Mobile Cloud Traffic Control and Maintenance

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Abstract- As we all know that our country is second largest in terms of population just after China. And as the population is increasing the number of vehicles too are and so is the number of accidents. During high traffic on roads with no traffic police officials to manage and automation is the only way to control the traffic it is difficult to take decisions. For overcoming this problem we have sensors in all directions of a junction and based on the traffic level we allow the passage of vehicles and stop the rest of the vehicles in all the other directions. This paper also deals with the payment of entire taxes at one toll gate which allows it to pass through the other toll gates. We implement this solution using the CLOUD approach.

Index Terms- Cloud, Sensor

I. INTRODUCTION

Efficiently projecting the state of the traffic lights using the images captured by the sensors in all directions and ensuring no accidents and traffic jam is one of the main objectives of this paper. We can also keep a track of vehicles and in which direction they are heading towards. This is accomplished by maintaining sensors in all directions and capturing images which covers some portion of the road ahead. This images are sent to the server and the server analyses the traffic and manages the traffic accordingly. This paper also deals with tracing of criminals and people who break traffic rules. This can be done by sending the image captured by the sensor to the server which broadcasts the same information to all the devices connected to it. This is beneficial for the public and police as the crime can be controlled easily and more efficiently with less man power.

Another important issue dealt by this paper is payment of taxes of all the toll gates in the path leading to the destination at one point and allowing the vehicle to pass through the other toll gates using his number plate which is broadcasted to other toll gates by the first toll gate. This will save time of both drivers and toll gate authorities. He can also find resting stops near to him by connecting to social networking website and getting reviews from his/her friends. He can also send requests to the other vehicle drivers in and around him. If they accept the request then he can enquire about best and cheapest accommodations and food nearby. We use mobile cloud approach because, mobile cloud is a set of protocols that enable interoperability among distributed clients. The cloud protocols do not dictate the implementation details such as programming language or operating system. Instead, they offer a high level map to guide implementations. Cloud details the standard services without limiting the implementation possibilities for a service.

As shown in the diagram, all the sensors will be sensing the traffic load of the particular lane and a report will be generated and submitted to base station. The base station allows the passage of vehicles in a lane whose traffic is more. This base station forwards the information to the server which later broadcasts to all the base stations connected to the cloud network. This enables the other base stations to predict the traffic which will appear in near future. This kind of approach will also be useful for tracing the criminals because the images generated by sensor will be sent to the other stations which will be useful in stopping the tress passers. The sensor will identify the vehicle using the number plate of the vehicle. When an ambulance or a higher authority vehicle comes, the sensor will identify it according to the information given to it and clears the path by making the signals in the other directions red. During the night time when it will be seen that whether the traffic is less or more then accordingly the distance of the sensors will be decreased or increased from the red light via base-station.

II. RELATED WORKS

This paper includes a rapid and accurate classification-based detection technique is proposed for the Pedestrian Detection System (PDS). Experimental results on urban traffic videos show that the proposed method has a high detection speed with an acceptable detection rate and a false-alarm rate for on board detection; moreover, the training procedure is very fast. [1] In this paper a hierarchical approach to detecting various network attacks using a two-tiered system of image analysis. In a first tier, random attacks are detected by analysing the global traffic and can also discover semi-random attacks by examining the local traffic images in second tier. The proposed method can effectively detect small scale attacks like scanning attacks as well as large-scale attacks such as DDos, Worm and etc. [2] This paper presents an application of the moving target detection by focusing technique (MTDF) in civil traffic monitoring .The experimental results based on simulations show that the basic civil traffic monitoring can be solved using MTDF using a single-channel airborne SAR system. With an assumption of known moving directions of vehicles, MTDF allows detecting, estimation of speed, and finally reconstructing a SAR image of the vehicles of interest. In this study, the focusing approach of MTDF is based on ultra wideband chirp scaling (UCS) algorithm. [3] This paper presents a passive camera based pipeline for traffic light state detection, using (imperfect) vehicle localization and assuming prior knowledge of traffic light location. First, it introduces a convenient technique for mapping traffic light locations from recorded video data using tracking, back-projection, and triangulation. In order to achieve robust real-time detection results in a variety of lighting conditions, they have combine several probabilistic stages that explicitly account for the corresponding sources of sensor and data uncertainty. In

