road traffic noise pollution in Agartala city due to rapidly growing vehicular traffic. A relationship has been developed between different traffic noise parameters and its harmful impact on daily life of individuals using multiple regression analysis. In addition, statistical analysis was also carried out between measured and predictive values and a good agreement was noticed between observed and predicted value of noise based level.

Index Terms- Road Traffic Noise, Noise Annoyance, Fuzzy Set, Fuzzy Expert System, Fuzzy Modeling, Multiple Regressions Analysis

I. INTRODUCTION

Noise is one of the most important factors in producing deterioration of both well being and quality of life of people in urban areas. Noise produces a series of physiological, psychological, behavioural changes in responses [10]. Traffic noise is one of the major environmental pollutants that are encountered in daily life and directly affects the human health [28]. Annoyance can be defined as totality of all negative feelings like displeasure, disturbance, dissatisfaction and nuisance, associated with any condition and known by individual to adversely affect them [3]. The perception of noise depends to the sound frequency and level [19]. The increment being situated between 2-19 kHz and 10-135 dB (A) [17]. Noise pollution [14] can be defined as unwanted or offensive sounds that unreasonably intrude into our daily activities [9]. Noise cannot only degrade the living of a person and reduce work efficiency but can also produce some permanent ill-effects like hearing loss [26]. So it is crucial to have a model which can predict the effect of traffic noise [27] on individuals’ daily life. Traffic Noise is the major source responsible for environmental annoyance. Road traffic noise [6] is probably the most rigorous and pervasive type of noise pollution and has become a serious problem nowadays because of inadequate urban planning of Agartala city in the past. Homes, schools, offices, hospitals, commercial business centres and other community buildings were routinely built close to the main roads of the municipality without any buffer zones or adequate sound proofing. The problem has been compounded by increasing in traffic volumes (two wheelers, heavy motor vehicles, other vehicles) far beyond the expectations of our early urban planners. This alarming increase in the volume of traffic is actually inversely related to the degradation of the environment [20]. There are number of problems among the individuals associated with noise pollution like sleep disturbances, headache in the morning, reduction of immunity power specially among senior citizen; creation of severe problems among high blood pressure and blood sugar persons; retardation in growth and development among new born babies; difficulties in preparing lessons of students of different classes; laziness, tiredness, annoyance, mistakes in counting, irritation, etc. among employees working in Government, semi Government offices, private organizations, banks which reflects on their work performances. Noise reduces the depth and quality of sleep thus may adversely effect overall mental and physical health. The public roads network is insufficient in comparison to the rate of increase in traffic volume. In addition improper modernization and maintenance of the roads (high proportion of un-asphalted roads, with road stone or gravel or with degraded asphalt), narrowness of the roads and inadequate traffic management further aggravate the situation. It is important to study noise pollution from a quantitative point of view as well as from the point of view of the annoyance that it produces in the population [13]. Annoyance is measured in the interval [0, 1]; ‘0’ represents the lowest degree of annoyance and ‘1’ represents the highest degree of annoyance. For the present study of measurement of percentage of annoyance level caused by road traffic noise pollution, a survey based on Agaratala city, a relatively medium-large urban city, situated in the North Eastern region of India and located at 23.50°N and 91.5°E has been under taken and the data obtained have been analyzed.

1.1 OBJECTIVES OF THE STUDY

The objectives of this study are to appraise the impact of noise and concomitant annoyance on individuals in their daily life due to road traffic parameters, by measuring different noise indices. For this, the study is conducted in three levels. The first level predicts the percentage of Highly Annoyance (%HA) among the individuals in terms of various noise indices like: Day–Night Noise Level (Ldn), Traffic Noise Index (TNI), Equivalent Noise
Level (Leq) and Maximum Equivalent Noise Level (Lmax). The second level describes the percentage of Highly Annoyance (%HA) in terms of average traffic volume, % of two wheelers, % of heavy vehicles and mean traffic speed. In third level i.e., Quis model based on Ldn has been used to predict percentage of Highly Annoyance. A comparison among observed values of %HA and values calculated by above three levels have been furnished.

1.2. REVIEW OF LITERATURE

Recent researches clearly demonstrate that road traffic noise has been the predominant source of annoyance; no other single noise has been of comparable importance. It is due to the large number of automotive vehicles in comparison with other machines. In India, few studies on traffic noise level have been carried out at different cities like Calcutta, Delhi, Bombay, Visakhapatnam, Baroda, Anantpur, Asansol, etc. [21],[15], [7] , [23], [24], [26]. In international arena recent works on traffic noise assessment have been carried out at different cities like Alexandria, Tehran, etc. [11], [12].

1.3 SCOPE AND STRUCTURE OF THE STUDY

The study presents the problem of noise pollution in terms of road traffic. The study starts with a background cover of noise pollution, its affect among the individuals in daily life and literature review of similar works. The main portion of the work includes i) collection of environmental data in relation to road traffic noise by methods of monitoring and storing them for further retrieval, editing, analysis and promote their use for the best possible purpose, ii) prediction by modeling and iii) identification of spread and distribution of the data.

II. FUZZY RULE BASED MODELING

Boole [5] introduced the beautiful notion of binary numbers, which is the foundation of modern digital computer but Boolean logic is unable to model the human cognition and thinking process. Because of its rigid boundaries, the two valued logic is not so efficient in mapping real world situations. For handling real world problems Zadeh [31] introduced the concept of ‘Mathematics of Fuzzy or cloudy quantities’ followed by his seminal paper ‘Fuzzy sets’ [32]. Generally, the term fuzzy logic is used in two different senses [30]. In a narrow sense, fuzzy logic refers to a logical system that generalizes classical two valued logic for reasoning under uncertainty. In a broad sense, fuzzy logic refers to all of the theories and technologies that employ fuzzy sets, which are classes with unsharp boundaries. The concept of fuzzy modeling was originally proposed by [33] and developed further by other researchers [29].

The model proposed by [16] is based on the collections of IF-THEN rules with both fuzzy antecedent and consequent predicates and functional consequent; essentially they are a combination of fuzzy and non-fuzzy models. The main benefit of this model is its computational efficiency [8], [1]. An important trait of fuzzy model is that it uses fuzzy algorithm which is a knowledge-based algorithm, the essential concepts of which are derived from fuzzy logic. The fuzzy expert system is a knowledge-based system that contains the fuzzy algorithm in a simple rule-base. As depicted in figure 1, a fuzzy expert system is composed of four parts: fuzzifier, knowledge base, inference engine, and defuzzifier. The fuzzifier converts real valued inputs into fuzzy values. The knowledge base includes fuzzy rule base and database. Membership functions of the linguistic terms are contained in the database. The inference engine calculates fuzzy output from fuzzy inputs using fuzzy implication function and finally the defuzzifier yields a real-valued output from the inferred fuzzy output [4]. The advantage of this model is that the rule base is generally provided by an expert and the system solves problems that are normally solved by “Human Experts” [25].

Fig.1: Structure of Fuzzy Expert System

III. METHODOLOGY AND MATERIALS

The sampling area is the Agartala city. The noise level was recorded from road side residences, offices, organizations, banks, etc which are at variable distances depending on the location of the building from the center of the road. Motor vehicular traffic prone sites of the city are identified and selected during the survey. These are Agartala-Airport Road, Assam-Agartala Road, Ronaldsay Road, Office Lane, Akhaura Road, Agartala-Bishalgarh Road, Hari Ganga Basak (H.G.B.) Road, and Central Road which are representatives of entire urban areas. All these sites have their unique characteristics i.e. having a typical road width, roadside building pattern, traffic flowing pattern in different directions. At each selected spot, the measurements were taken at different times during the day time and night time. The details of each selected location are given in table I.

| Table I: Identified locations for the Field Studies |
|---|---|
| Location Place | Location Code |
| Agartala Airport Road | L1 |
| Assam-Agartala Road | L2 |
| Ronaldsay Road | L3 |
| Office Lane | L4 |
| Akhaura Road | L5 |
| Agartala-Bishalgarh Road | L6 |
| H.G.B. Road | L7 |
| Central Road | L8 |
The continuous day night sampling method (The Planning Guidelines for Environmental Noise Limits and Control, 2004) were used where measurements were taken eight times a week for a month. The noise measurement was done by using Integrating Sound Level Meter (model SL-4001). The range and sensitivity of the instrument is 30 dB (A) to 80 dB (A), 50dB (A) to 100dB (A) & 80 dB (A) to 130 dB (A) with accuracy [+ or -] 3%. Microphones were positioned at a height of 1.4m above the ground, and at least 1m from any other reflecting surface (Tempest, 1985). The parameters measured were $L_{\text{max}}$, $L_{\text{eq}}$, $L_{\text{min}}$, $L_{10}$, $L_{50}$ and $L_{90}$ for the estimation of $L_{dn}$ and TNI. The TNI is a method used for the estimating annoyance responses due to traffic noise and is computed using the following formula [14]:

$$\text{TNI} = 4(L_{10} - L_{90}) + (L_{90} - 30)$$ ............. (1)

where, $L_{10}$ = Level of sound exceeded for 10% of the total time of measurement

$L_{90}$ = Level of sound exceeded for 90% of the total time of measurement.

While, the $L_{dn}$ is a 24-hour average noise level used to define the level of noise exposure on a community. It can be calculated by the following formula [18]:

$$L_{dn} = 10 \log \left\{ \frac{1}{24} \left[ 15 \left( 10^{L_d/10} \right) + 9 \left( 10^{L_n+10} \right) \right] \right\}$$ ............. (2)

where, $L_d$ = Equivalent noise levels during day time (i.e. from 6 am to 10 pm) $L_n$ = Equivalent noise levels during night time (i.e. from 10 pm to 6 am).

The types and quantity of motor vehicles that passed through the area were also recorded. Different traffic characteristics like Traffic Volume Count including percentage of two wheelers, percentage of heavy motor vehicles, percentage of other vehicles and average traffic speed were also recorded. A comprehensive, yet briefly structured questionnaire was made to collect information about traffic noise traits and its effects on exposed individuals. For data collection a “Simple Random Sampling” technique was used on local area population of the selected sites of the city and total 280 individuals (students, employees, and different aged people) were interviewed through random sampling questionnaire at eight selected locations.

The present fuzzy system has two input variables and one output variable as shown in figure 2; only those inputs, which affect the output to a large extent, have been selected.

Fig 2: Fuzzy Model for Expert System

The input variables and output variable with their linguistic values and fuzzy intervals are shown in table II.

<table>
<thead>
<tr>
<th>System's variable</th>
<th>Linguistic Variables</th>
<th>Linguistic Values</th>
<th>Fuzzy Intervals</th>
</tr>
</thead>
<tbody>
<tr>
<td>Input</td>
<td>Noise Level</td>
<td>Low</td>
<td>35-70 dB(A)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Medium</td>
<td>65-90 dB(A)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>High</td>
<td>85-95 dB(A)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>VH = Very High</td>
<td>90-105 dB(A)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>EH = Extremely High</td>
<td>100-115 dB(A)</td>
</tr>
<tr>
<td>Noise Duration</td>
<td>Short</td>
<td>0-7 hours</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Medium</td>
<td>5-14 hours</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Long</td>
<td>12-24 hours</td>
<td></td>
</tr>
<tr>
<td>Output</td>
<td>Annoyance</td>
<td>ES = Extremely Small</td>
<td>0 - 0.2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>VS = Very Small</td>
<td>0.15 - 0.35</td>
</tr>
<tr>
<td></td>
<td></td>
<td>S = Small</td>
<td>0.30 - 0.50</td>
</tr>
<tr>
<td></td>
<td></td>
<td>M = Medium</td>
<td>0.45 - 0.65</td>
</tr>
<tr>
<td></td>
<td></td>
<td>H = High</td>
<td>0.60 - 0.80</td>
</tr>
<tr>
<td></td>
<td></td>
<td>VH = Very High</td>
<td>0.75 - 0.95</td>
</tr>
<tr>
<td></td>
<td></td>
<td>EH = Extremely High</td>
<td>0.9 - 1</td>
</tr>
</tbody>
</table>

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Finally, through IF-THEN rules, a total of 45 relationships between input and output variables are formed. A set of rules is illustrated. This model is implemented in MATLAB 7.0.1.

1. If (Noise level is low) and (Noise Duration is short) then (Annoyance in daily life is extremely small)
6. If (Noise level is low) and (Noise Duration is medium) then (Annoyance in daily life is small)
45. If (Noise level is extremely high) and (Noise Duration is long) then (Annoyance in daily life is extremely high).

IV. RESULTS AND DISCUSSIONS

Noise pollution is assessed and analyzed in different locations of the city (Table I, Fig. 2).

A brief description of Traffic Conditions, Various Noise Indices (Ldn, TNI) were calculated using the relations (1) & (2) and the calculated parameters Leq, Lmax, L100, L90, Ld, Ln, Number of Sampled Persons and their Attitudinal Annoyance Response at each selected site are shown in Table III.

Using different sets of independent variables, three predictive models were developed for the calculation of percentage of ‘highly annoyance’ individuals among the road side dwellers, office employees, etc. In the first model various noise indices (Ldn, TNI, Leq and Lmax) were used as independent factors and a regression formula was developed as:

\[
%HA1 = 0.097782Ldn + 0.27922 Lmax – 0.17358TNI + 0.21415 Leq^{0.93356} \quad \ldots \ldots \ldots (3)
\]

Using regression equation (3) & table III, the percentage of highly annoyance was calculated and result shown in Table IV.

<table>
<thead>
<tr>
<th>Site</th>
<th>Traffic Condition</th>
<th>Sample Size</th>
<th>%Highly Annoyance</th>
<th>Noise Indices, dB(A)</th>
</tr>
</thead>
<tbody>
<tr>
<td>L1</td>
<td>Medium, Congested</td>
<td>35</td>
<td>27.06</td>
<td>Leq 62.25, Ldn 76.22, Lmax 83.56, TNI 88.74</td>
</tr>
<tr>
<td>L2</td>
<td>Heavy, Congested</td>
<td>35</td>
<td>30.64</td>
<td>Leq 65.11, Ldn 77.34, Lmax 86.22, TNI 87.42</td>
</tr>
<tr>
<td>L3</td>
<td>Heavy, Congested</td>
<td>35</td>
<td>28.52</td>
<td>Leq 63.23, Ldn 72.34, Lmax 86.06, TNI 88.17</td>
</tr>
<tr>
<td>L4</td>
<td>Medium, Congested</td>
<td>35</td>
<td>26.15</td>
<td>Leq 60.56, Ldn 74.52, Lmax 82.12, TNI 87.64</td>
</tr>
<tr>
<td>L5</td>
<td>Medium, Congested</td>
<td>35</td>
<td>27.28</td>
<td>Leq 63.78, Ldn 75.14, Lmax 86.71, TNI 89.35</td>
</tr>
<tr>
<td>L6</td>
<td>Heavy, Congested</td>
<td>35</td>
<td>30.32</td>
<td>Leq 64.82, Ldn 74.16, Lmax 85.96, TNI 85.46</td>
</tr>
<tr>
<td>L7</td>
<td>Heavy, Congested</td>
<td>35</td>
<td>30.23</td>
<td>Leq 66.54, Ldn 77.06, Lmax 90.24, TNI 86.08</td>
</tr>
<tr>
<td>L8</td>
<td>Heavy, Congested</td>
<td>35</td>
<td>29.46</td>
<td>Leq 65.37, Ldn 72.82, Lmax 88.24, TNI 87.57</td>
</tr>
</tbody>
</table>

Table III: Shows that the percentage of highly annoyance among the various aged persons, students, employees, etc. due to road traffic was between 26.15 to 30.64. Ldn value was ranged between 72.34–77.34; Lmax was found between 82.12–90.24; whereas, TNI ranged between 85.46–89.35. Higher Noise Levels and Annoyance values were due to over populated road ways, minimal traffic management, and frequent misuse of horns at all the selected sites. Improper stoppage of public transportation facilities also increases the congestion level.

Using different sets of independent variables, three predictive models were developed for the calculation of percentage of ‘highly annoyance’ individuals among the road side dwellers, office employees, etc. In the first model various noise indices (Ldn, TNI, Leq and Lmax) were used as independent factors and a regression formula was developed as:

Using regression equation (3) & table III, the percentage of highly annoyance was calculated and result shown in Table IV.

