ISSN 2250-3153

Application of Fuzzy Logic for Analysis of Vague Relational Database

M.K. Mishra*, Aarthi .U, Raja soundarya.S**, Suriya.B****

* Prof., EGSPEC Nagapattinam
** ECE,CSE, EEE Department (Final Year) EGSPEC Nagapattinam

Abstract**-** The purpose of the proposed paper is that analysis of uncertainty and impression handling in fuzzy Relational Data Base by defining the fuzzy relationships between the existing database model to Fuzzy Vague Relational Database Model (FRDBMS) with the help of fuzzy membership function for analysis of the degree of uncertain information of existing data base. Some theoretical properties of the model can also be defined by the Slandered Relational Database Model (SRDBMS).

Index Terms- Crisp set, Fuzzy set, fuzzy subset, membership function, vague, attributes, set, fuzzy Relationship, data, metadata, logical adjunct, logical proximity, data security.

I. History

The present is often more meaning full when we have a better understanding of the past. Indeed many historians believe that one of the main characteristics of all the progressive civilization is their ability to produce and use of information effectively. In the Mesopotamian valley, civilization flourished as for back as 4500BC. An interesting point is that these civilizations kept fairly supplicated records on the clay tablet of various sizes well as shapes. These storage devices provided a great deal of information about receipts disbursement, loans, purchase and other transactions etc. The Egyptian was able to manage the complex pyramid building projects, because they also had advanced method of storing the data. More than 500 years ago the Inca Indians of south America developed the comprehensive information system, with data base and processing model composed the thousands of knotted strings some times called Queues i.e. quip is also called an accounting apparatus, an array of knots and different colors conveyed a combination of mnemonic, digits and narrative information the people who built these is some called **quipuamayus**. In the mid of eighteen century pressures to process and refinement of data is increased**.** The industry revaluated the basics of production from home to small shops. The development of large manufactures led to the development of service of markets and transportation of manufacturing units, the increased size and complexity of these originations made it impossible for any person to manage the above information to manage them effectively without enlisting the aid of data processing, moreover management needed more information for internal decision and more successfully running the origination.

II. Introduction

General data base were designed under a common assumption and based on the requirement with the various fields which is stored in a data base and the database is reliable. For example programmer used some numeric field then all information record in the required field, it ignore the facts with out comparing with the others, so some of the data of that field is not reliable for one user and rest of the data is reliable for others which forces the uncertainty i.e., indicate to the fuzzy approach for analysis and measuring the various applications of data and their reliability also. Form Codd introduce a Relational data base model by which he proven a useful model in information management system and applied in the wide spectrum application the inherent of the relational model is effective for precise and unambiguous data real world application, Dubois uncertainty and imprecision be the complementary aspect of imperfect information, which refers to degree of satisfactory and other trueness of data and. By the development of may be operation in the RDBMS, some researchers taken two kind of imprecise information null value and disjunctive information’s in the RDBMS, generally the null value applicable (resp inapplicable) and disjunctive information is either inclusive or disjunctive function. How-ever these uncertain information arrives from Relational Database, some researchers gives mathematical model for defining the uncertainty by using the fuzzy approach i.e., fuzzy set theory and fuzzy probability theory. In the past decades fuzzy set technique have been used for modeling of uncertain database In 1982 Buckels and Petri proposed fuzzy Relational database for representing incorrect information in the real world problems in 1984, H.T. Parade defines a fuzzy database using possible distribution over the set of attribute domains. Since 1982 significant work has been done in inculpating the uncertainty management in relational database using fuzzy set theory. Many approaches found in the literature for processing the databases.

III. Fuzzy Logic

Definition and design of Fuzzy Relational Maps (FRMs):In FCMs with the help of correlations between causal associations among concurrently active units. But in FRMs we divide the very causal associations into two disjoint units.

Definition 2.1: Let X be some set of objects, with elements noted as x. X = {x}.

Definition 2: A fuzzy set A in X is characterized by a membership function $\mu_A(x)$ which maps each point in X onto the real interval [0, 1]. As $\mu_A(x)$ =1, the "grade of membership" or true membership function of x in A increases.

Definition2.7: Data are binary Computer representation of stored logical entities.

Definition 2.8: Index files and data dictionaries, store administrative information known ads meta data.

IV. Fuzzy Control Techniques

Various therapeutic situations are related to control problems. Although the early medical systems appeared at the same time as the article by Zadeh (1965), there has been little communication between the research fields, but recently this has changed due to the developments in computer systems, and rapid development of the literature searching methods motivated by the internet. Many systems are being developed which utilize fuzzy logic and fuzzy set theory.

Definition 3.1: A fuzzy relational R on a relational schema if A_i be the set of attributes and $R(A_1,A_2,\ldots\ldots.,A_n)$ is the fuzzy sub set of the Cartesian product of Universe defined by $dom(A_1)\_dom(A_2)\_$...............$dom(A_n)$.According to the complexity of the $dom(A_i)$ the classical fuzzy relational can be classified to type1, fuzzy relational. In first type each attribute domain dom(Ai) can only crisp set or a fuzzy sub set so we can capture the impression of attributed value in a type 1 fuzzy relational allow each domain to be a crisp set, a fuzzy subset of fuzzy sets, and the second type is relation express the imprecision in the association among the attribute value.