addition, their approach is the first to account for multiple lights per intersection, which yields superior results by probabilistically combining evidence from all available lights. [4] In this paper, a stochastic multiclass vehicle classification system which classifies.A vehicle (given its direct rear-side view) into one of four classes: sedan, pickup truck, SUV/minivan, and unknown is presented. A feature set of tail light and vehicle dimensions is extracted which feeds a feature selection algorithm to define a low-dimensional feature vector. The feature vector is then processed by a hybrid dynamic Bayesian network to classify each vehicle. [5] This paper presents an unsupervised abnormality detection method using a multi camera system with clustering in real time. The proposed work addresses anomaly detection by means of trajectory analysis based on single support vector machine (single-SVM) clustering. The main problem associated with vehicle tracking is the occlusion effect. They have used a hybrid scheme of scale invariant feature transform (SIFT) to detect and recognize vehicles in multi view system, so behaviour extraction is done more accurately and conveniently. The main focus of this paper is to extract traffic flows which assists in regulating traffic lights based on smart cameras. [6].

This paper presents the results of a set of extensive experiments carried out under both daytime and night time real traffic conditions. The data is captured using an enhanced or extended Floating Car Data system (xFCD) that includes a stereo vision sensor for detecting the local traffic ahead. The collected information is then used to propose a novel approach to the level-of-service (LOS) calculation. This calculation uses information from both the xFCD and the magnetic loops deployed in the infrastructure to construct a speed/occupancy hybrid plane that characterizes the traffic state of a continuous route. In the xFCD system, the detection component implies the use of previously developed monocular approaches in combination with new stereo vision algorithms that add robustness to the detection and increase the accuracy of the measurements corresponding to relative distance and speed. In addition to the stereo pair of cameras, the vehicle is equipped with a low-cost Global Positioning System (GPS) and an electronic device for controller-area-network bus interfacing. **[7]** The proposed system works by detection of vehicles in video frames acquired by cameras installed on roads and then perform accurate counting of vehicles at the same time. Dynamic background subtraction technique and morphological operations for vehicle detection have been used to achieve better detection efficiency. **[8**] In this paper, we propose a cooperative localization algorithm that combines the hybrid time of arrival (TOA) / angle of arrival (AOA) measurements of all identified line-of-sight (LOS) base station (BS) - mobile station (MS) links with the TOA measurements of MS-MS links. Different cost functions are described according to the NLOS detection results based on existing identification methods. We also present a NLOS correction model which can be carried out when the destination MS to be located is completely in NLOS propagation, whereas some BS - cooperative MS links are in LOS conditions. **[9]**In this paper, they have mainly discussed the BP neural network traffic information fusion method and procedures based on the existing research results and Beijing traffic situation. The development of traffic detection technique makes it possible for people to get the traffic flow foundation information. Information fusion technology can remove redundant, overcome the ambiguity and get more comprehensive, more accurate and more reliable information than any individual data sources**[10].**This study proposes a new approach to video-based traffic surveillance using a fuzzy hybrid information inference mechanism (FHIIM). The three major contributions of the proposed approach are background updating, vehicle detection with block-based segmentation, and vehicle tracking with error compensation. During vehicle detection, the proposed approach detects the vehicle candidates from the foreground image, and it resolves problems such as headlight effects. The tracking technique is employed to track vehicles in consecutive frames. First, the method detects edge features in congested scenes. Next, FHIIM is employed to determine the tracked vehicles. Finally, a method that compensates for error cases under congested conditions is applied to refine the tracking qualities. **[11**] To aid in the screening of vehicles, they proposed to examine traffic patterns at checkpoints using burst detection algorithms. They also found that such bursts in suspicious traffic can be attributable to increases in vehicular traffic associated with certain kinds of criminal activity. This information can be used to specifically target vehicles searches during primary screening at ports and in the surrounding areas. **[12]** Like other security solutions, this scheme employs digital signature to guarantee the identity authentication, data integrity and non repudiation.The difference to most of other existed solutions is that an evaluation mechanism is proposed, which can detect malicious nodes that drop or tamper routing data. This mechanism has been proved efficient and has better security and network performance by comparing with the hybrid signature routing scheme via NS2 simulation. **[13].**

III. PROPOSED METHODOLOGY

1-In the following figure , all the vehicles are linked with the CLOUD server and the entire traffic is controlled through the base station. Situated near by. Sensors are present on all the roads along with the cameras. The sensor distance will vary according to the traffic and following cases.