<table>
<thead>
<tr>
<th>Site</th>
<th>% Highly Annoyance (using Regression equation (3))</th>
</tr>
</thead>
<tbody>
<tr>
<td>L1</td>
<td>27.37</td>
</tr>
<tr>
<td>L2</td>
<td>29.44</td>
</tr>
<tr>
<td>L3</td>
<td>28.47</td>
</tr>
<tr>
<td>L4</td>
<td>26.53</td>
</tr>
<tr>
<td>L5</td>
<td>28.77</td>
</tr>
<tr>
<td>L6</td>
<td>29.35</td>
</tr>
</tbody>
</table>
In the second experiment average vehicles per hour ($Q$), percent of heavy vehicles ($Q_h$), percent of 2-wheeler ($Q_{2w}$) and mean vehicular speed ($V_s$) were used as independent factors and a regression relation was developed.

$$\%HA2 = 33.555 + 0.0013Q + 0.4363Q_h - 0.0864Q_{2w} - 0.5194V_s \ldots\ldots\ldots\ldots\ldots (4)$$

The percentage of ‘highly annoyance’ individuals’ was calculated by using equation (4) and result shown in table V.

**Table V:** Calculation of percentage of Highly Annoyance (using regression equation (4))

<table>
<thead>
<tr>
<th>Site</th>
<th>Average vehicle/hr ($Q$)</th>
<th>Percent of heavy vehicles ($Q_h$)</th>
<th>Percent of 2-wheeler ($Q_{2w}$)</th>
<th>Mean vehicular speed ($V_s$)</th>
<th>% Highly Annoyance (Regression equation(4))</th>
</tr>
</thead>
<tbody>
<tr>
<td>L1</td>
<td>296</td>
<td>21.8</td>
<td>36.2</td>
<td>27.5</td>
<td>26.04</td>
</tr>
<tr>
<td>L2</td>
<td>328</td>
<td>25.2</td>
<td>36.7</td>
<td>28.4</td>
<td>27.05</td>
</tr>
<tr>
<td>L3</td>
<td>365</td>
<td>24.5</td>
<td>37.5</td>
<td>30.6</td>
<td>25.58</td>
</tr>
<tr>
<td>L4</td>
<td>388</td>
<td>27.4</td>
<td>38.8</td>
<td>29.2</td>
<td>27.49</td>
</tr>
<tr>
<td>L5</td>
<td>450</td>
<td>27.2</td>
<td>39.6</td>
<td>28.8</td>
<td>27.63</td>
</tr>
<tr>
<td>L6</td>
<td>405</td>
<td>30.8</td>
<td>34.5</td>
<td>30.2</td>
<td>28.67</td>
</tr>
<tr>
<td>L7</td>
<td>485</td>
<td>31.8</td>
<td>38.2</td>
<td>30.4</td>
<td>29.27</td>
</tr>
<tr>
<td>L8</td>
<td>416</td>
<td>26.1</td>
<td>37.1</td>
<td>28.6</td>
<td>27.42</td>
</tr>
</tbody>
</table>

Also the percentage of ‘highly annoyance’ individuals’ was calculated by using the third model namely, Quis Model [22] as given below:

$$\% HA_3 = 0.24(L_{dn}-42) + 0.0277(L_{dn}-42)^2 \ldots\ldots\ldots\ldots\ldots (5)$$

where, $L_{dn}$ = Day-Night Equivalent noise levels and result shown in table VI.

**Table VI:** Calculation of percentage of Highly Annoyance (using regression equation (5))

<table>
<thead>
<tr>
<th>Site</th>
<th>% Highly Annoyance (using Regression equation (5))</th>
</tr>
</thead>
<tbody>
<tr>
<td>L1</td>
<td>40.65</td>
</tr>
<tr>
<td>L2</td>
<td>43.05</td>
</tr>
<tr>
<td>L3</td>
<td>40.91</td>
</tr>
<tr>
<td>L4</td>
<td>37.05</td>
</tr>
<tr>
<td>L5</td>
<td>38.35</td>
</tr>
<tr>
<td>L6</td>
<td>36.37</td>
</tr>
<tr>
<td>L7</td>
<td>42.46</td>
</tr>
</tbody>
</table>
Predicted values of percentage of Highly Annoyance obtained by the three regression models (viz. equations 3, 4 and 5) are compared with observed values (collected from field survey) and the detailed results of statistical analysis for three models have been shown in table VII.

### Table VII: Comparison of various models using Statistical Analysis

<table>
<thead>
<tr>
<th>Statistical Parameters</th>
<th>Noise Based Model</th>
<th>Vehicular Based Model</th>
<th>Quis Model</th>
</tr>
</thead>
<tbody>
<tr>
<td>Paired t-test (0.05 level)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean</td>
<td>28.83</td>
<td>27.39</td>
<td>39.06</td>
</tr>
<tr>
<td>Variance</td>
<td>1.97</td>
<td>1.29</td>
<td>12.82</td>
</tr>
<tr>
<td>SD</td>
<td>1.41</td>
<td>1.14</td>
<td>3.58</td>
</tr>
<tr>
<td>Hypothesized value</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>t-Statistical</td>
<td>0.349</td>
<td>2.59</td>
<td>8.7213</td>
</tr>
<tr>
<td>Tabulated value of t</td>
<td>1.645</td>
<td>1.645</td>
<td>1.645</td>
</tr>
<tr>
<td>(at 5% level, one sided)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>r² Value (rank method)</td>
<td>0.818</td>
<td>0.509</td>
<td>0.275</td>
</tr>
</tbody>
</table>

Based on the statistical examination it can be said that there exists significant difference between the observed and predicted annoyance data in case of the vehicle based and Quis annoyance models. Also correlation values are moderate to low. The noise based model gives a t value of 0.349, which is less than the theoretical value of t at the 0.05 level of significance. The r² value of 0.818 is acceptable.

### V. DISCUSSION ON FINDINGS

Perception cum attitudinal survey was conducted using questionnaire method at eight locations along with acoustic measurements to assess the impact of road traffic noise annoyance on daily life in Agartala city. A total of 280 respondent’s data were used for the analysis. Annoyance with the existing noise atmosphere, as expressed by different aged people, students, employees at each location, was associated with the noise intensities in such a way that it was possible to predict the level of annoyance by taking into account the mean sound levels. The relationships were evaluated using regression modeling. The important findings of this exercise are given hereunder.

1. Development of annoyance prediction models were conducted using traffic and noise data. It was observed that the predicted values from noise based model yield better results \((r^2 = 0.818)\) and also provide evidence to the fact that annoyance related directly to noise, rather than traffic flow \((r^2 = 0.509)\). Prediction with Quis model \((r^2 = 0.275)\) with input data from present study demonstrated moderate to low association, with modest predictability capacity.

2. Since the calculated t-value of noise based model is less than the tabulated value of t at 5% level, in this case the null hypothesis \(H_0\): mean of observed value is equal to mean of the noise level based model is accepted. Based on the statistical examination it can be said that there exists significant difference between the observed and predicted annoyance level of the vehicle based and Quis annoyance models. So in those cases the null hypothesis is rejected.

3. Noise Based Model would predict the annoyance of community with better accuracy and is acceptable for this study area. This also provides evidence for the fact that annoyance is more related to the noise levels, rather than traffic flow.

4. Fuzzy expert system based table II and the correlation coefficient \((r^2 = 0.818)\) of noise based model indicates that the present study that the effect of road traffic noise annoyance among the individuals’ daily life in Agartala city is very high.

### VI. CONCLUSION

Noise pollution is not properly recognized despite of the
fact that it is steadily growing in developing countries like India and in particular in the city Agartala. It is well established now that road traffic noise is a potential hazard to health and is becoming an unjustifiable interference and imposition upon human comfort and quality of modern life. In swiftly urbanizing Agartala city the transportation sector is growing rapidly. This has led to overcrowded roads and noise pollution in the city. In the present study results showed that there is a relationship between traffic noise and its annoyance on daily life of busy road side dwellers, employees in road side offices, banks etc. A field survey was conducted for the calculation of percentage of ‘highly annoyance’ among the individuals at eight heavy to medium congested corridors of the city. Collected data were compared with the regression models developed by different sets of independent variables. The hypothesis was also tested using t-test in order to examine the goodness of fit among the observed and predicted values. It can be concluded that the model based on noise indices gives significantly high correlation coefficient values as compared to other two models. The summarized detail shows that all the models can predict the annoyance level among busy road side dwellers, employees with certain degree of error in comparison to observed noise annoyance. Few suggestions to prevent this type of problems due to road traffic noise are banning hydraulic horns, improvement and streamlining of roads and parking system, discouragement of high sound producing vehicles, and public awareness would also be helpful in reduction of the present noise level in Agartala. By double-glazing the windows of homes facing the road will reduce the level by up to 20 dB (A). Vegetation buffer zones must be created in different parts of the city. In addition, design and fabrication of silencing devices and their use in all types of vehicles would also be an effective measure to abate noise pollution. Integrated Road Traffic Noise Strategy (IRTNS) must be developed at government level to minimize noise pollution.

REFERENCES

Correlation of Plasma homocysteine levels with BMI and Insulin Resistance, amongst Obese, Overweight and Non Obese Infertile Women

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Abstract- Background and Aims: The present study was done to evaluate serum homocysteine level and its correlation with metabolic (S. glucose level, S. insulin level and HOMA-IR.) and anthropometric parameter (BMI) amongst over weight, obese and non obese infertile women.

Methods: This cross sectional prospective study was conducted in Department of Obstetrics and Gynaecology, CSM Medical University, Lucknow, UP, India. After informed consent total 90 infertile women were enrolled, which included 29 overweight, 16 obese and 45 non-obese infertile women, who were taken as controls. Blood samples were obtained in morning on 2nd day of menstruation after an overnight fasting. During the same visit all subjects underwent anthropometric measurement. Plasma homocysteine concentration was measured by fluorescence polarization immunoassay by using ABBOTT diagnostic kit (USA). The estimation of insulin resistance by HOMA-IR score, and BMI was calculated.

Results: Difference between the BMI, homocysteine levels, insulin and HOMA-IR of three groups were statistically significant (p<0.001). In obese group the mean homocysteine level was (14.78±5.71), in overweight (9.84±5.16) and in non obese (8.37±2.48). Result suggests association between increasing homocysteine levels with increasing BMI. Insulin resistant obese and overweight women had higher mean BMI (29.91±2.32) than non insulin resistant (P<0.001). Serum testosterone levels were significantly higher in obese (65.05±22.90) and over weight (50.13±23.54) group as compared to non obese (36.75±19.38) group (P<0.001). A positive correlation of total homocysteine levels was observed with insulin (r=0.584), S. LH/FSH ratio (r=0.512) and HOMA-IR(r=0.595).

Conclusions: We can conclude that a positive correlation was observed between increasing homocysteine levels with BMI, insulin resistance, testosterone levels and LH/FSH ratio.

Index Terms- Homocysteine, Body mass index, Serum testosterone, Follicular stimulating hormone, Insulin resistance, HOMA-IR.

I. INTRODUCTION

Obesity is a chronic metabolic disorder which is associated with various cardiovascular and atherosclerotic complications. The proportion of obese women has increased from 16.4% in 1993 to 24.2% in 2006. In many studies obesity has been shown to cause hypertension, dyslipidemia, type-II diabetes mellitus and cancer. Hyperhomocystenemia is an independent risk factor for atherosclerotic vascular disease, cerebrovascular events and recurrent venous thromboembolism. Hyperhomocystenemia occurs due to genetic defect in enzyme involved in homocysteine metabolism like methylene tetrahydrafolate reductase (MTHFR) & other deficiencies in vitamin cofactors (folate Vitamin B 12). It may also be associated with certain chronic medical conditions and drugs such as fibrates and nicotinic acid.

Hyperhomocystenemia can induce insulin resistance leading to compensatory hyperinsulinemia, which may impair the activity of MTHFR and CBS enzymes leading to accumulation of homocysteine in plasma. Thus insulin levels have also been observed as a modulating factor of homocysteine because it inhibits hepatic cystathione β-synthase activity. Insulin resistance or ingestion of a diet with a high insulinaemic index will tend to increase plasma homocysteine.

The health risks increase above the cut-off point of 25 kg/m² that defines overweight in the current WHO classification. Thus this study was done to evaluate the serum homocysteine level & its correlation with metabolic (S. glucose level, S. insulin level and HOMA-IR.) and anthropometric parameter (BMI) amongst over weight, obese and non obese infertile women.
II. MATERIAL & METHODS

This cross sectional prospective study was conducted in Department of Obstetrics and Gynaecology, from August 2010 to July 2011 in collaboration with department of Pathology and Medicine, CSM Medical University, Lucknow, UP, India. After informed consent total 90 infertile women were enrolled, which included 29 overweight, 16 obese and 45 non-obese infertile women, who were taken as controls. Women with chronic diseases that could cause obesity, history of drug use (steroids and antipsychotics), endocrine pathology (Cushing’s syndrome & hypothyroidism) or suspected syndromes (Prader willi & Laurence moon beilde syndrome) were excluded from the study. Women on metformin, folic acid and on antiepileptics, vitamins, oral contraceptive pills, antidiabetics, cigarette smoking, and coffee consumption more than 2 cups per day, known case of hypertension, diabetes mellitus and CVD were also excluded. Infertility was defined according to standard criteria.

The ethical clearance for this study was given by the Institutional ethics committee of CSM Medical University, Lucknow (Ref. No.: XLVECM/BFP10).

All the woman were subjected to thorough physical examination and laboratory tests.

Physical examination included measurement of height and weight of the patient. The height of the woman was measured by using harpaden stadiometer with a sensitivity of 0.1 cm and weight was measured using a sera scale with a sensitivity of 0.1 kg. The weight of the each woman was measured with minimal clothing. BMI was calculated by dividing weight in kg by height in meter square. BMI less than 25 were considered a non obese, ≥25 were considered as overweight and ≥30 were considered obese. The metabolic profile of patients included a battery of laboratory tests.

All blood samples were obtained in the morning on 2nd day of menstruation after an overnight fasting. During the same visit all subjects underwent anthropometric measurement. The serum concentration of FSH, LH, testosterone, prolactin and TSH were measured by chemiluminescent enzyme immunoassay. (Immulite 2000 diagnostic product corporation LA,CA) Serum glucose measured by using glucokinase technique. Plasma insulin levels were measured by Chemiluminescent enzyme immunoassay (Immulite 1000 analyzer with Interassay and intrassay coefficient of variation did not exceed 6.4%). Blood samples for homocysteine measurement were collected, immediately placed on ice and centrifuged at 4°C. Plasma was separated within 30 minute and stored at -70°C. Plasma homocysteine concentration was measured by fluorescence polarization immunoassay by using ABBOTT diagnostic kit (USA). Normal reference range of our laboratory were 5-11µmol/L. Hyperhomocystenemia was defined as plasma homocysteine level ≥11µmol/L, insulin resistance was determined by a number of different methods including fasting insulin, fasting glucose to insulin ratio and HOMA-IR (Homeostasis Model Assessment Insulin Resistance). HOMA–IR  ≥2.5 was considered as insulin resistance. The estimation of insulin resistance by HOMA score was calculated with the formula fasting serum insulin (µU/ml) X fasting plasma glucose (mmol/L) ÷ 22.5. BMI was calculated as the weight in kilograms divided by the square of the height in metres (kg/m²).

The data was subjected to statistical analysis by SPSS-16 version. These group were compared by using analysis of variance (ANOVA). The means of continuous variables were compared by student ‘t’ test. Association between demographic characteristics (age, BMI), serum sex hormones (LH, FSH, TSH, LH/FSH ratio) HOMA-IR and homocysteine levels were assessed by Pearson's bivariate correlation analysis. Statistical significance was set at the 0.005 level.

III. RESULTS

This study included ninety infertile women who were divided into three groups. On the basis of BMI, according to WHO classification 2004 for Asian women, the groups constituted 16 obese (BMI ≥30), 31 overweight (BMI ≥25) and 43 non obese women (BMI <25). A comparison of the data from overweight, obese and non obese women group revealed that the difference between the BMI, homocysteine levels, insulin and HOMA-IR of three groups were statistically significant (P<0.001). The groups were similar for age and sex but significant difference was found between the homocysteine levels among the various groups (P<.001) Table-1

In the obese group 62.5% (10/16) women had hyperhomocysteinemia, where as in over weight group 29.03% (9/31) had hyperhomocysteinemia, however only 4.6% (2/43) in non obese group had hyperhomocysteinemia. In obese group the mean homocysteine level was (14.78±5.71), in overweight (9.84±5.16) and in non obese (8.37±2.48). The above results suggest association between increasing homocysteine levels with increasing BMI. Table-1

Insulin resistances among subjects were calculated by HOMA-IR. It is considered one of the most sensitive indicators of determining insulin resistance. HOMA-IR value showed increasing trends with BMI. Mean HOMA-IR was significantly raised in obese groups (5.56±2.23) as compared to overweight group (2.79±2.06).