Definition 3.2: Vague Set: Let U be the universe of discourse defined as U={u1,u2,……un} with a generic element of U denoted by ui, A Vague set is defined as a true membership function from universe to the interval defined as follows
μA:U [0,1] and a false membership function VA: U [0,1] where μ(Ai) (ui) is a lower bound on the grade of membership of ui derived by ui ,Vi(ui) is a lower bound on the negation of ui derived from the evidence against ui with μ(Ai) (ui) + VA (ui) 1 the grade of membership of ui in the Vague set A is bounded to a sub interval [μ(Ai) (ui) , 1- VA (ui)] of [0,1] . The Vague value [μ(Ai) (ui) , 1- VA (ui)] indicate the exact grade of membership ç A(ui) of ui may be unknown but bounded by [μ(Ai) (ui) çA"(ui) 1-VA(ui) with the property μ(Ai) (ui) + VA (ui) =1

General Vague Set:

Definition3.3: Let U be a nonempty set and A be a generalized set of U defined by $A=[\mu(A_i)_{(ui)}, 1- V(A)_{(ui)}]$ Where the membership function
$\mu_A:U\rightarrow [0,1]$ and false membership function $VA: U\rightarrow [0,1]$ which satisfy the condition $[\mu(A_i)_{(ui)} =1- V(A)_{(ui)}]= 0.5$ for every $u_i \in U$ $\mu(A_i)_{(ui)}$ and $V(A)_{(ui)}$ are called the degree membership and non membership (u_i) to A.

Definition3.4:A generalized Vague relation from a non empty fuzzy X to Y is a sub set of generalized Vague sub set of X x Y than relation R be the Vauge relations defined by membership function $R: X \times Y\rightarrow [0,1]$ and false membership function $VA: X \times Y\rightarrow [0,1]$ where $\mu_R:(x,y) = 1- V_R (x,y)= 0.5$ for all $(x, y) \in \{X \times Y\}$.

Generalized Vague Relational database model:

A fuzzy relational R on a relational database is an extension of fuzzy relational database model proposed by Beaubouef and Petry . In this model a tuple it takes the form $(d_{i1},d_{i2},\ldots.d_{im}, d_{i\mu},d_{iv})$ where dij be the domain is a domain value of a particular domain set D_j and $d_{i\mu},d_{iv} \in [o,1]$, the domain for truth membership values such that $d_{i\mu}\, d_{iv}$ =0.5. Let $P(D_i)$ denote any non-null value member of the power set of D_i.

Definition3.5: A generalized Vague relation R is a sub set of the set of cross proudest $P(D_1) \times P(D_2),\ldots\ldots\ldots\ldots P(D_m)_x(1 \times 1)$. A generalized V ague tuple t is any member of R if ti is some arbiter tuple and defined as follows, $ti= (d_{i1},d_{i2},\ldots.d_{im}, d_{i\mu},d_{iv})$ where $d_{ij}\, D_j$ and $d_{i\mu} ,d_{iv} \in 1$ such that $d_{i\mu}\, d_{iv} = 0.5$.

Definition3.6: An interpretation of $á= (a_i, a_i\, a_i\ldots\ldots a_m, a_\mu\, a_v)$ of a vague rough tuple $t_i= (d_{i1}, d_{i1}\, d_{i1}\, d_{i1}\ldots\ldots.. d_{i\,m}, d_{i\mu}\, d_{iv})$ is any assignment such that aj ª dij for all j. The interpretation space is the cross product $\{ (D_1 \times D_2\ldots\ldots.x\, D_m)\}\ x\{ (1 \times 1)\}$, but it is limited for a given relation, R be the set of those tuples which are valid according to the underlying semantics of R. In an ordinary relational database because domain value are atomic, there is one possible interpretation for each tuple t_i . Moreover, the interpretation of 't_i' is equivalent to the tuple t_i. In the vague rough relational database, this is not always the case.

Definition3.7: Tuples $t_i= (d_{i1}, d_{i1}\, d_{i1}\, d_{i1}\ldots\ldots.. d_{i\,m}, d_{i\mu}\, d_{iv})$ and $t_k= (d_{ik1}, d_{ik2}\, d_{ik3}\, d_{ik4}\ldots\ldots.. d_{i\,km}, d_{ik\mu}, d_{ikv})$ are the redundant if $[d_{ij}] =[d_{kj}]$ for all j=I,2,3…n. If the relation contains those tuples of a lower approximation ie. Those tuples having the truth membership value1 and false value 0 The interpretation of á operation f at tuple is unique. This follows from redundant tuples. In vague rough relation there are no redundant tuples the merging process used in relational database operations removes duplicate since duplicate are not allowed in the sets, the structure upon which the relational model is used.