3.1 CASE-1: PEAK HOURS (Maximum Rush)

This case is considered to be as top priority as the rush is expected to be the maximum in this case because it includes office hours and school hours i.e. morning hours 8:00a.m. till 10:00a.m. and evening hours 6:30p.m. till 9:00p.m.

SOLUTION: In this we will increase the sensor node distance to control the traffic.this will be done through base station via CLOUD SERVER. The signals will be regulated on priority basis as the maximum traffic in particular lanes will be allowed to go first.

Fig 1: Peak hours

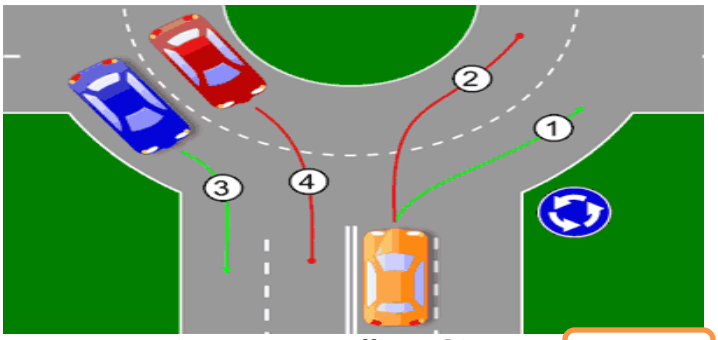


Fig 2: Sensor Traffic Architecture

3.2 CASE-2: NORMAL HOURS (Smooth Traffic)

This case is considered to be as normal one as the rush is less , so proper rules are needed to be followed by the people. In this the sensor distance is the default one. As this is the time in the afternoon hours i.e. 1:30p.m.till 4:30p.m. and morning hours 4:30a.m. till 6:30a.m.

SOLUTION: In this we don't need to make any changes as everything will be default only and will be directly controled by the CLOUD SERVER through base station.the distance of the sensor nodes are 100metres for such hours.

3.3 CASE-3: NIGHT HOURS(More Accidents)

This case is considered to be important as most of the accidents takes placer at time of night due to drunk driving or rash driving specially after 11:00p.m. till 4:00a.m.**(INCLUDING CRIME).**

SOLUTION: So to stop the accidents and the crime rate we will not only use the sensors but also police patrol jeeps will be present aftter certain distance. As soon as a person breaks the traffic rules or crosses a speed limit of 80kmph during the time of night will be caught by the police as snapshot of the car along with its number will be sent to the police via CLOUD SERVER.

3.4 CASE-4 EMERGENCY CASES OR V.I.P MOVEMENT(Police Van,V.I.P movement)

This case is considered to be of utmost importance as in this during the time of some emergency like fire break out or criminal activity etc and also like V.I.P movement for example chief minister's movement. For these cases we need a clean passage for them.

SOLUTION: In this cases an entire route map has to be provided by the police vans , ambulance, fire brigade and V.I.P's secretary to the base station before starting and immediately after receiving the information all the signals route will be made green and others will be turned red during this time using CLOUD SERVER).