Insulin resistance was present in 48.93% (23/47) overweight and obese infertile women. Serum homocysteine level were found to be significantly higher (13.93±6.02) in obese and overweight insulin resistant women as compared to overweight and obese non insulin resistant group (P<0.004). Table-2

This indicates that insulin resistance may tend to increase plasma homocysteine. Insulin resistant obese and overweight women had higher mean BMI (29.91±2.32) than non insulin resistant obese and overweight women (P<0.001). Table-2

The mean values of hormonal parameters were also compared among the various groups. It was found that there was no statistically significant difference between overweight, obese and non obese infertile women in terms of hormonal values except serum testosterone levels which were significantly higher in obese (65.05±22.90) and over weight (50.13±23.54) group as compared to non obese (36.75±19.38) group (P<0.001). Table-3

The hormonal parameters were also compared amongst insulin resistant and non insulin resistant obese and overweight women. On statistical analysis it was found that insulin resistant infertile women had higher mean LH/FSH ratio (2.61±0.97) as compared to those without insulin resistant (1.51±1.36) which was significant (P<0.003). This points to the fact that there may...
be an association of increasing LH/FSH ratio with insulin resistance and probable association of PCOS with IR. It was also inferred that testosterone levels were higher in insulin resistant infertile women (58.58±22.47) as compared to non insulin resistant women (51.97±25.72) (P<0.354). Table-4

A positive correlation of total homocysteine levels was observed with insulin (r=0.584), S. LH/FSH ratio (r=0.512) and HOMA-IR (r=0.595), which was also statistically significant (P<0.001). Among all the infertile women homocysteine levels were significantly correlated with BMI, insulin, fasting glucose, Serum LH/FSH ratio and HOMA-IR and testosterone (P<0.001). No correlation was found between homocysteine with age, S. TSH and LH. Table-5

The above results suggest that sex steroid appear to influence homocysteine metabolism.

IV. DISCUSSION

Homocysteine is a sulfur containing amino acid and it is a risk factor for vascular damage. It has been associated with cerebrovascular disease and recurrent arterial venous thromboembolism. Homozygous or heterozygous defects in gene encoding the enzymes involved in the remethylation (methylene tetrahydrofolate reductase) or trans-sulfuration (cystathione β-synthase) metabolic pathways as well as deficiencies in nutrients or micronutrients (folate, Vit B12 and Vit B6) disrupt homocysteine metabolism and increases homocysteine level. Homocysteine levels may also be affected by demographic life style and various health factors.

In recent years controversial results regarding the association between obesity and total homocysteine levels have been reported. In our study homocysteine levels have been reported to vary according to BMI, and insulin resistance in obese, overweight and non obese infertile women.

The serum homocysteine levels were high in obese group as compared to non obese and overweight group (p<0.001) and insulin resistance as calculated by HOMA-IR also increased with increasing BMI (p<0.001).

Significant difference was found between various groups for insulin resistance and BMI. In obese group the total homocysteine level was significantly correlated with BMI, insulin and HOMA-IR and no relation with age.

The above study showed that a significantly higher mean homocysteine levels (14.78±5.71, 9.84±5.16) were present in obese women as compared to non obese women however in the study conducted by Vivian A Fonseca et al. they concluded that there was no correlation between homocysteine levels and BMI.

Howard BV et al in their study concluded a significant interaction between increasing obesity and insulin resistance. Similarly higher insulin resistance (HOMA-IR=5.56±2.23) was present in obese women in our study.

Guthrie JR et al found in their prospective study in middle aged women, that although increase in insulin levels were independent of age, they were positively associated with increases in BMI.

Henry et al concluded that plasma homocysteine levels showed an increasing trend with age but above study did not show any correlation with age in any group of subjects.

In the above study over weight and obese women with insulin resistance had higher mean homocysteine levels (13.93±6.02) as compared to non insulin resistant group. The results were similar to study conducted by James B et al who had reported presence of positive association between fasting levels of plasma homocysteine and some individual traits associated with insulin resistance.

Sex steroid also appear to influence homocysteine metabolism. Androgens may also affect homocysteine metabolism and they have been reported to increase homocysteine levels.

In the present study there was positive correlation between homocysteine levels and S. Testosterone and LH/FSH ratio. This could be probably be associated with PCOS related hyperandrogenemia and its probable association with hyperhomocysteinemia.

However study conducted by George E et al DHEAS and testosterone level were not related with homocysteine levels, which is contradictory to our results.

Randolph JF et al in their initial cross sectional analysis of baseline annual serum hormone levels demonstrated variation in all hormones by body size, positively for testosterone and negatively for all other.

In the literature increasing homocysteine levels have been reported to be associated with raised insulin level in obese individuals. Similarly in this study, there was a positive correlation of homocysteine levels with, BMI, insulin (r=0.584) and HOMA-IR (r=0.595). (p<0.001)

Gideon et al also reported that homocysteine levels were higher in metabolic syndrome patients compared to patients without metabolic syndrome.

The results of study by F. Tanrikulu-Kilic et al suggest that plasma homocysteine concentration are not related to insulin resistant.

V. CONCLUSION

In the above study amongst all the infertile women homocysteine levels were significantly correlated with BMI, insulin and fasting glucose and HOMA-IR. Positive correlation was also observed with sex steroid serum LH/FSH ratio and testosterone. But no association was found between homocysteine levels with age of subjects, S. TSH, and S.LH and FSH.

Hence, we can conclude that a positive correlation was observed between increasing homocysteine levels with BMI, insulin resistance, testosterone levels and S. LH/FSH ratio.
Table 1: Clinical and laboratory characteristics of overweight, obese and non-obese group (Mean±SD)

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Overweight (n=31)</th>
<th>Obese (n=16)</th>
<th>Non-obese (n=43)</th>
<th>&quot;p&quot; value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>26.84±3.98</td>
<td>25.69±3.74</td>
<td>26.69±4.50</td>
<td>0.649</td>
</tr>
<tr>
<td>BMI</td>
<td>27.00±1.57</td>
<td>31.33±0.92</td>
<td>23.03±1.32</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Homocysteine</td>
<td>9.84±5.16</td>
<td>14.78±5.71</td>
<td>8.37±2.48</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Glucose</td>
<td>82.03±7.76</td>
<td>85.75±8.52</td>
<td>82.93±6.95</td>
<td>0.274</td>
</tr>
<tr>
<td>Insulin</td>
<td>13.65±9.31</td>
<td>26.33±9.47</td>
<td>11.53±7.59</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>HOMA-IR</td>
<td>2.79±2.06</td>
<td>5.56±2.23</td>
<td>2.39±2.24</td>
<td>&lt;0.001</td>
</tr>
</tbody>
</table>

Analysis of Variance (ANOVA)

Table 2: Clinical and laboratory characteristics of overweight and obese group with or without insulin resistance (n=47) (Mean±SD)

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Without IR Overweight+Obese (n=24)</th>
<th>With IR Overweight+Obese (n=23)</th>
<th>&quot;p&quot; value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>26.50±3.28</td>
<td>26.39±4.53</td>
<td>0.925</td>
</tr>
<tr>
<td>BMI</td>
<td>27.09±1.78</td>
<td>29.91±2.32</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Homocysteine</td>
<td>9.21±4.59</td>
<td>13.93±6.02</td>
<td>0.004</td>
</tr>
<tr>
<td>Glucose</td>
<td>80.83±6.97</td>
<td>85.87±8.59</td>
<td>0.032</td>
</tr>
<tr>
<td>Insulin</td>
<td>7.89±1.74</td>
<td>28.48±5.21</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>HOMA-IR</td>
<td>1.55±0.33</td>
<td>6.01±1.45</td>
<td>&lt;0.001</td>
</tr>
</tbody>
</table>

Student "t"-test

Table 3: Mean value of hormonal parameters and comparison among overweight, obese and non-obese groups (Mean±SD)

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Overweight (n=31)</th>
<th>Obese (n=16)</th>
<th>Non-obese (n=43)</th>
<th>&quot;p&quot; value</th>
</tr>
</thead>
<tbody>
<tr>
<td>S. LH (IU/ml)</td>
<td>7.98±4.52</td>
<td>10.95±4.39</td>
<td>8.59±13.17</td>
<td>0.600</td>
</tr>
<tr>
<td>S. FSH (IU/L)</td>
<td>5.30±2.08</td>
<td>4.54±1.76</td>
<td>5.33±2.37</td>
<td>0.437</td>
</tr>
<tr>
<td>S. LH/S. FSH</td>
<td>1.77±1.33</td>
<td>2.57±1.08</td>
<td>1.49±0.96</td>
<td>0.006</td>
</tr>
<tr>
<td>S. TSH</td>
<td>3.12±1.39</td>
<td>4.05±2.35</td>
<td>3.16±2.30</td>
<td>0.275</td>
</tr>
<tr>
<td>S. Testosterone</td>
<td>50.13±23.54</td>
<td>65.05±22.90</td>
<td>36.72±19.38</td>
<td>&lt;0.001</td>
</tr>
</tbody>
</table>

Analysis of Variance (ANOVA)

Table 4: Mean value of hormonal parameters and comparison between overweight and obese group with or without insulin resistance (n=47) (Mean±SD)

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Without IR Overweight+Obese (n=24)</th>
<th>With IR Overweight+Obese (n=23)</th>
<th>&quot;p&quot; value</th>
</tr>
</thead>
<tbody>
<tr>
<td>S. LH (IU/ml)</td>
<td>6.96±3.94</td>
<td>11.11±4.46</td>
<td>0.001</td>
</tr>
<tr>
<td>S. FSH (IU/L)</td>
<td>5.70±2.17</td>
<td>4.36±1.56</td>
<td>0.020</td>
</tr>
<tr>
<td>S. LH/S. FSH</td>
<td>1.51±1.36</td>
<td>2.61±0.97</td>
<td>0.003</td>
</tr>
<tr>
<td>S. TSH</td>
<td>3.27±1.59</td>
<td>3.61±2.02</td>
<td>0.532</td>
</tr>
<tr>
<td>S. Testosterone</td>
<td>51.97±25.72</td>
<td>58.58±22.47</td>
<td>0.354</td>
</tr>
</tbody>
</table>

Student "t"-test
### Table 5: Correlation of different demographic, clinical and laboratory parameters with Total Homocysteine levels (Pearson's bivariate correlation)

<table>
<thead>
<tr>
<th>Parameter</th>
<th>( r )</th>
<th>( p )</th>
</tr>
</thead>
<tbody>
<tr>
<td>BMI</td>
<td>0.430</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Age</td>
<td>-0.113</td>
<td>0.291</td>
</tr>
<tr>
<td>Insulin</td>
<td>0.584</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Glucose</td>
<td>0.309</td>
<td>0.003</td>
</tr>
<tr>
<td>S.TSH</td>
<td>-0.172</td>
<td>0.105</td>
</tr>
<tr>
<td>LH</td>
<td>0.123</td>
<td>0.248</td>
</tr>
<tr>
<td>FSH</td>
<td>-0.102</td>
<td>0.340</td>
</tr>
<tr>
<td>S.LH/FSH</td>
<td>0.512</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>S. Testosterone</td>
<td>0.387</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>HOMA-IR</td>
<td>0.595</td>
<td>&lt;0.001</td>
</tr>
</tbody>
</table>

\( a = \) Pearson's bivariate correlation

**Abbreviations:** BMI- body mass index, TSH- Thyroid stimulating hormone, LH- luteinizing hormone, FSH- Follicular stimulating hormone, HOMA-IR- Homeostasis Model Assessment Insulin Resistance

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Twilight- An Academic Web Portal for Department

Imran Tamboli, Amit Kanbarkar, Akshay Kotasthane, Arunkumar Patel, Sagar Rajebhosale

PGMCOE, Pune, India

Abstract- An intranet is a network inside an organization that uses internet technologies to provide an internet like environment with the organization for information sharing, communications, collaboration, and the support of academic processes. An intranet is protected by security measures such as passwords, encryption, and firewalls, and thus can be accessed by authorized users through the intranet.

Our aim is to design an intranet based web application server directed for academic institutions. We also aim at providing additional features that can benefit an academic institution from using networking systems within their academic firewalls. This way the institution does not have to worry about blocking or allowing an internet based social networking application since our application will entirely be hosted and run on an intranet rather than the internet. This also helps in keeping academic data, student profiles, departments’ internal workings etc. from being publicly hosted on the internet.

It also helps in protecting private data from some online attack. Interactive Intranet Portal for effective management in department is an enhanced and interactive method of managing and processing key issues in Tertiary Institution, Problems of result processing, teaching feedback, information about ongoing events in department, workshops, seminars, academic information, University Circulars etc. are analyzed in this work. An interface was generated to handle this problem; the software is an interactive one.

Index Terms- Web application, Intranet portal, Web based, Intranet.

I. INTRODUCTION

An important feature of any knowledge-intensive organizations is its ability to learn. This includes the ability to learn external knowledge, but also the ability to learn from others inside the organization. Hence, the knowledge must be shared amongst the organization members, and it has to be offered in an efficient way.

Now a day’s many universities solve problems associated with the usage of E-Learning technologies in educational process. A number of universities use the mixed form of training: resident instruction is combined with elements of remote forms of training. For example, the organization of students’ independent studies is realized through e-learning. In addition, Universities have accumulated considerable internal digital educational resources (electronic publications, electronic educational - methodical materials, electronic practical works and so forth), which were developed by the University professors.

As a result, the outstanding problem is as follows: the creation of the integrated information-educational environment of the University, which fits the requirements of different forms of training, providing access to various educational resources (external and internal) and realizing functions of management of educational process on various levels. The importance of an educational portal will increase in this situation as a sole point of an entry to the integrated information educational environment of the University.

The purpose of this work is to consider using the systematic approach to creation of the educational portal of the University. Our approach to education analytics helps to incorporate and integrate data from multiple sources (i.e., student information, learning management and business systems) into specialized repositories designed to provide easy-to-understand visualized reporting and analysis.

II. BACKGROUND

Like our institute there are many institutes who need communication and co-operation between the administrational staff and department. This is because most of the department resources like student course registration, Result management, staff management and student management have to be managed partly by one or the another group for different resources for different reasons.
III. OBJECTIVES

The main objective of this project is to develop an intranet portal software that will adequately manage records.

A. Benefits

Portal techniques improve three of these factors:
1. Delivery of contents and applications
2. Updates which are made become more visible in portals, because the data and contents of application are being filtered.
3. Portalization allows users to customize or personalize the content as to fit their interests.

Providing staff with a single point of access to business systems
1. Aggregating academic information into a single location.
2. Providing staff with a single user experience that crosses information systems and technologies.
3. Eliminating the need for multiple logins.
4. Easily import data from internal and external sources.
5. Improve productivity by increasing the speed and customizing the content of information to students and staff.
6. Provide a feedback system for students through which teacher’s performance can be measured.
7. In a forum teachers can filter some post which contains words which are not related to the subject.
8. For the security purpose the password of student and staff is store in the encrypted form.

B. Justification

1. Need for efficient, effective and adequate management of students records.
2. Need for adequate protection and security of important information.
3. Providing academics the ability to manage and communicate more effectively with student dat.
4. Helping HOD to spend less amount of time on student’s feedback for teachers.

IV. METHODOLOGY

Being an intranet based portal, first the web development is determined using an open sources platform that will be more flexible and have lower cost due to free ware.

- **Dreamweaver:** This is a unique tool expressly designed for the development and optimization of web pages. All the coding in this Project is done in the view of the Dreamweaver.

- **Hypertext Preprocessor (PHP):**
  PHP is the web development language written by and for web developers. PHP is a server side scripting language, which can be embedded in the HTML.

- **MYSQL:** This is an open source SQL Relational Database Management System (RDBMS) that is free for many uses.

![Block Diagram of Portal](image-url)
V. STRUCTURAL ANALYSIS

Different user can use the portal like administrator, staff and student. The system will be analyzed in the following.

- **ADMINISTRATOR MODULE:**
  The first point to mention is admin of the system i.e. Head of Department. Admin has full control over the system. Admin has to generate login ID and password. Admin has rights to add, update and delete the events and news. Admin sends the mail to the staff members.