V. Generalized Vague SQL

There has been some studies which was discuss the some topic of fuzzy SQL quarries in fuzzy database which only cater for true membership i.e. combination of true and false membership, now describe the VSQL as an extension of SQL,it is powerful enough and retrieve any set of items of any degree of vagueness.

Model for VSQL:

We consider the data vagueness can occur in both relations and quarry expression. Thus we develops GVSQL and allow users to formulate a wide range of vauge quarries that occur in different modes of interaction between data and the queries we classified GVSQL as follows

Crisp Data	**Generalized vauge data**
Crisp data conventional SQL	**GVSQL conventional SQL**
Crisp data GVSQL conventional SQL	**Generalized vague data GVSQL**

I.Crisp Data Conventional SQL:

The first mode concern only conventional region of SQL where data value of GVSQL are both crisp This model is same as classical relational Database model so it is downloadable version of SQL. For example the following table shows the classical version of relational in which the data are crisp and the quarry defined as follows.

Ex.1: Find the item whose price = Rs-20

Product ID	Price	Weight
1	10	50
2	20	100
3	20	150
4	50	200
5	80	350

Select*From Product where Price=Rs.-20

Thus answer is given by following table it can be classified that by the true membership function it gives the answer shown as by the following table and by applying the false membership function the data is not considered and defined by the table number 2

True Answer:

Product ID	Price	Weight	Output
3	20	100	T
4	20	150	T

False answer:

Product ID	Price	Weight	Output
1	10	50	F
4	50	200	F
5	80	350	F

2 Mode: Vague Data Conventional:- The second mode concern the scenario that the data values are vague but queries are conventional . we allow classical SQL according to the vague table to be formulated and represents by the following example i.e. vague relational database table weight and price given as follows

Product ID	Price	Weight
1	10 Light	50
2	20 Light Middle	[0.6,0.8]/100
3	20, [1,1]/20 +[0.5,0.6]/50	[0.5,0,9]/150
4	50 Middle	[0.8,0.9]/200
5	80 Heavy	[0.7,1]/350

3 The vague product relation R_2:
Find the product which are the equal to
Rs-20/- SELECT*FROM Product WHERE

Price =Rs. -20/- We first transform 20 in to the vague set [1,1]/20 and that determine the SEQ BETWEEN THE PRICE VALUES R2 (Also in the form of vague rough set)

Example:

Consider the topple of ID 4 in R_2 then by degree of similarity SEQ (t_4[Price],[1,1/20] = SEQ (middle, [1,1]/200) = 0.617 then the rank of the touple by this SEQ value is given by the following table

Product ID	Price	Weight	Rank	Output
1	20,[1,1]/ 20+[0.5, 0.6]/50	[0.5,0. 9]/150	0.967	T
2	10 Light	[1,1]/5 0	0,624	F
3	20 [light, middle]	[0.6,0. 8]/100	0.624	F
4	50 middle	[0.8,0. 9]/200	0.617	F

5	80 Heavy	[0.7,1]/ 350	0.551	F

4 ModeIII: Crisp Data VSQL:

The third mode concerns the scenario that the data values are crisp but SQL are vague it is defined by the following example

Example1:

Find the product which are "high (Max.) in Price" SELECT*FROM Product WHERE Price =high(Max.) We transform the value in to the Price value is R1 in to the vague rough set and determine the rough set SEQ high for the given table ID 2 in R1 We Obtain the SEQ (t2[Weigh]) heavy by the previous table its rank is 0.551

Product ID	Price	Weight	Output	Rank
5	80 heavy	[0.7,1]/350	T	0.551
4	50 middle	[0.8,0.9]/200	F	0.617
3	20[1,1]/20+[0.5,0.6]/50	[0.5,0.9]/150	F	0.967
2	20 [light ,middle]	[0.6,0.8]/100	F	
1	10 light	[1,1]/50	F	

Example2:

Similarly we can determine the product of heavy weight SELECT*FROM Product WHERE Price =high (Max.)

Product ID	Weight	Price	Output	Rank
5	80 heavy	[0.7,1]/350	T	1
4	50 middle	[0.8,0.9]/200	F	0.750
1	10 light	[1,1]/50	F	0.591
2	20 [light ,middle]	[0.6,0.8]/100	F	0.591
3	20[1.1]/20+[0.5,0.6]/50	[0.5,0.9]/150	F	0.578

VI. Conclusion

We try the model of imprecision vagueness and uncertainty in database through an extension of the relational model of data to the generalized vague relational database. The new model is formally defined. Finally the generalized vague relational database model is and generalized vague query language is easy to understand and to use also. In addition it is more accurate model the uncertainty of real world enterprise than do conventional database through the vague membership function and non membership values by defining the suitable condition between these values.

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Authors

First Author – Prof., EGSPEC Nagapattinam
Second Author – Aarthi .U**,** ECE,CSE,EEE Department (Final Year) EGSPEC Nagapattinam
Third Author – Raja soundarya.S**,** ECE,CSE,EEE Department (Final Year) EGSPEC Nagapattinam
Fourth Author – Suriya.B**,** ECE,CSE,EEE Department (Final Year) EGSPEC Nagapattinam