- **STAFF MODULE:**
  Staff is divided into two categories
  1. Class Teacher: Class teacher can update the records like attendance etc. of students of particular class.
  2. Subject Teacher: Subject teacher has right to update the record like unit test marks regarding to that particular subject which is assign to him.

- **STUDENT MODULE:**
  This module has interface that allow students to register themselves on portal. A student who has not registered at all has to get new login ID and password from admin for first use. New student must change their login ID and password after first use. Student has to check their notifications, news and events. Student can download the attachments or notes loaded by staff. Student has right to use Forum to solve their queries.

VI. DATABASE DESIGN

The database is the long-term memory of the web database application. Relational database management system (RDBMS) was considered during the design of this database. The database structures have tables and their relationships are defined. The databases have ten (10) tables and they are related with primary and foreign keys.

1. Users
2. Class_teacher
3. Subject_teacher
4. Subject_master
5. Attendance
6. Ci_sessions
7. Notes
8. Comments
9. News
10. Events
11. Post

VII. SYSTEM IMPLEMENTATION

The system implementation was done using CodeIgniter and integrating it with macromedia Dreamweaver installed on computer. The following and done for the implementation

1. The admin, staff, student module was created by logic flow diagram using dream weaver 8.0.
2. E-news module was created and linked to admin module.

VIII. DATABASE IMPLEMENTATION

Implementation of database is carried out in MYSQL 5.0 DB server engine. The communication link is required between web browser and web server. The web browser sends the request to server and the server sends back the response to the browser.

In the data retrieval following stages are involved.

1. A user’s web browser sends the request for a particular page to the server.
2. After receiving the request the browser pass it to the PHP engine for processing.
3. PHP engine finds the commands to connect the database inside script and execute the query.
4. Then MYSQL server receives the query and forwards the required result.
Figure 2: BASIC WEB ARCHITECTURE
IX. CONCLUSION

Intranet portal bring vast information and services resources available from many sources to many users within the same department in an effective manner. Intranet portal had resulted in a much better control over processes, the workflow is faster, less of paper, less tonner for printer are being used and lesser printers are needed, fewer employee are needed, leading to a lesser cost in the overall system. It gives Easy and user-friendly environment for the interaction of the staff and students with the system through a conventional web browser. Portal Supports of co-operative mechanisms for assisting the student whenever necessary. More Interactive communication session can be done. Other systems normally work on stand-alone machines whereas our system can work on a network machine as well.

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Mobile Computing

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Abstract- Mobile computing refers to using the small portable and hand held computing devices such as PDA, laptops, mobile phones, MP3 players, digital cameras, tablet PC and Palmtops in a wireless enabled network. In broad sense, it is referred to use any handheld computing device without the cables. In recent years the growth of mobile broadband and mobile broadband pay as you go devices have meant that many more people and business can take advantage of mobile computing.

Index Terms- mobile computing, business and mobile computing, portable hand held derives

I. INTRODUCTION

It provides the continuous access to the wireless network services and the flexible communication between the people. It provides the real-time business to employee communication, enhanced customers interactions, improved B2B options and fastest communication between the individuals. The communication occurs with the real-time wireless connection. It provides the data, audio and video access to any user, any time with a wireless enable device.

The wireless network may be WLAN, Wi-Fi, GSM, CDMA, Wimax or GPRS. There are many companies that provide the mobile computing solutions on contract and pay as you go mobile broadband plans to the home users and businesses. ‘The cell phones and laptops are the most commonly used mobile computing devices. It can be referred to the two main field portable and mobility

Computing: It can be used to checking the email via the mobile phones, sending SMS, accessing internet and sending MMS. This technology has enabled the users to remain connected while on the move and it provides all the benefits of the computer network but without the cables. There are many companies that provide the mobile computing solutions to the home users and businesses.

The portable device that uses this technology is the laptop computers. The geographic coverage of this technology is pretty broad and anyone on the move with portable and handheld computing device can access it such as travelers, taxi drivers, warehouse workers, postal services vehicles and automobiles etc.

Mobile computing devices can access any type of wireless network such as Wi-Fi, Wimax and wireless conventional network to access the internet and the network.

Mobile computing services can be provided for the specific purposes and its cost varies from company to company. The laptop users, businessmen, home users and PDA users can achieve the usefulness of this technology. Additionally, there are customized mobile computing solutions that are designed for the different commercial fields like health care, business, education, pharmaceutical, IT and service providers. With the wireless technology, businesses, sales force, customers and partners will be able to maintain the smooth communication between them.

Mobile computing is a form of human– computer interaction by which a computer is expected to be transported during normal usage. Mobile computing has three aspects: mobile communication, mobile hardware, and mobile software. The first aspect addresses communication issues in ad-hoc and infrastructure networks as well as communication properties, protocols, data Formats and concrete technologies. The second aspect is on the hardware, e.g., mobile devices or device components. The third aspect deals with the characteristics and requirements of mobile applications.

II. LIMITATIONS

• Insufficient bandwidth: Mobile Internet access is generally slower than direct cable connections, using technologies such as GPRS and EDGE, and more recently HSDPA and HSUPA 3G networks. These networks are usually available within range of commercial cell phone towers. Higher speed wireless LANs are inexpensive but have very limited range.

• Security standards: When working mobile one is dependent on public networks, requiring careful use of VPN. Security is a major concern while concerning the mobile computing standards on the fleet. One can easily attack the VPN for a very huge number of networks interconnected through the line.

• Power consumption: When a power outlet or portable generator is not available, mobile computers must rely entirely on battery power. Combined with the compact size of many mobile devices, this often means unusually expensive batteries must be used to obtain the necessary battery life.

• Transmission interferences: Weather, terrain, and the range from the nearest signal point can all interfere with signal reception. Reception in tunnels, some buildings, and rural areas is often poor.

• Potential health hazards: More car accidents are related to drivers who communicate with mobile devices. Cell phones may interfere with sensitive medical devices. There are allegations that cell phone signals may cause health problems.
• Human interface with device: Screens and keyboards tend to be small, which may make them hard to use. Alternate input methods such as speech or handwriting recognition require training.

III. PORTABLE COMPUTING DEVICES

There are several categories of portable computing devices that can run on batteries but are not usually classified as laptops: portable computers, keyboardless tablet PCs, Internet tablets, PDAs, ultra mobile PCs (UMPCs) and smartphones.

A Nokia N800 Internet tablet

A portable computer is general-purpose computer that can be easily moved from place to place, but cannot be used while in transit, usually because it requires some "setting-up" and an AC power source. The most famous example is the Osborne I. Portable computers are also called a "transportable" or a "luggable" PC.

An ultra mobile PC is a full-featured, PDA-sized computer running a general-purpose operating system.

A smart phone is a PDA with integrated cell phone functionality. Current smart phones have a wide range of features and installable applications.

A carputer is a computing device installed in an automobile. It operates as a wireless computer, sound system, GPS, and DVD player. It also contains word processing software and is Bluetooth compatible.

A Fly Fusion Pen Top computer is a computing device the size and shape of a pen. It functions as a writing utensil, MP3 player, language translator, digital storage device, and calculator.

Boundaries that separate these categories are blurry at times. For example, the OQO UMPC is also a PDA-sized tablet PC; the Apple eMate had the clamshell form factor of a laptop, but ran PDA software. The HP Omnibook line of laptops included some devices small enough to be called ultra mobile PCs. The hardware of the Nokia 770 internet tablet is essentially the same as that of a PDA such as the Zaurus 6000; the only reason it's not called a PDA is that it does not have PIM software. On the other hand, both the 770 and the Zaurus can run some desktop Linux software, usually with modifications.

IV. APPLICATIONS OF MOBILE COMPUTING

The importance of Mobile Computers has been highlighted in many fields of which a few are described below:

• For Estate Agents

Estate agents can work either at home or out in the field. With mobile computers they can be more productive. They can obtain current real estate information by accessing multiple listing services, which they can do from home, office or car when out with clients. They can provide clients with immediate feedback regarding specific homes or neighborhoods, and with faster loan approvals, since applications can be submitted on the spot. Therefore, mobile computers allow them to devote more time to clients.

• Emergency Services

Ability to receive information on the move is vital where the emergency services are involved. Information regarding the address, type and other details of an incident can be dispatched quickly, via a CDPD system using mobile computers, to one or several appropriate mobile units which are in the vicinity of the incident.

V. CONCLUSION

In this paper with the rapid technological advancements in Artificial Intelligence, Integrated Circuitry and increases in Computer Processor speeds, the future of mobile computing looks increasingly exciting.

With the emphasis increasingly on compact, small mobile computers, it may also be possible to have all the practicality of a mobile computer in the size of a hand held organizer or even smaller.
Use of Artificial Intelligence may allow mobile units to be the ultimate in personal secretaries, which can receive emails and paging messages, understand what they are about, and change the individuals personal schedule according to the message. This can then be checked by the individual to plan his/her day.

The working lifestyle will change, with the majority of people working from home, rather than commuting. This may be beneficial to the environment as less transportation will be utilized. This mobility aspect may be carried further in that, even in social spheres, people will interact via mobile stations, eliminating the need to venture outside of the house.

This scary concept of a world full of inanimate zombies sitting, locked to their mobile stations, accessing every sphere of their lives via the computer screen becomes ever more real as technology, especially in the field of mobile data communications, rapidly improves and, as shown below, trends are very much towards ubiquitous or mobile computing.

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Identification of Various Parameters for Designing A
Decision Support System to Propose A Suitable
Architecture for Cloud Computing

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Abstract- In a Multi-Tenant architecture, the data from multiple companies are placed on the same server generally separated from each other via a simple partition that prevents data to migrate from one company to another. As the data is housed on the same server, each company using the software is running the same basic application, with the same basic functionality and with the same limited configuration capabilities. In a Multi-Tenant architecture, the modifications to the software are limited because multiple customers use the same instance of software. In comparison to this, in Single-Tenant architecture, the software can be customized to meet the specific and special needs of each customer. Multi-Tenant Architecture also provides Improved Scalability, Operational Efficiency, Software Development Life Cycle Management, etc. Here, we will concentrate on critically analyzing the multi-tenant architecture and virtualization techniques to implement SaaS on various quantifiable parameters to propose an decision support system that would propose the architecture that best meets the needs of the user. The parameters will take into account the essential cloud computing requirements such as load balancing, security, configurability of applications to business model and workflow, economies of scale, data aggregation and data mining etc and provide the most suitable architecture that provides the scalability of hardware virtualization and the flexibility of software virtualization in multi-tenancy.

Index Terms- Cloud Computing, Virtualization, multi-tenancy, Data warehouse, single-tenant

I. INTRODUCTION

This Cloud computing is a model for enabling ubiquitous, convenient, on-demand network access to a shared pool of configurable computing resources (e.g., networks, servers, storage, applications, and services) that can be rapidly provisioned and released with minimal management effort or service provider interaction. On-demand self-service, broad network access, Resource pooling, Rapid elasticity and Measured Service are the essential characteristics of cloud. Cloud Software as a Service (SaaS), Cloud Platform as a Service (PaaS), Cloud Infrastructure as a Service (IaaS) are three service models of cloud. Private cloud, Community cloud, Public cloud and Hybrid cloud are four deployment models.

The working definition of SaaS, “Software deployed as a hosted service and accessed over the Internet” encompasses a lot of ways SaaS can be implemented. From an application architect's point of view, there are three key differentiators that separate a well-designed SaaS application from a poorly designed one. A traditional well-designed SaaS application is Scalable, Multi-tenant-efficient and Configurable.

Though, Salesforce.com, the most successful SaaS Company of all times has a purely Multi-tenant architecture, the advent of virtualization has significantly challenged this model. Many companies like SAP are moving towards a Single-Tenant architecture. The world of Software-as-a-Service (SaaS) is now witnessing the most talked about Single-Tenant vs. Multi-Tenant architecture debate.

Cloud computing is the delivery of computing as a service whereby software (SaaS), platform (PaaS), Infrastructure (IaaS) are provided to computers over a network. Vendors, namely, Salesforce, Google, Microsoft, Amazon etc have used different techniques/architectures for providing these services to consumers. Two most widely used architectural techniques being multi-tenancy and virtualization each with its own advantages and disadvantages.

There are various parameters that will help in determining the most appropriate cloud computing architecture on over all service interaction from service provider and service consumer point of view. The parameters will take into account the essential cloud computing requirements such as load balancing, security, configurability of applications to business model and workflow, economies of scale, data aggregation and data mining etc and provide the most suitable architecture that provides the scalability of hardware virtualization and the flexibility of software virtualization in multi-tenancy. Such a system will automate the process of architectural decision making thus saving valuable cost and time providing benefits to the service provider in terms of efficient resource utilization, customer satisfaction, ease of maintenance and administration and to the service consumer by providing the architecture that meets the business objectives and business logic for maximum profitability.

To solve this problem of complexity, we use multi agent based architecture in distributed data warehouse. It will also facilitate the collaboration, interaction and independency of the different machines and to improve the parallel execution of the user queries. In this case, the distribution consists in distributing data when the server reaches its storage capacity limit. This
distribution assures the scalability and exploits the storage and processing resources available in the organization using the data warehouse. The materialized views and indexes will be used on each individual machine that must be tuned and optimized for performance. Our work aims is 1) to develop a dynamic system that can manage the DWH automatically, 2) taking advantage of the storage and processing resources available in the organization, 3) Reduce the network load, (4) improve the query response time, 4) use of individual buffer for client, therefore no need to be connected with dispatcher all the time to get result.

This paper is organized as follows: Sect. 2, gives the information about our finding related to multi agent based architecture and distributed data warehouse. In sect. 3, we will show our experimental results related to our work. In sect. 4, we mention the reviews that we have got. In sect 5, we will improve our work. Finally, in sect. 6, a conclusion is made.

II. RESEARCH ELABORATIONS

Data Warehousing is a collection of decision support technologies, aimed at enabling the knowledge worker to make better and fast decisions [3]. There are many technologies to transform traditional DBMS to be more suitable for multi-tenant architecture [4]. They also identify the various performance bottlenecks of multi-tenant architecture. Donald Kossmann evaluated various alternative architectures for transaction processing in the cloud. He presents a benchmark study of the services of various vendors namely Amazon, Google and Microsoft on various parameters like business model, cloud provider, web/app server, database, consistency, App-language, DB language, architecture and Hardware configuration using TPC-W benchmark [11]. We can use the metadata to store information about each tenant. Any update specific to a particular tenant are made by updating its metadata thus avoiding conflicts with other tenants. The database model used is shared database, shared schema [5]. The proposed architecture provides two levels of multi-tenancy. The first level of multi-tenancy being provided due to allocation of different tenants to different databases while the second level of multi-tenancy being provided by allowing the tenants to share the database tables. We can propose an efficient priority service algorithm as a master in the cloud that maps the local priorities of the tenants to global priorities while following the fairness constraint for each tenant and evaluating the algorithms performance in terms of the expected total revenues, Quality of Service and expected response time [6]. We can propose a Multi-Tenant platform “Uranus”, that is designed to overcome the shortcomings of hardware based virtualization which lacks scalability for providing a cost effective service to the customer and software based multi tenant architecture used in cloud computing which lacks in flexibility as the applications need to modified or developed from scratch in order to work on this platform [3]. “Uranus” allows LAMP applications to be run without requiring any modification in secure, scalable and flexible manner. There is architecture of a SaaS platform for executing multi-tenant SaaS applications [7]. The platform allows configuring the SaaS applications specifications according to organizations culture, workflow and business logic. The architecture consists of three parts namely-Configuration manager which is to configure the application, Runtime engine which generates a tenant specific application using codebase and metadata and metadata management system which provides metadata API for easier access to shared database. There is an automated approach to reduce the operational cost of cloud service such as cost of facilities, physical IT equipment and software, administration costs by optimizing the workloads among servers while keeping the number of servers required to minimum in a shared resource environment by taking into account the configuration of host and the time-varying demand of workloads [8]. There is a loosely coupled cloud computing architecture which focuses on over all service interaction from service provider and service consumer point of view for SaaS [11]. The author identifies the necessary components for cloud computing SaaS and how they interact with each other focus on security and load balancing requirement in cloud computing environment while considering the multi-tenant nature of cloud computing.

III. PROPOSED METHOD

Cloud computing is the delivery of computing as a service whereby software (SaaS), platform (PaaS), Infrastructure (IaaS) are provided to computers over a network. Vendors, namely, Salesforce, Google, Microsoft, and Amazon etc have used different techniques/architectures for providing these services to consumers. Two most widely used architectural techniques being multi-tenancy and virtualisation each with its own advantages and disadvantages. The hypothesis on the observation that through rigorous study of journals, white papers and books that both the principle of multi tenancy and virtualisation are not universally accepted and supported within the software industry, and this may be a source of competitive differentiation.

The study for the identification of various technical alternatives at various levels of the cloud computing architecture including front end, application and database level and identification of different quantifiable parameters for the decision support system to make intelligent and informed architectural decisions will also be based on data collected from experts in the industry including companies like Accenture, Cognizant, Tavant Technologies,Ericsson,GlassBeam,Force.com etc through a Questionnaire developed through extensive study of journals, books, white papers etc.

The comprehensive list of parameters thus developed can be used in the development of the decision support system in ASP.NET with SQL Server as backend to automate the process of architectural decision making thus saving valuable cost and time providing benefits to the service provider in terms of efficient resource utilization, customer satisfaction, ease of maintenance and administration and to the service consumer by providing the architecture that meets the business objectives and business logic for maximum profitability.
Platform-ASP.net- This platform will be used for building the prototype decision support system including the user interfaces, application logic and database. Language-C#-This language will be used for the coding the logic behind the decision support system so that intelligent decisions can be made. The logic will be based on the parameters that will identify in the course of research work. Database-SqI Server-The database will store the values of the parameters identified. Compiler-Microsoft Visual Web Developed. The Questionnaire developed through extensive study of journals, books, white papers etc. will be used to collect data from experts in the industry including companies like Accenture, Cognizant, Tavant Technologies, Ericsson, GlassBeam, SalesForce.com etc. The data collected will further be refined through in depth study of research papers, journals, books and further verifies from an expert in the domain.

IV. CONCLUSION

Having analyzed both architectures on the basis of technology, functionality and security, both single-tenant and multi-tenant architectures have their own advantages and disadvantages. It is important to identify and assess what key aspects are most important for your needs. We must consider configurability, integration, customizable security factors and how they match your needs. The parameters will take into account the essential cloud computing requirements such as load balancing, security, configurability of applications to business model and workflow, economies of scale, data aggregation and data mining etc and provide the most suitable architecture that provides the scalability of hardware virtualization and the flexibility of software virtualization in multi-tenancy.

Such a system will automate the process of architectural decision making thus saving valuable cost and time providing benefits to the service provider in terms of efficient resource utilization, customer satisfaction, ease of maintenance and administration and to the service consumer by providing the architecture that meets the business objectives and business logic for maximum profitability.

We discussed about the existing problem and our proposed method for that problem. We described here is multi agent based system based query cycling process in distributed DWH and also remove the disadvantage of multi agent approach by placing an buffer, so that there will be no need for client to connect at all the time to get the results. Now it is not connected approach. Buffer will be on client side. This architecture ensures high performance to dynamic content applications even during overload conditions such as those during time-of-day effects. We have concentrated only on query cycling agent and an iteration agent in distributed data warehousing and limit some disadvantages of this architecture. In future we can implement the remaining agents which we can propose in our system.

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EXPLORATION OF SOME WILD EDIBLE PLANTS OF DIGRAS TAHSIL, DIST. - YAVATMAL, MAHARASHTRA, INDIA


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Abstract- India is well known for its “Indus-Vedic” cultural heritage. The study of this civilization has been made by the help of biodiversity. The ancient people of India had very good and sufficient knowledge about the use of plants from the ancient time. The plants have been used as source of food, medicine, shelter, clothing’s, fiber, oil, gum, etc. The knowledge of consumption of fruit and their use is only limited to senior peoples of tribe. Digras tahsil has a large population of tribals like Banjara, Adivasi, Gond, Gawali, etc. Several wild plants are used as food by tribals and other local people living in and around the forest area of villages. The knowledge of using wild edible plants is very interesting. These plants play incredible role in their life. So it is necessary to keep this knowledge of tribe alive.

The present study deals exclusively with first hand information of 25 wild edible plant species belonging to 15 families. This work is helpful to explore the food habits of tribals of Digras tahsil. Dist.- Yavatmal, Maharashtra, India. Plants botanical name, family, common name along with their parts used is discussed in present paper.

Index Terms- Indus-Vedic, Banjara, Adivasi, Gond, Gawali

I. INTRODUCTION

Ethanobotany can be defined as the total natural and traditional relationship and interactions between man and his surrounding plant wealth. Documentation of traditional knowledge on the ethanomedicinal uses along with the other uses of the plants is essential for conservation effort for the plants source and new drug development and to get their use in future. An ethanobotanical survey with respect to food plants and their medicinal values shows that tribals of this area are much depend upon the products obtained from the plant which available in or around the forest area. The knowledge of consumption of fruit and their use is only limited to senior peoples of these tribe, on the other hand the younger people or generation of these tribe has very insufficient and quite knowledge about the plant parts used. There is need to developed awareness as well as interest in younger generation of tribe about the use of edible plants. Out of the 25 hot spots of the world, India has 2 hot spots therefore India is mega-biodiverse country. The traditional knowledge about the use of plants is on sharp decline due to lack of awareness and interest of younger generations. This knowledge is now only limited to senior people of small town, villages or the people who are residing near by the forest area. Unless efforts are made to educate the younger generations about their importance, this traditional knowledge may be lost in the near future. In Digras tshsil some villages are having about more than 60% population of tribe. The tribe population mainly includes the Banjara, Adivasi, Gond, Gawali, etc. which immensely used the plant species in their routine life for their welfare as food, medicine, household purposes, etc. The knowledge of using wild edible plants is very interesting. These plants play incredible role in their life. So it is necessary to keep this knowledge of tribe alive. A study on native wild edible plant used by the tribe and local peoples of this area was carried out with major objective of how to use the wild edible plants and also to understand their conservation. Also the goal of this study is that to explore the knowledge of tribe.

This paper deals with exploration of 25 plant species belonging to 15 families consumed by tribals and other local peoples of Digras tahsil. Dist.- Yavatmal, Maharashtra, India. Plants botanical name, family, common name along with their parts used is discussed in present paper. In Digras tahsil, there are about 70 villages having about 80% population of tribals like Banjara and other tribes are Andh, Gawali, Adivasi, etc.

II. METHODOLOGY

The ethanobotanical study with respect to the wild edible plants used by tribals was carried out during March 2009 to February 2011. During this period this region was frequently visited. Local peoples and tribes were interviewed and the data of 25 wild edible plants were collected and documented. Edible plant species were located or searched by the help of informants.

Leaves are sweet testing. Flowers are also sweet eaten...
raw. Leaves are chewed as mouth freshner and also as ingredient of Pan.

*Amaranthus spinosus* L. (V. Kanta, Katili-Chaulai) Family – Amaranthaceae

Leaves and whole plant chopped, mixed with onion and made into vegetable.

*Amaranthus polygamus* L. Hook f. (V. Laal Shaak) Family – Amaranthaceae.

Young leaves mixed with onion and made into vegetables. It is supposed to be more nutritious and tasty than *Amaranthus spinosus* L.

*Bauhinia racemosa* Lam. (V. Bhosa, Apta) Family – Caesalpinaceae.

Flowers are used as vegetable. Pods are also said to be eaten after roasting, but not commonly used.

*Bauhinia purpurea* L. (V. Kachnar) Family – Caesalpiniaceae.

Flower buds and flowers are large, used as a vegetable, it is fried in purified butter. This preparation is also useful for patients suffering from dysentery. Flowers are used after removing calyx.

*Boswellia serrata* Roxb. Ex Coleber. (V. Salai) Family – Burseraceae.

The drupe i.e. fruit of plant is pickled, they are strongly scented. The fruit along with twig is used in marriage ceremony of tribe people. Gum obtained from plant is also used.

*Capparis zeylanica* L. (V. Vagati) Family – Capparidaceae.

The fruits are edible. The fruits are eaten at the time of fast in some festivals like Mahashiv ratri.

*Careya arborea* Roxb. (V. Kumbhi) Family – Lecythidiaceae.

The flowers are large and showy used as vegetable. The fruits of this plant is also used in marriage ceremony of some tribe.

*Cassia fistula* L. (V. Amaltaasa) Family – Caesalpinaceae.

Leaves of the plant is used as vegetable. The flowers and pods are have medicinal value and are edible in some part of this tahsil.

*Cassia tora* L. (V. Tarota) Family – Caesalpinaceae.

Leaves are used as vegetables. It is said that this vegetable if eaten in rainy season fives immunity towards seasonal disease. Equal parts of leaves and seeds is given for jaundice.

*Celosia argenta* L. (V. Kurdu) Family – Amaranthaceae.

Tender leaves are used as vegetable. This plant is usually grown on marshy places and on non-useable lands as weed.

*Cicer arietinum* L. (V. Chana) Family – Fabaceae

The fruits are well known eaten raw but the leaves of the plant is used as vegetable, it has sour taste.

*Commelina behghalensis* L. (V. Keena) Family – Commelinaceae.

Leaves of this plant is used to make pakodas. Leaves and flowers are used in worship of God and Poojas on specific occasions like Ganesh pujan, Teej, Haritalika pooja and Mahalaxmi pooja.

*Cordia dichotoma* Frost f. (V. Bhokar) Family – Boraginaceae

The fruits are used to make vegetable and also make pickles in some tribe of Digras tahsil.

*Cordia gharaf* (Forsk.) Ehrenb and Ash. (V. Gondani) Family – Boraginaceae

The fruits are used as vegetable and pickled.

*Digera muricata* (L.) Mart. (V. Kunzar, Lat-Mahuria) Family – Amaranthaceae.

Young leaves used as vegetable. Flowers and seeds are also used.

*Dioscorea bulbifera* L. (V. Matalu, Banalu) Family – Dioscoreaceae.

Dried and pounded tubers and bulbils are edible. The tubers are bitter, they lose their bitterness on roasting and are then eaten. Some tribe boil the tubers like potato and eaten.

*Ficus glomerata* Roxb. (V. Umbar) Family – Moraceae

Ripe fruits (receptacles) are eaten raw.

*Ficus religiosa* L. (V. Pipal) Family – Moraceae

Young leaves and shoots are used as vegetable. The plant is also worship in some festivals of tribe.

*Ficus hispida* L. f. (V. Anjir Dashti, Peyatti) Family – Moraceae

Leaves are large in size and used as vegetable. It also have fruit which is eaten raw. Fruits are recommended in treatment of jaundice.

*Ipomoea batatas* (L.) Lam. (V. Ratalu) Convolvulaceae

The fruits are eaten raw or in some cases they are boiled like potato and eaten with sugar. They are rich in starch content.

*Lannea coromandelica* (Houtt.) Merr. (V. Moin) Family – Anacardaceae

Young leaves are used as vegetable by some community of tribe. Fruits are edible and also made into pickles.

*Mangifera indica* L. (V. Amba) Family – Anacardaceae

Fruits are edible which is well known but some community used tender leaves to make chutteny. It taste like young fruits and has very pleasant smell.

*Oxalis corniculata* L. (V. Ambushi, Amlikaa) Family – Oxalidaceae

Leaves are used as vegetable or used in salad as they are acidic in taste. The plant when boiled with butter milk is home remedy for diarrhea in children. Leaf paste apply over forehead to cure headache.

*Soymida febrifuga* A. Juss. (V. Rohan) Family – Meliaceae

these fruits are edible and it also used in marriage ceremony of some tribe.

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Amaranthus polygamus L.  
Boswellia serrata Roxb. Ex Coleber.  

Abrus precatorius L.  
Cassia tora L.  

Soymida febrifuga A. Juss.  
Cordia dichotoma Frost f.
III. RESULT

The life of tribal and other local peoples were very much depends upon the plant products because mainly they used the plants as vegetables; few species were used as fruit and also for grains. They were very simple people and the knowledge of them is very interesting. During this study local 25 plants belonging to 15 families were studied, whenever possible, the local names were also noted down. Known, commonly used edible species were excluded from the given data. Only those species are enumerated which form interesting part of eating habits of tribals of Digras tahsil. It was observed that only old people know about the use of wild edible vegetables and fruits; on the other hand the young generation of these tribe rely on the vegetables and fruits that dominate the market of plain area and have poor knowledge about the wild edible plants. The knowledge of using wild edible plants is very interesting. These plants play incredible role in their life. So it is necessary to keep this knowledge of tribe alive. Survey of weekly market of this area show that people are trying to cultivate the popular vegetable and fruits. It is necessary to readvocate the use of wild vegetables and edible fruits to young generations of tribe.

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Authors acknowledge the tribal of Digras tahsil for giving the information willingly. Authors also thankful to all the people directly or indirectly supported and helped to make contact to the tribal.

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Horizontal Fragmentation Technique in Distributed Database

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Abstract- Distributed database technology is expected to have a significant impact on data processing in the upcoming years. Today's business environment has an increasing need for distributed database and Client/server applications as the desire for consistent, scalable, reliable and accessible information is steadily growing. Distributed processing is an effective way to improve reliability and performance of a database system. Distribution of data is a collection of fragmentation, allocation and replication processes. Previous research works provided fragmentation solution based on empirical data about the type and frequency of the queries submitted to a centralized system. These solutions are not suitable at the initial stage of a database design for a distributed system. The purpose of this work is to present an introduction to Distributed Databases which are becoming very popular now days with the description of distributed database environment, fragmentation and horizontal fragmentation technique. Horizontal fragmentation has an important impact in improving the applications performance that is strongly affected by distributed databases design phase. In this report, we have presented a fragmentation technique that can be applied at the initial stage as well as in later stages of a distributed database system for partitioning the relations. Allocation of fragments is done simultaneously in the algorithm. Result shows that proposed technique can solve initial fragmentation problem of relational databases for distributed systems properly.

Index Terms- Distributed database, Fragmentation, Horizontal Fragmentation, Allocation.

I. INTRODUCTION

1.1 Distributed Database System

A distributed database (DDB) is a collection of data that logically belongs to the same system but is spread over the sites of a computer network. It is not necessary that database system have to be geographically distributed. The sites of the distributed database can have the same network address and may be in the same room but the communication between them is done over a network instead of shared memory. As communication technology, hardware, software protocols advances rapidly and prices of network equipments falls every day, developing distributed database systems become more and more feasible. Design of efficient distributed database is one of the major research problems in database & information technology areas.

A distributed database management system (DDBMS) is then defined as the software system that permits the management of the DDB and makes the distribution transparent to the users. Distributed database system (DDBS) is the integration of DDB and DDBMS. This integration is achieved through the merging the database and networking technologies together. Or it can be described as, a system that runs on a collection of machines that do not have shared memory, yet looks to the user like a single machine. Assumptions regarding the system that underlie these definitions are:

1. Data is stored at a number of sites. Each site is assumed to logically consist of a single processor. Even if some sites are multiprocessor machines, the distributed DBMS is not concerned with the storage and management of data on this parallel machine.
2. The processors at these sites are interconnected by a computer network rather than a multiprocessor configuration.

3. To form a DDB, distributed data should be logically related, where the relationship is defined according to some structural formalism, and access to data should be at a high level via a common interface. The typical formalism that is used for establishing the logical relationship is the relational model.

4. The system has the full functionality of a DBMS.

Distributed processing on database management systems (DBMS) is an efficient way of improving performance of applications that manipulate large volumes of data. This may be accomplished by removing irrelevant data accessed during the execution of queries and by reducing the data exchange among sites, which are the two main goals of the design of distributed databases. Primary concern of distributed database system design is to making fragmentation of the relations in case of relational database or classes in case of object oriented databases, allocation and replication of the fragments in different sites of the distributed system, and local optimization in each site.

### 1.2 Fragmentation

Primary concern of distributed database system design is to making fragmentation of the relations in case of relational database or classes in case of object oriented databases, allocation and replication of the fragments in different sites of the distributed system, and local optimization in each site. Fragmentation is a design technique to divide a single relation or class of a database into two or more partitions such that the combination of the partitions provides the original database without any loss of information. This reduces the amount of irrelevant data accessed by the applications of the database, thus reducing the number of disk accesses. Fragmentation can be horizontal, vertical or mixed/hybrid.

#### 1.2.1. Horizontal fragmentation

Horizontal fragmentation (HF) allows a relation or class to be partitioned into disjoint tuples or instances. Intuition behind horizontal fragmentation is that Every site should hold all information that is used to query at the site and the information at the site should be fragmented so the queries of the site run faster.

Horizontal fragmentation is defined as selection operation, \( \sigma_p(R) \).

For example, the following relation

**EMPLOYEE** (eid, fname, lname, site, pos, salary)

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th>Site</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Eid</td>
<td>Fname</td>
<td>Lname</td>
<td>Site</td>
<td>Pos</td>
<td>Salary</td>
</tr>
<tr>
<td>Fragment1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fragment2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fragment3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Figure 2: Horizontal fragmentation**

#### 1.2.2. Vertical Fragmentation

Vertical fragmentation (VF) allows a relation or class to be partitioned into disjoint sets of columns or attributes except the primary key. Each partition must include the primary key attribute(s) of the table. This arrangement can make sense when different sites are responsible for processing different functions involving an entity.

Objective of vertical fragmentation is to partition a relation into a set of smaller relations so that many of the applications will run on only one fragment.

a. Vertical fragmentation of a relation \( R \) produces fragments \( R_1, R_2, \ldots, R_n \), each of which contains a subset of \( R \)'s attributes.

b. Vertical fragmentation is defined using the projection operation of the relational algebra:

\[
\Pi_{A_1, A_2, \ldots, A_n}(R)
\]

<table>
<thead>
<tr>
<th></th>
<th>Fname</th>
<th>Lname</th>
<th>Site</th>
<th>Eid</th>
<th>Pos</th>
<th>Salary</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fragment1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fragment2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Figure 3: Vertical fragmentation**

#### 1.2.3. Hybrid fragmentation

Combination of horizontal and vertical fragmentations is mixed or hybrid fragmentations (MF). In this type of fragmentation scheme, the table is divided into arbitrary blocks, based on the needed requirements. Each fragmentation can be allocated on to a specific site. This type of fragmentation is the most complex one, which needs more management, in most cases simple horizontal or vertical fragmentation of DB applications.

Mixed fragmentation (hybrid fragmentation) Consists of a horizontal fragment followed schema will not be sufficient to satisfy the requirements of the by a vertical fragmentation, or a vertical fragmentation followed by a horizontal fragmentation. Mixed Fragmentation is defined using the selection and projection operations of relational algebra:

\[
\Pi_{p(\_A_1,\_A_2,\ldots,\_A_n)}(R)
\]
II. LITERATURE REVIEW

Distributed databases are not new, nor are they a consideration unique to client/server architectures or relational databases. Data distribution needs, no doubt, arose immediately after the first database management systems appeared 30 years ago, and various solutions to the distribution problem have been implemented over the years on mainframe and minicomputer platforms using a wide variety of database management software.

HF using min-term predicate is first proposed by Ceri et al. [5]. Oszu and Valduriez proposed an iterative algorithm COMMIN to generate a complete and minimal set of predicates from a given set of simple predicates [1]. Navathe et al. proposed a MF technique. The input of the procedure comprises a predicate affinity table and an attribute affinity table [3]. Bai’oo et al. inputted predicate affinity matrix to build a predicate affinity graph thus defines horizontal class fragments [4]. Navathe et al. used attribute usage matrix (AUM) and Bond energy algorithm to produce vertical fragments [6]. Shin and Irani proposed knowledge based approach in which user reference clusters are derived from the user queries to the database and the knowledge about the data [7]. Ra presented a graph based algorithm for HF in which predicates are clustered based on the predicate affinities [8]. Cheng et al. presented a genetic algorithm based fragmentation approach that treats horizontal fragmentation as a travelling salesman problem [9]. Ma et al. used an attribute uses frequency matrix (AUFM) and a cost model for VF [10]. Alfares et al. used AAM to generate groups based on affinity values [11]. Marwa et al. uses the instance request matrix to horizontally fragment object oriented database [12]. Abuelyaman proposed a static algorithm StatPart for VF [13]. Mahboubi H. and Darmont J. used predicate affinity for HF in data warehouse [14].

To the best of our knowledge, only Abuelyaman [13] provided a solution for initial fragmentation of relations of a distribution database. A randomly generated reflexivity matrix, a symmetry matrix and a transitivity module has been used to produce vertical fragments of the relations and no algorithm for horizontal fragmentation. But he could not justify his hypothesis that why it will produce good fragments.

III. RELATED WORK

To solve the problem of taking proper fragmentation decision at the initial stage of a distributed database, we have provided a new technique of fragmentation. That is to fragment a relation horizontally according to locality of precedence of its attributes. Attribute locality precedence (ALP) can be defined as the value of importance of an attribute with respect to sites of distributed database. ALP table will be constructed by database designer for each relation of a DDBMS at the time of designing the database with the help of modified CRUD (Create, Read, Update, and Delete) matrix and cost functions. A block diagram of our system is depicted in Figure 5.

A relation in a database contains different types of attributes those describe properties of the relation. But the important thing is that the attributes of a relation do not have same importance with respect to data distribution in different sites. According to above importance we can calculate locality precedence of each attribute for each relation and construct ALP table for the relations.

3.1 CRUD Matrix

A CRUD (data-to-location) matrix is a table of which rows indicate attributes of the entities of a relation and columns indicate different locations of the applications (processes that affect those attributes). If a particular process uses a particular

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entity attribute, the appropriate cell is filled with the letters C, R, U, or D. A "C" in the cell of a CRUD matrix indicates that the process sometimes creates new instances of the corresponding entity type. An "R" in the cell indicates that the process sometimes reads existing instances of the entity type. A "U" in the cell indicates that the process sometimes updates instances of the corresponding entity type. A "D" in the cell indicates that the process sometimes deletes instances of the corresponding entity type.

A process does not necessarily use an entity every time it occurs. This does not mean that the interaction should not be shown on the CRUD matrix. If the process ever uses the entity, it occurs. This does not mean that the interaction should not be documented in the CRUD matrix. A "D" in the cell indicates that the process sometimes updates instances of the corresponding entity type. A "U" in the cell indicates that the process sometimes reads existing instances of the entity type. A "R" in the cell indicates that the process sometimes deletes instances of the corresponding entity type. An "C" in the cell indicates that the process sometimes creates new instances of the corresponding entity type. A "C" in the cell indicates that the process sometimes creates new instances of the corresponding entity type. A "D" in the cell indicates that the process sometimes deletes instances of the corresponding entity type. An "R" in the cell indicates that the process sometimes reads existing instances of the entity type. A "U" in the cell indicates that the process sometimes updates instances of the corresponding entity type.

We have used MCRUD to generate ALP table for each relation. We have modified the existing CRUD matrix according to our requirement of HF and name it Modified Create, Read, Update, and Delete (MCRUD) matrix. It is a table constructed by placing predicates of attributes of a relation as the rows and applications of the sites of a DDBMS as the columns. We have used MCRUD to generate ALP table for each relation.

We treated cost as the effort of access and modification of a particular attribute of a relation by an application from a particular site. For calculating precedence of an attribute of a relation we take the MCRUD matrix of the relation as the input and use the following cost functions:

\[
\begin{align*}
C_{i,j,k,r} &= f_C + f_R R + f_U U + f_D D \\ 
S_{i,j,k} &= \sum C_{i,j,k,r} \\ 
S_{i,j,m} &= \max(S_{i,j,k}) \\ 
ALP_{i,j} &= S_{i,j,m} - \sum_{k \neq m} S_{i,j,k} \\ 
ALP_i &= \sum_{j=1}^{\text{TotalPredicates}} ALP_{i,j}
\end{align*}
\]

where 
- \(f_C\) = frequency of create operation 
- \(f_R\) = frequency of read operation 
- \(f_U\) = frequency of update operation 
- \(f_D\) = frequency of delete operation 
- \(C\) = weight of create operation 
- \(R\) = weight of read operation 
- \(U\) = weight of update operation 
- \(D\) = weight of delete operation 
- \(C_{i,j,k}\) = cost of predicate \(j\) of attribute \(i\) accessed by application \(r\) at site \(k\) 
- \(S_{i,j,k}\) = sum of all applications’ cost of predicate \(j\) of attribute \(i\) at site \(k\) 
- \(S_{i,j,m}\) = maximum cost among the sites for predicate \(j\) of attribute \(i\) 
- \(ALP_{i,j}\) = actual cost for predicate \(j\) of attribute \(i\) 
- \(ALP_i\) = total cost of attribute \(i\) (locality precedence)

For simplicity we have assumed that \(f_C, f_R, f_U\) and \(f_D\) = 1 and \(C=2, R=1, U=3\) and \(D=2\). The justification of the assumption is that at the design time of a distributed database, the designer will not know the actual frequencies of read, delete, create and update of a particular attribute from different applications of a site and generally update incurs more cost than create and delete, and reading from database always incurs least cost.

After construction of ALP table for a relation, predicate set \(P\) will be generated for the attribute with highest precedence value in the ALP table. Finally each relation will be fragmented horizontally using the predicates of \(P\) as selection predicate. The procedures can be clearly understood from the following algorithm and pseudo code of Fig 6 and 7.
ALP[i] = 0
for (j = 1; j <= TotalPredicates[i]; j++) /* calculating total cost for attribute i (locality precedence)*/
{
    ALP[i] += ALPsIngle[i][j]
}

Figure 7: ALP-table-construction Pseudocode

To justify our technique, we have implemented a distributed banking database system. One of the relations of the database is Accounts shown in Table 1. Initially number of sites of the distributed system is three.

Table 1: Accounts Relation

<table>
<thead>
<tr>
<th>AccNo</th>
<th>Type</th>
<th>CustId</th>
<th>OpenDate</th>
<th>Balance</th>
<th>Branch</th>
</tr>
</thead>
<tbody>
<tr>
<td>01</td>
<td>Saving</td>
<td>101</td>
<td>05/01/12</td>
<td>30000</td>
<td>Pune</td>
</tr>
<tr>
<td>02</td>
<td>Current</td>
<td>102</td>
<td>18/01/12</td>
<td>48000</td>
<td>Pune</td>
</tr>
<tr>
<td>03</td>
<td>Current</td>
<td>103</td>
<td>10/02/12</td>
<td>15900</td>
<td>Nagpur</td>
</tr>
<tr>
<td>04</td>
<td>Saving</td>
<td>104</td>
<td>06/03/12</td>
<td>37750</td>
<td>Mumbai</td>
</tr>
<tr>
<td>05</td>
<td>Current</td>
<td>105</td>
<td>12/03/12</td>
<td>50000</td>
<td>Pune</td>
</tr>
<tr>
<td>06</td>
<td>Saving</td>
<td>106</td>
<td>25/03/12</td>
<td>25000</td>
<td>Nagpur</td>
</tr>
<tr>
<td>07</td>
<td>Current</td>
<td>107</td>
<td>28/03/12</td>
<td>45000</td>
<td>Mumbai</td>
</tr>
</tbody>
</table>

3.2. Construction of MCRUD Matrix

We have constructed the MCRUD matrix for the Accounts relation in the requirement analysis phase. Part of MCRUD matrix is shown in Figure 8.

3.3 Calculation of ALP

We have calculated locality precedence of each attribute from the MCRUD matrix of Accounts relation according to the cost functions of equation (1)-(5). Calculating the locality precedence of the attribute Branch is shown in Figure 9.

According to the cost functions, value of the predicate Branch=Pune is (8+4+8) - (1+1) = 18, Branch=Nagpur is (8+8+1) - (1+1) = 15 and Branch=Mumbai is (8+3+6) - 0 = 17. So ALP of Branch = 18+15+17 = 50.

3.4. Construction of ALP Table

ALP values of all the attributes of the Accounts relation was computed from its MCRUD matrix. The attribute with highest precedence value will be treated as most important attribute for fragmentation. Table 2 shows the ALP table for Accounts relation.

Table 2: ALP table for Accounts relation

<table>
<thead>
<tr>
<th>Attribute Name</th>
<th>Precedence</th>
</tr>
</thead>
<tbody>
<tr>
<td>AccNo</td>
<td>6</td>
</tr>
<tr>
<td>Type</td>
<td>22</td>
</tr>
<tr>
<td>CustId</td>
<td>6</td>
</tr>
<tr>
<td>OpenDate</td>
<td>7</td>
</tr>
<tr>
<td>Balance</td>
<td>10</td>
</tr>
<tr>
<td>Branch</td>
<td>50</td>
</tr>
</tbody>
</table>

3.5. Generation of Predicate Set

Predicate set was generated for Branch, the attribute with highest precedence value will be treated as most important attribute.

\[ P = \{ p1: \text{Branch}=\text{Pune}, p2: \text{Branch}=\text{Nagpur}, p3: \text{Branch}=\text{Mumbai} \} \]

3.6. Fragmentation of Relation

According to the predicate set P, Account relation was fragmented and allocated to 3 sites (figure 10) shown in table 3-5.
banking database can be fragmented in the same way like distributed database system through a study that targeted two databases. Many techniques have been proposed by the attributes.

In this report, we presented an introduction to distributed database system through a study that targeted two main parts: in the first part we presented an exploration of distributed database environment and types of fragmentation. In the second part, we explore the horizontal fragmentation technique of a relation according to locality of precedence of its attributes.

From the above result, we can see that our technique has successfully fragmented the Accounts relation and allocated the fragments among the sites of the distributed system. As we have only taken highest valued attribute from ALP table, no unwanted fragments were created. Other relations of the distributed banking database can be fragmented in the same way like Accounts.

For simplicity we have considered only four sites of the system for allocation. It is worth mentioning that our fragmentation technique will work in the same way for large number of sites of any distributed system.

### IV. CONCLUSION

In this report, we presented an introduction to distributed database system through a study that targeted two main parts: in the first part we presented an exploration of distributed database environment and types of fragmentation. In the second part, we explore the horizontal fragmentation technique of a relation according to locality of precedence of its attributes.

Making proper fragmentation of the relations and allocation of the fragments is a major research area in distributed databases. Many techniques have been proposed by the researchers using empirical knowledge of data access and query frequencies. But proper fragmentation and allocation at the initial stage of a distributed database has not yet been addressed. In this report, we have presented a fragmentation technique to partition relations of a distributed database properly at the initial stage when no data access statistics and query execution frequencies are available. Using our technique, no additional complexity is added for allocating the fragments to the sites of a distributed database as fragmentation is synchronized with allocation. So performance of a DDBMS can be improved significantly by avoiding frequent remote access and high data transfer among the sites. This work can be extended to support fragmentation in distributed object oriented databases as well.

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A Technique for Constructing Odd-order Magic Squares Using Basic Latin Squares

Tomba I.

Abstract- In this paper, a technique for constructing n² magic squares (when n is odd) using n² basic Latin square is developed. Magic squares are practically important of the properties of equality in the sum of its rows, columns, diagonals. The construction is made by fixing the pivot element and arranging other elements in an orderly manner. The construction is illustrated with numerical examples.

Index Terms- Latin square (basic), magic square (normal), pivot element, rotation, reflection

I. INTRODUCTION

The Latin squares and Greco-Latin squares are used in statistical research particularly in agricultural sciences and design of experiments whereas magic squares are used in puzzle games of cubes, pattern recognition and magic carpet constructions, magic square cipher in Cryptology etc.

Basic Latin Squares

A basic (3 x 3) Latin square can be represented with Latin letters A, B and C as:

\[
\begin{bmatrix}
A & B & C \\
B & C & A \\
C & A & B
\end{bmatrix}
\]

[1]

Inter-changing rows and columns are other forms of (3 x 3) Latin Squares.

In all cases Latin letters are seen once in each row and column. In a Latin square, the sums of rows and columns are equal but not the sums of diagonals.

The basic Latin Square is represented as:

\[
\begin{bmatrix}
a_{11} & a_{12} & a_{13} \\
a_{21} & a_{22} & a_{23} \\
a_{31} & a_{32} & a_{33}
\end{bmatrix}
\]

[2]

Where, \( \sum_{i} a_{ij} = \sum_{j} a_{ij} \) but \( \sum_{i} d_{ij} \neq \sum_{j} d_{ij} \)

Normal Magic Squares

On the other hand, (3 x 3) magic square (normal) with numbers 1,2,3,…..9 is represented as:

\[
\begin{bmatrix}
4 & 9 & 2 \\
3 & 5 & 7 \\
8 & 1 & 6
\end{bmatrix}
\]

[3]

Where, the sums of the rows, columns and diagonals are equal.

The above (3 x 3) magic square (normal) can be expressed as:

\[
\begin{bmatrix}
a_{ij}
\end{bmatrix}; i,j = 1,2,3
\]

Satisfying \( \sum_{i} a_{ij} = \sum_{j} a_{ij} = \sum_{i} d_{ij} = \sum_{j} d_{ij} \) for all i,j = 1,2,...,n

Since the elements are consecutive and not repeated and therefore normal magic square.

Magic squares (normal) may be classified an arrangement of non repeated integers (n ≥ 0) in an array of equal rows and columns such that the sums of its rows, columns and diagonals are equal.

For a normal magic square, the following properties can be established

(a) Elements or numbers (n ≥ 0) are consecutive

(b) Elements are not repeated

(c) Sums of the rows, columns and diagonals are equal

\[ \Rightarrow \sum_{i} a_{ij} = \sum_{j} a_{ij} = \sum_{i} d_{ij} = \sum_{j} d_{ij} \quad \text{for all} \quad i,j = 1,2,...,n \]

(d) Equality property of the rows, columns and diagonals remain unaltered for rotations and reflections.

There exists different (n x n) magic square not satisfying these properties. Examples of such magic squares, not satisfying the above properties are: magic squares (special or random, prime numbers etc.)

Examples: (i) magic square (special)

\[
\begin{bmatrix}
1 & 14 & 14 & 4 \\
11 & 7 & 6 & 9 \\
8 & 10 & 10 & 5 \\
13 & 2 & 3 & 15
\end{bmatrix}
\]
(ii) Magic square (prime numbers) \[
\begin{bmatrix}
17 & 39 & 71 \\
113 & 59 & 5 \\
47 & 29 & 101
\end{bmatrix}
\]

It satisfies: \( \sum_i a_y = \sum_j a_y = \sum_j d_y = \sum_i d_y \)

However, these magic squares are not normal because in (i) the elements are repeated and non-consecutive and (ii) the numbers (prime) are not repeated but non-consecutive

3. Symmetric properties of Basic Latin Squares

**Lemma-1**: A (n x n) basic Latin square (n is odd) is symmetric and non-duplicated.

Let a (3 x 3) basic Latin square be

\[
\begin{bmatrix}
A & B & C \\
B & C & A \\
C & A & B
\end{bmatrix} \Rightarrow \begin{bmatrix}
a_{1,1} & a_{1,2} & a_{1,3} \\
a_{2,1} & a_{2,2} & a_{2,3} \\
a_{3,1} & a_{3,2} & a_{3,3}
\end{bmatrix}
\]

Here, \( \{a_{ij}\} = \{a_{ji}\} \) for all \( i \) and \( j \) \( \Rightarrow a_{13} = a_{31} = C, a_{23} = a_{32} = A \) and so on.

But \( a_{11} = A, a_{22} = C, a_{33} = B \) \[5\]

The diagonal elements are not equal or repeated \( \Rightarrow \) non-duplicated

**Lemma-2**: A (n x n) basic Latin square (n is even) is symmetric but duplicated

Again, let a (4 x 4) basic Latin square be

\[
\begin{bmatrix}
A & B & C & D \\
B & C & D & A \\
C & D & A & B \\
D & A & B & C
\end{bmatrix} \Rightarrow \begin{bmatrix}
a_{1,1} & a_{1,2} & a_{1,3} & a_{1,4} \\
a_{2,1} & a_{2,2} & a_{2,3} & a_{2,4} \\
a_{3,1} & a_{3,2} & a_{3,3} & a_{3,4} \\
a_{4,1} & a_{4,2} & a_{4,3} & a_{4,4}
\end{bmatrix}
\]

Clearly, \( \{a_{ij}\} = \{a_{ji}\} \) for all \( i \) and \( j \) \( \Rightarrow \) Basic Latin squares (of all orders) are symmetric.

But \( a_{11} = A, a_{22} = C, a_{33} = A, a_{44} = C \)

\( \Rightarrow a_{11} = A = a_{33} \) and \( a_{22} = C = a_{44} \) \[6\]

The diagonal elements are equal or repeated \( \Rightarrow \) duplicated

**Lemma-3**: Conversely, a (n x n) square (n is odd), satisfying the symmetric and non duplication properties is a basic Latin square.

Prof: If \( \{a_{ij}\} = \{a_{ji}\} \) for all \( i \) and \( j \), then it follows that \( \{a_{ij}\} \) is a Basic Latin square.

**Lemma-4**: In a basic Latin square (n is odd), one of the sum of diagonal is equal to the sum of rows or columns.

Prof: It follows immediately that in a basic Latin square (when n is odd),

\[ \sum_i a_y = \sum_j a_y = \sum_i d_y or \sum_j d_y \] holds. \[7\]

2. METHODOLOGY

2.1 For constructing \( n^2 \) (n is odd) magic square

The technique of constructing magic square using basic Latin square principle can be expressed as follows:

Let the \((n \times n)\) matrix \( \{a_{ij}\}; i,j=1,2,\ldots,n \) with the consecutive elements/numbers of \( (a_{11}, a_{12}, \ldots, a_{1n}), (a_{21}, a_{22}, \ldots, a_{2n}), \ldots (a_{n1}, a_{n2}, \ldots, a_{nn}) \), arranged in Basic Latin square format be;

\[
\begin{bmatrix}
a_{11} & a_{12} & \ldots & a_{1n} \\
a_{21} & a_{22} & \ldots & a_{2n} \\
\vdots & \vdots & \ddots & \vdots \\
a_{n1} & a_{n2} & \ldots & a_{nn}
\end{bmatrix}
\]

giving \( \sum_j a_{ij} = S \) for all \( i \) where \( S = \frac{n(n^2+1)}{2} \) \[8\]

This condition will be true for all \( n \) (odd or even) due to basic Latin square property

The **pivot element** (number) in the middle cell, when \( n \) is odd can be defined as

\[ a_{\frac{n+1}{2}, \frac{n+1}{2}} \] \[9\]

Since the pivot element is fixed, we select the row, associated with it and assign as the diagonal of the \((n \times n)\) array, fixing the pivot element in the middle and arranging the other elements in an orderly manner to get a new matrix \( \{b_{ij}\}; i,j=1,2,\ldots,n \), satisfying symmetric property of Latin Square

Hence, \( \sum_j b_{ij} = \sum_i d_{ij} = \sum_j d_{ij} = S \) for all \( i \) and \( j \) \[10\]

Again, since sum of the columns of \( \{a_{ij}\} \) are now the rows of \( \{b_{ij}\} \)

Therefore, \( \sum_i a_{ij} = \sum_j b_{ij} = S \) \[11\]

Hence, \( \sum_i a_{ij} = \sum_j a_{ij} = \sum_i d_{ij} = \sum_j d_{ij} \) is fulfilled

\( \Rightarrow \{b_{ij}\}; i,j=1,2,\ldots,n \) is a magic square.

Hence the theorem is established as:

The \((n \times n)\) square, developed by using basic Latin square format when the pivot element is fixed and rearranging in an orderly manner represents a magic square \[12\]

2.2 Steps for construction of a magic square (n is odd)

The construction of magic square by using basic Latin square can be expressed in the following steps:

**Step-1**: First arrange the consecutive numbers \( (a_{11}, a_{12}, \ldots, a_{1n}), (a_{21}, a_{22}, \ldots, a_{2n}), \ldots (a_{n1}, a_{n2}, \ldots, a_{nn}) \) in basic Latin square form
Step-2: Determine the pivot element to be assigned in the middle cell, \( a_{\frac{n+1}{2}, \frac{n+1}{2}} \) and select the row associated with this pivot element.

Step-3: Assign this row as diagonal elements, fixing the pivot element in the middle and arrange other elements in an orderly manner to give the desired magic square.

Check whether it satisfies the property or not,

\[
\sum_j b_j = \sum_j d_j = \sum_i a_i = \sum_j d_j
\]

Note:

(i) For the consecutive numbers (n ≥ 1), then pivot element (P) and sum (S) are

\[
P = \frac{\left(n^2 + 1\right)}{2} \quad \text{and} \quad S = n \left\{s + \frac{n^2 + 1}{2}\right\}
\]

(ii) If the consecutive number (n ≥ 0), then it gives the lowest magic square.

(iii) If the consecutive number starts from s+1 where s ≥ 1, the corresponding

\[
P = s + \frac{\left(n^2 + 1\right)}{2} \quad \text{and} \quad S = n \left\{s + \frac{n^2 + 1}{2}\right\}
\]

(iv) Maximum and minimum elements can be determined using

\[
a_{\frac{n+1}{2}, \frac{n+1}{2}} \pm \frac{\left(n^2 - 1\right)}{2} \quad \text{and} \quad a_{\frac{n+1}{2}, \frac{n+1}{2}} \pm \frac{\left(n^2 - 1\right)}{2}
\]

2.3 Alternate Structures of \((n \times n)\) magic squares

Let \( \{a_{ij}\} \) be a magic square satisfying the properties (a) to (d). Equality in the sums of rows, columns and diagonals will remain unchanged for rotations and reflections.

The alternate structures of a magic square can be expressed (clockwise or anticlockwise rotation)

\[
(k \frac{n}{2}); \quad k = \pm 1, \quad \pm 2, \quad \ldots \quad \pm m
\]

As \( \{a_{ij}(k)\} \)

Where \( \{a_{ij}\} = \{a_{ij}(k)\} \) for all \( i = 0, 4, 8, \ldots \)

2.4 More properties

(a) Infinite number of magic squares can be generated by multiplying or adding by a number \( p \geq 1 \) to each element of the given magic square.

Or, if \( \{a_{ij}\} \) is a magic square, then \( p \{a_{ij}\} \) and \( \{a_{ij} + p\} \) are magic squares

(b) If the minimum element/number is 0, then \( \{a_{ij}\} \) gives the lowest magic square

(c) Sum of two magic squares in the same rotation/reflection gives a magic square

(d) Sum of two magic squares in different rotation are not magic squares.

(e) Product of two magic squares is not a magic square

Magic squares in the same rotation/reflection are additive

3. NUMERICAL EXAMPLES

3.1 To construct a \((3 \times 3)\) magic square

Let the numbers be \((1, 2, 3, 4, 5, 6)\) and \((7, 8, 9)\)

Step-1: Latin square format gives

\[
\begin{bmatrix}
1 & 2 & 3 \\
5 & 6 & 4 \\
9 & 7 & 8
\end{bmatrix}
\]

It gives the column totals equal, \( \sum_j a_{ij} = 15 \) for all \( j \)

Here, \( P = \frac{(n^2 + 1)}{2} = 5 \) and \( S = n(n^2 + 1)/2 = 15 \) for \( n = 3 \)

Step-2: Select the row associated with the pivot element (say 5, 6, 4) and assign it as diagonal elements, fixing the pivot element in the middle (say 4, 5, 6)

Step-3: Rearrange the other elements in an orderly manner to get a new \((3 \times 3)\) array \( \{b_{ij}\} \) as

\[
\begin{bmatrix}
8 & 1 & 6 \\
3 & 5 & 7 \\
4 & 9 & 2
\end{bmatrix}
\]

which represents the \(3^2\) magic square

On alternate structures of \(3^2\) magic square

By rotation or reflex ion, alternate structures of a magic square \( A = \{a_{ij}\} \) can be expressed in different structures (multiples of 90°)

Let \( A = \begin{bmatrix}
8 & 1 & 6 \\
3 & 5 & 7 \\
4 & 9 & 2
\end{bmatrix} \)

Reflection: \( \begin{bmatrix}
6 & 1 & 8 \\
7 & 5 & 3 \\
2 & 9 & 4
\end{bmatrix} \)

and Rotation (+90°): \( \begin{bmatrix}
4 & 3 & 8 \\
9 & 5 & 1 \\
2 & 7 & 6
\end{bmatrix} \)

(i) \( A^{(m)} = \{a_{ij}(m)\} \) with the rotation of m 90° clockwise or anti-clockwise, where m is real and positive or negative.

\[
A^{(1)} = \{a_{ij}(1)\} \Rightarrow \begin{bmatrix}
4 & 3 & 8 \\
9 & 5 & 1 \\
2 & 7 & 6
\end{bmatrix} \quad A^{(1, -)} = \begin{bmatrix}
6 & 7 & 2 \\
1 & 5 & 9 \\
8 & 3 & 4
\end{bmatrix}
\]

\[
A^{(2)} = \{a_{ij}(2)\} \Rightarrow \begin{bmatrix}
2 & 9 & 4 \\
7 & 5 & 3 \\
6 & 1 & 8
\end{bmatrix} \quad A^{(2, -)} = \begin{bmatrix}
2 & 9 & 4 \\
7 & 5 & 3 \\
6 & 1 & 8
\end{bmatrix}
\]
\[
A^{(3)} = \begin{bmatrix} 1 & 2 & 3 & 4 & 5 & 6 & 7 \\ 1 & 2 & 3 & 4 & 5 & 6 & 7 \\ 1 & 2 & 3 & 4 & 5 & 6 & 7 \end{bmatrix} \quad \Rightarrow \quad \begin{bmatrix} 6 & 7 & 2 \\ 1 & 5 & 9 \\ 8 & 3 & 4 \end{bmatrix} \quad \Rightarrow \quad \begin{bmatrix} 4 & 3 & 8 \\ 9 & 5 & 1 \\ 2 & 7 & 6 \end{bmatrix}
\]

In all cases, \( \sum_i a_{ij} = \sum_j a_{ij} = \sum_i d_{ij} = \sum_j d_{ij} \) are fulfilled.

### 3.2 To construct a \( 5^2 \) magic square

Let the consecutive numbers be \( (1, 2, 3, 4, 5), (6, 7, 8, 9, 10), (11, 12, 13, 14, 15), (16, 17, 18, 19, 20), (21, 22, 23, 24, 25) \).

**Step-1:** Arranging in basic Latin square format, it gives

\[
\begin{bmatrix} 1 & 2 & 3 & 4 & 5 \\ 7 & 8 & 9 & 10 & 6 \\ 13 & 14 & 15 & 11 & 12 \\ 19 & 20 & 16 & 17 & 18 \\ 25 & 21 & 22 & 23 & 24 \end{bmatrix}
\]

Satisfying \( \sum_i a_{ij} = S \) for all \( j \),

\[ P = \frac{n^2 + 1}{2} = 13 \quad \text{and} \quad S = \frac{n(n^2 + 1)}{2} = 65 \]

**Step-2:** Select the row associated with the pivot element (13) as \( (13, 14, 15, 11, 12) \) and assign this row as diagonal elements, fixing the pivot element (13) in the middle.

**Step-3:** Rearrange the other elements in an orderly manner to get a new matrix

\[
\begin{bmatrix} 17 & 24 & 1 & 8 & 15 \\ 23 & 5 & 7 & 14 & 16 \\ 4 & 6 & 13 & 20 & 22 \\ 10 & 12 & 19 & 21 & 3 \\ 11 & 18 & 25 & 2 & 9 \end{bmatrix}
\]

Satisfying \( \sum_i a_{ij} = \sum_j a_{ij} = \sum_i d_{ij} = \sum_j d_{ij} \)

### 3.3 To construct a \( 7^2 \) magic square

Let the consecutive numbers be \( (1, 2, 3, 4, 5, 6, 7), (8, 9, 10, 11, 12, 13, 14), \ldots, (43, 44, 45, 46, 47, 48, 49) \).

Following the steps of arranging in \( 7^2 \) basic Latin square format:

\[
\]

Selecting the row associated with the pivot element (25) and assigning it as diagonal elements, fixing the pivot element in the middle and rearranging the other elements in an orderly manner to get a new \( (7 \times 7) \) matrix:

\[
\]

It satisfies \( \sum_i a_{ij} = \sum_j a_{ij} = \sum_i d_{ij} = \sum_j d_{ij} \)

where \( P = 25 \) and \( S = 175 \)

### 3.4 Construction of \( 9^2 \) and \( 13^2 \) magic squares using basic Latin squares

Selecting the row associated with the pivot element and assigning it as diagonal elements, fixing the pivot element in the middle and rearranging the other elements in an orderly manner, one can construct the magic squares.

(a) Arranging in \( 9^2 \) basic Latin square format

\[ P = \frac{n^2 + 1}{2} = 41 \quad \text{and} \quad S = \frac{n(n^2 + 1)}{2} = 369 \]

\[
\]

\( \Rightarrow \) the required \( 9^2 \) magic square is

\[
\]
(b) Arranging in $13^2$ basic Latin square format;

$$P = \frac{(n^2 + 1)}{2} = 85$$ and $$S = \frac{n(n^2 + 1)}{2} = 1105$$

$$\begin{bmatrix}
1 & 2 & 3 & 4 & 5 & 6 & 7 & 8 & 9 & 10 & 11 & 12 & 13 \\
29 & 30 & 31 & 32 & 33 & 34 & 35 & 36 & 37 & 38 & 39 & 27 & 28 \\
43 & 44 & 45 & 46 & 47 & 48 & 49 & 50 & 51 & 52 & 40 & 41 & 42 \\
57 & 58 & 59 & 60 & 61 & 62 & 63 & 64 & 65 & 53 & 54 & 55 & 56 \\
71 & 72 & 73 & 74 & 75 & 76 & 77 & 78 & 66 & 67 & 68 & 69 & 70 \\
85 & 86 & 87 & 88 & 89 & 90 & 91 & 79 & 80 & 81 & 82 & 83 & 84 \\
99 & 100 & 101 & 102 & 103 & 104 & 92 & 93 & 94 & 95 & 96 & 97 & 98 \\
127 & 128 & 129 & 130 & 118 & 119 & 120 & 121 & 122 & 123 & 124 & 125 & 126 \\
141 & 142 & 143 & 131 & 132 & 133 & 134 & 135 & 136 & 137 & 138 & 139 & 140 \\
155 & 156 & 144 & 145 & 146 & 147 & 148 & 149 & 150 & 151 & 152 & 153 & 154 \\
169 & 157 & 158 & 159 & 160 & 161 & 162 & 163 & 164 & 165 & 166 & 167 & 168 \\
\end{bmatrix}$$

⇒ the required $13^2$ magic square is

$$\begin{bmatrix}
93 & 108 & 123 & 138 & 153 & 168 & 1 & 16 & 31 & 46 & 61 & 76 & 91 \\
107 & 122 & 137 & 152 & 167 & 13 & 15 & 30 & 45 & 60 & 75 & 90 & 92 \\
121 & 136 & 151 & 166 & 12 & 14 & 29 & 44 & 59 & 74 & 89 & 104 & 106 \\
135 & 150 & 165 & 11 & 26 & 28 & 43 & 58 & 73 & 88 & 103 & 105 & 120 \\
149 & 164 & 10 & 25 & 27 & 42 & 57 & 72 & 87 & 102 & 117 & 119 & 134 \\
163 & 9 & 24 & 39 & 41 & 56 & 71 & 86 & 101 & 116 & 118 & 133 & 148 \\
8 & 23 & 38 & 40 & 55 & 70 & 85 & 100 & 115 & 130 & 132 & 147 & 162 \\
22 & 37 & 52 & 54 & 69 & 84 & 99 & 114 & 129 & 131 & 146 & 161 & 7 \\
36 & 51 & 53 & 68 & 83 & 98 & 113 & 128 & 143 & 145 & 160 & 6 & 21 \\
50 & 65 & 67 & 82 & 97 & 112 & 127 & 142 & 144 & 159 & 5 & 20 & 35 \\
64 & 66 & 81 & 96 & 111 & 126 & 141 & 156 & 158 & 4 & 19 & 34 & 49 \\
78 & 80 & 95 & 110 & 125 & 140 & 155 & 157 & 3 & 18 & 33 & 48 & 63 \\
79 & 94 & 109 & 124 & 139 & 154 & 169 & 2 & 17 & 32 & 47 & 62 & 77 \\
\end{bmatrix}$$

Similarly, magic squares of complex numbers of any order (n is odd) can be generated.

4. CONCLUSION

The technique can be used for finding magic squares from basic Latin Squares of any order (n ≥ 1, for n is odd) easily within a shortest possible time. In this paper, construction of odd order magic squares using basic Latin squares is shown.

However, even-order magic squares can’t be constructed directly in the same process because of duplications in diagonal elements and therefore separate techniques are to be adopted.

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Research Agenda: Behavioural Business Intelligence Framework for Decision Support in Online Retailing in Indian Context

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Abstract- The topic of Behavioural Business Intelligence (BBI) for decision support in online retail sector has been examined under various contexts over the years (Rina Fitriana, et al., 2011). Although researchers from a variety of business disciplines have made significant progress over the past few years, the scope of these studies is rather broad, the studies appear relatively fragmented and no unifying theoretical model is found in this research area. In view of this, we provide review of the literature and propose a research framework for designing BBI which is essentially based on online buying behaviour of Indian buyer. The propose research is based on four key building blocks (motivation, attitude, personality and trust) so as to analyze the online buyer behaviour in a systematic way. This proposed framework provides us with a cohesive view of online buyer behaviour which is a backbone of BBI decision support system in online retail sector. We conclude our paper with a research agenda for the designing Behavioural Business Intelligence Framework for decision support in online retail sector in Indian Context.

Index Terms- Behavioural Business intelligence, decision support systems, knowledge management, online buyer behavior.

I. INTRODUCTION

There is a growing popularity of Internet as a medium of information search, communication link, and online buying worldwide including India. Although there has been a widespread change in the mindset of Indian buyers by way of switching over to online buying from the traditional physical shopping (Joines et al., 2003; and Jayawardhena, 2004), the rate of diffusion and adoption of the online buying amongst buyers is still relatively low. Various business intelligence approaches are currently used by decision makers like spreadsheets and databases, online transaction processing, online analytical processing, data mining to assist with strategic planning in online retail (L. Venkata Subramaniam et al., 2009). Information such as demographics, buying patterns, product preferences etc. may be used and useful deductions can be made such as determining a suitable product mix or estimated demand of a product to decide on inventory level. Although such information can be invaluable to decision makers, it only provides part of the picture. These BI approaches do not provide insight into why buyers are doing and what they are doing (Luan Ou and Hong Peng, 2006).

Greater understanding of the ‘why’ is essential in predicting the future and gaining insights in order to reduce inefficiencies, costs and risks, and improve future decisions related to online buying (www.IntelligentSoftware.com.au, Behavioural Business Intelligence: the next generation of predictive analysis). The proposed research agenda not only provide us with a cohesive view of online buyer Behaviour of Indian buyer based on empirical study but also proposes a comprehensive Behavioural Business Intelligence (BBI) framework for online retailer.

The paper is organized as follows. Section 1 outlines the research done in the field of online buyer behaviour. Section 2 analyzes some business intelligence models developed in recent past. Section 3 outlines the relationship between business intelligence, knowledge management and data mining, as these approaches will be used to design BBI framework. Section 4 concludes the paper by considering the future research agenda.

II. ONLINE BUYER BEHAVIOUR

It has been found in literature survey that there is lot of study done on developing a business intelligence model based on buyer behaviour but most of it is fragmented and does not provide a comprehensive approach on online buying behaviour of Indian buyer.

Online buyer behaviour has become an emerging research area with an increasing number of publications per year. The research articles appear in a variety of journals and conference proceedings in the fields of information systems, marketing, management, and psychology. A review of these articles indicates that researchers mostly draw theories from classical buyer behaviour research, such as behavioural learning, personality research, information processing, and attitude models (Fishbein 1980). Moreover, a close examination of the literature in this area reveals that most of the components of buyer behaviour theory have been applied to the study of online buyer behaviour. However, the application is not as straightforward as simply borrowing the components and applying them. There are still significant differences between offline and online buyer behaviour that warrant a distinguishing conceptualization. For example, L.R. Vijayasarathy (2001) integrated the web specific factors (online shopping aid) into the theory of reasoned action (TRA) to better explain buyer online shopping behavior. Song and Zahedi (2001) built on the model of the theory of planned behaviour (TPB) and examined the effects of website design on the adoption of Internet shopping.

III. BUSINESS INTELLIGENCE MODELS

Business Intelligence systems are used widely across many industries such as retail, finance, insurance and telecom. BI
systems are typically used to monitor business conditions, track Key performance indicators (KPIs), aid as decision support systems, perform data mining and do predictive analysis.

Traditionally BI systems operate on structured data gathered in a data warehouse. These systems usually use data such as transactional data, billing data, and usage history and call records for applications such as churn prediction customer lifetime value modelling (S. Rosset et al., 2002), (B. Raskutti and A. Herschtal, 2005), campaign management (S. Rosset et al., 2001), customer wallet estimation and data mining (R. Agrawal and T. Imielinski, 93).

In the paper Business Intelligence from Voice of Customer (L. Venkata Subramaniam et al., 2009 ) an attempt is made to study the structured and unstructured data to obtain Voice of Customer (VoC). Information is obtained through interaction of customer with enterprise namely, conversation with call-centre agents, email, and sms. A combination of unstructured and structured data such as, educational qualification, age group, and employment details provide access to business variables and un to date dynamic requirements of the customers. It indicates trends that are difficult to derive from a larger population of customers through any other means. For example, some of the variables reacted in unstructured data are problem/interest in a certain product, expression of dissatisfaction with the business provided, and some unexplored category of people showing certain interest/problem. This gives the BIvoC system the ability to derive business insights that are richer, more valuable and crucial to the enterprises than the traditional business intelligence systems which utilize only structured information. The study demonstrate the effectiveness of Business Intelligence Voice of Customer (BIvoC ) system through one of our real-life engagements where the problem is to determine how to improve agent productivity in a call centre scenario. Voice of Customer (VoC), refers to customer communications, such as, conversational voice recordings, emails, text messages, chat transcripts, and agent notes. Most of the VoC is collected through contact centres.

Such rich analysis is not possible without achieving the combined all-round view of buyer behaviour. This technique also imposes several technical challenges relating to speech recognition, entity annotation, linking text to structured records, mining patterns and rules of interest, and visualizing results and relating them to business insights.

Hai Wang proposed a business intelligence model of knowledge development through DM in the research paper “A knowledge management approach to data mining process for business intelligence.” This model adds a crucial business insider centered knowledge development cycle to the conventional virtuous cycle of Data Mining (DM). The involvement of collaboration between knowledge workers can make DM more relevant to BI. The paper has proposed a model of knowledge sharing system that facilitates collaboration between business insiders and data miners. Through an illustrative case study, the paper has demonstrated the usefulness of the model of knowledge sharing system for DM in the dynamic transformation of explicit knowledge and tacit knowledge for KM.

Li Niu, Jie Lu, Eng Che, and Guangquan Zhan proposed a cognitive business intelligence system (CBIS) in their research on An Exploratory Cognitive Business Intelligence System in 2007. The CBIS is a web-based decision-making system with situations as its input and decisions as output. When a situation is presented to the system, the decision process starts from the executive’s initial Situation awareness (SA) about the situation. The initial (SA) can be obtained in different means, e.g. business meeting. The executive’s SA is input into the system and represented as computer information objects. After the CBIS receives the executive’s SA input, it retrieves case base and mental model base which closely related to the SA. Cases and mental models are the representation of the past business management experience. Retrieved cases, mental models and SA are integrated and parsed into the information needs. The information needs are used to retrieve data warehouse for the seeking of situation data. Situation data is visualized and presented to the executive. The executive perceives information from situation representation and understand it through combing her/his past experience. The executive’s cognitive process will eventually produce updated SA richer than the initial SA input. At the end of each interaction cycle (starting from initial SA input and ending at updated SA), the executive will have deeper understanding of the current situation and is more likely to make a good decision. The interaction cycle continues if the executive resubmits her/his SA to the system for richer SA and better decision. Otherwise the executive makes the decision and the interaction loop ends. In the real settings, several factors affect whether a new interaction cycle starts, such as permitted decision time, the executive’s confidence, and stakeholders’ opinions.

With the attempt to achieve a higher degree of human-computer interaction and make computers to cognitively support humans in decision-making processes; this research does not explore the various psychographic parameters of online buyer rather it is based on past cases.

Harold M. Campbell created a business intelligence model through knowledge management in his paper “The role of organizational knowledge management strategies in the quest for business intelligence.”

There are three strategic value propositions which are included in the above model which organization may use. These are:
1) The need to manage their staff member as assets, who add meaning to information;
2) The need to set up structures that allow staff members to gather and distribute information, but most importantly to convert that information into bottom-line income;
3) The need to be in touch with, and responsive to, the needs of the customers of the organizations; they are the best, and final, arbiters of an organizations’ actions. These value propositions are encapsulated in a model for creating BI through KM. The specific objectives and themes of this paper are on four components of KM and BI, namely:
1) Innovation - finding and nurturing new ideas, bringing people together in ‘virtual’ development teams, creating forums for brainstorming and collaboration
2) Responsiveness - giving people access to the information they need, when they need it, so that they can solve customer problems more quickly, make better decisions faster, and respond more quickly to changing market conditions
3) Productivity - capturing and sharing best practices and other re-usable knowledge assets to shorten cycle times and minimize duplication of efforts
4) Competency - developing the skills and expertise of employees through on-the-job, and online training, and distance learning.

Andreas Seufert and Josef Schiefer suggested an architecture for enhanced Business Intelligence that aims to increase the value of Business Intelligence by reducing action time and interlinking business processes into decision making in the paper Enhanced Business Intelligence - Supporting Business Processes with Real-Time Business Analytics. The central piece of the Business Integration infrastructure is a Sense & Respond (S&R) system that communicates events via hubs with the internal and external business environment.

Andreas Seufert and Josef Schiefer (2009) propose a architecture for real-time analytics with the aim of reducing the action time and thereby increasing the value of Business Intelligence. The information integration infrastructure is responsible for managing the data for business intelligence purposes and offers data analysis to decision makers and to IT systems. Traditional Business Intelligence aims to support strategic decision makers and therefore uses analytical applications that are periodically fed with data from the data warehouse. These analytical applications are generally completely disconnected from operational IT systems. Decisions are executed by communicating them as a command or suggestion to humans. On the other hand, the enhanced Business Intelligence includes analytical services which are continuously fed with data from the operational environment (e.g. via the ODS) and can be directly invoked by other systems. The object of analytical services is to provide continuous data analysis that is able to also cope with current changes in the business environment.

IV. BUSINESS INTELLIGENCE, KNOWLEDGE MANAGEMENT AND DATA MINING

BI is a collection of applications and technologies of gathering, accessing, and analyzing a large amount of data for the organization to make effective business decisions (Cook and Cook, 2000; Williams and Williams, 2006). Typical BI technologies include business rule modelling, data profiling, data warehousing and online analytical processing, and Data Mining (DM) (Loshin, 2003). The central theme of BI is to fully utilize structured data to help organizations gain competitive advantages.

Knowledge Management (KM) is concerned with unstructured information (Marwick, 2001) with human subjective knowledge, not data or objective information (Davenport and Seely, 2006). DM is useful for business decision making when the problem is well defined. There is over-emphasis on “knowledge discovery” in the DM field and de-emphasis on the role of user interaction with DM technologies in developing knowledge through learning. There is a lack of attention on theories and models of DM for knowledge development in business.

The proposed “BBI Framework for Decision Support in Online Retailing in Indian Context” is an attempt to fill the limitation of traditional data mining. DM would be done based on the attitude, motivation, personality, and trust parameters suggested after empirical study. The integration of such parameters for online buying with data exploration and query makes DM relevant to BBI. The knowledge work done by theses behavioural parameters can be generally described in the perspective of unstructured decision making. BI is a collection of applications and technologies of gathering, accessing, and analyzing a large amount of data for the organization to make effective business decisions (Cook and Cook, 2000; Williams and Williams, 2006). Typical BI technologies include business rule modelling, data profiling, data warehousing and online analytical processing, and Data Mining (DM) (Loshin, 2003). The central theme of BI is to fully utilize structured data to help organizations gain competitive advantages.

Knowledge Management (KM) deals with unstructured information and tacit knowledge which BI fails to address (Marwick, 2001).

DM is useful for business decision making when the problem is well defined. There is over-emphasis on “knowledge discovery” in the DM field and de-emphasis on the role of user interaction with DM technologies in developing knowledge through learning. There is a lack of attention on theories and models of DM for knowledge development in business.

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DM is a bond between BI and KM. Owing to its strength, DM is known as a powerful BI tool for knowledge discovery (Chen and Liu, 2005). The process of DM is a KM process because it involves human knowledge (Brachman et al., 1996). This view of DM naturally connects BI with KM.

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V. CONCLUSION

A The proposed BBI framework is an attempt to overcome shortfalls of BI as it is based on the people, their behaviours, as well as the environment that influence their behaviours with respect to online buying in Indian context.

The empirical study of online buyer behaviour is an endeavour for e-retailers to improve their marketing strategies by understanding issues such as the how buyers’ motivation, attitude, personality and trust impact their decision making in online buying.

The objective of the study is to explore the impact of attitude, motivation, personality and trust towards online buying decisions and design a framework for business intelligence. Decision makers and online retailers can use the information for competitive advantage.

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