Fig 3 Capturing image

Fig 4: Vehicle's stopped at lane

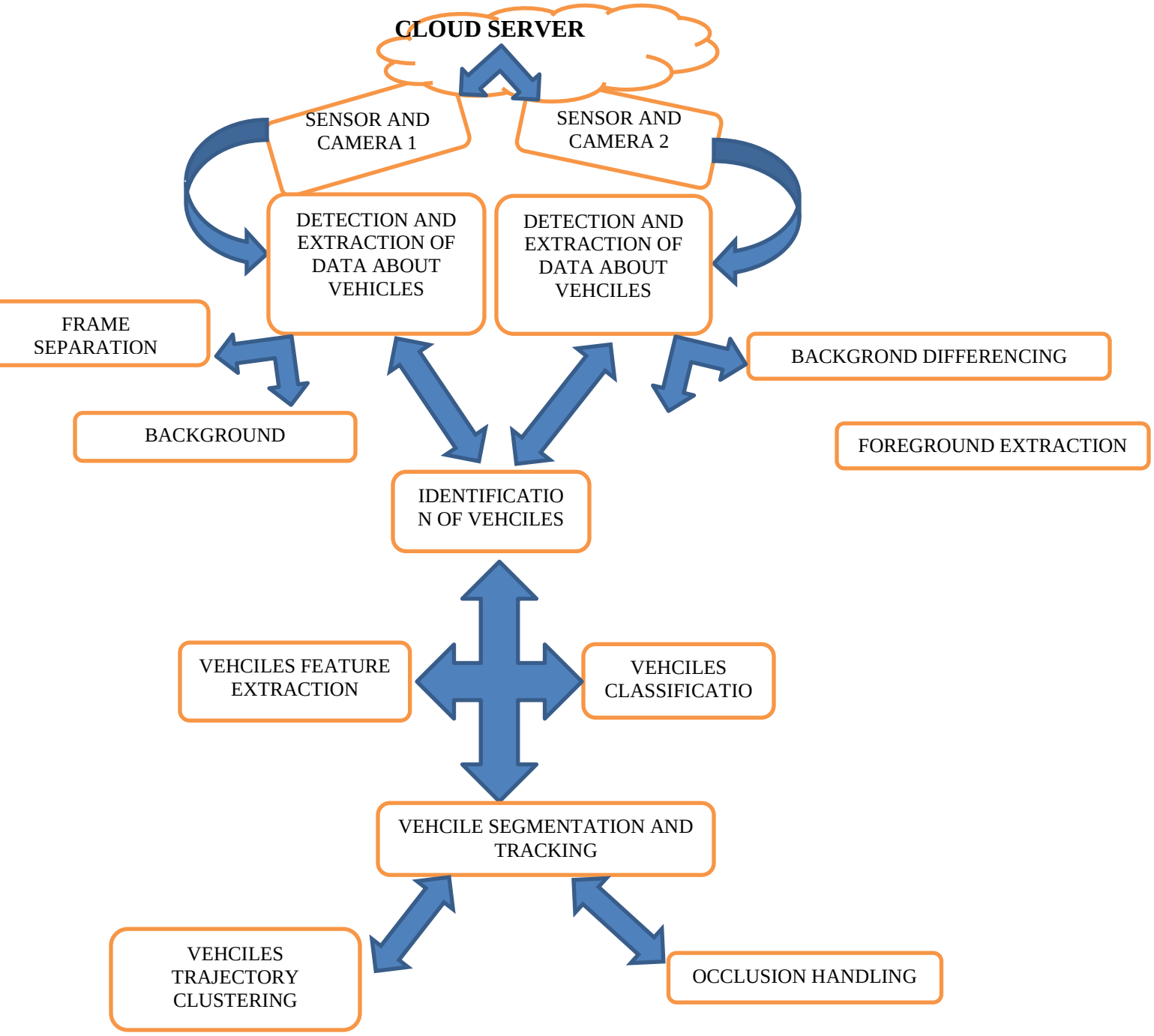


Fig 5: Process flow chart

Fig 6 : Regulation of Traffic on Priority basis

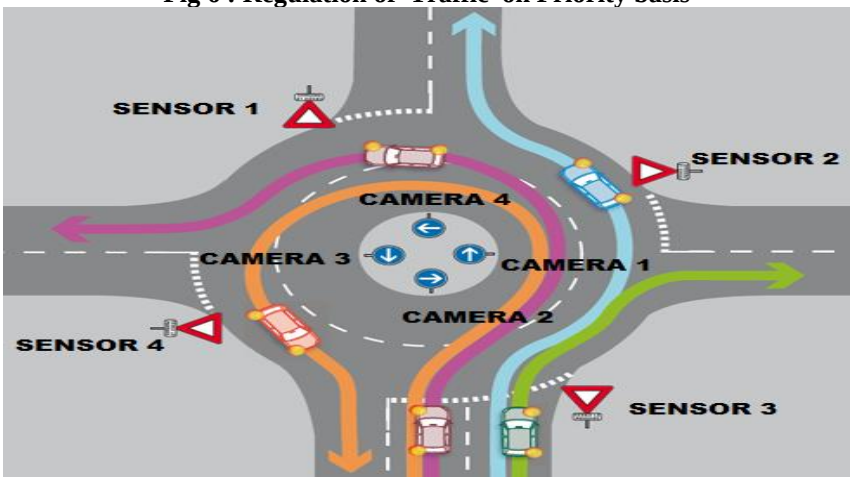


Fig- 7 Architecture for traffic detection mechanism

ROAD GRADE	**TIME(**IN HRS**)**	**SENSOR DETECTORS** (metres)	**CAMERA 1** (metres)	**CAMERA 2** (metres)	**REMARKS**
TRUNK ROAD	PEAK HOURS	100	120	80	SATISFACTORY
	NORMAL HOURS	50	80	40	MODERATE
	NIGHT HOURS	30	40	15	ACCURATE
	VIP MOVEMENT	5	15	0	ACCURATE

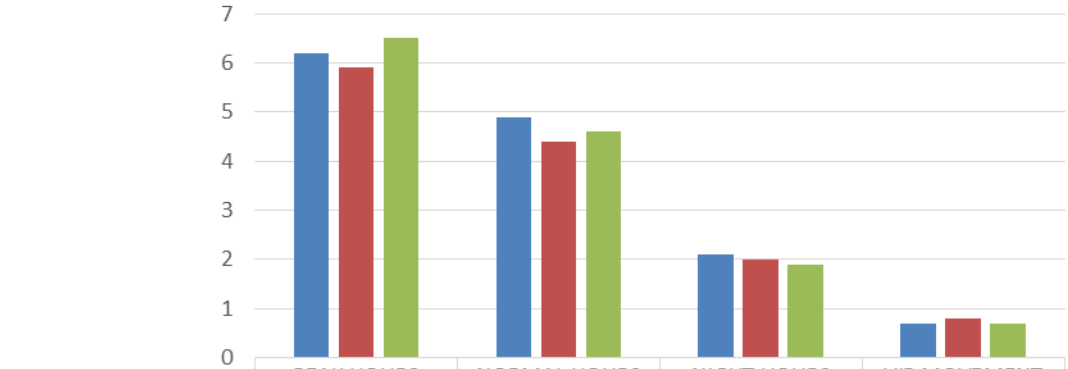
Table no. -1 :Experimental values for traffic detection

IV. EXPERIMENTAL EVALUATION

The above table represents the working mechanism of the proposed project. The above mentioned case is of a trunk road where the sensors are placed along with the cameras. The sensors and cameras are placed in such a way that during the time of peak hours the sensor will cover the area of 100metres and the camera 1 will cover up a distance of 120metres along with camera 2 that will cover up upto 80metres. As soon as the traffic reaches near about a range of (90-110)metres the , a message will be sent to the cloud base station and the trraffic will be regulated accordingly. The experiments were perfornmed for all the possible cases and the outputs were obtained accordingly

.The remarks were given based upon the experimental outcomes which proves that the proposed mechanism can serve best in controlling the traffic in every possible way.

FIG -8 GRAPHICAL REPRESENTATION OF TRAFFIC DETECTION



	PEAK HOURS	NORMAL HOURS	NIGHT HOURS	VIP MOVEMENT
SENSOR DETECTION	6.2	4.9	2.1	0.7
CAMERA DETECTION	5.9	4.4	2	0.8
EXACT TRAFFIC FLOW	6.5	4.6	1.9	0.7

SENSOR DETECTION CAMERA DETECTION EXACT TRAFFIC FLOW

The above bar graph represents the experimental outcomes of the proposed traffic detection policy in graphical form. All the possible cases have been taken into consideration for carrying out the experimental analysis. The blue bar represents the sensor detection i.e. during all the four cases, the sensor will identify the traffic along with the camera detection (orange bar) and they will regulate the traffic on priority basis. The grey bar represents the actual flow of traffic in all the cases. From the above graph it is clear that the experimental values and actual values are very close to each other. It means that the proposed mechanism can serve best for the traffic regulation.

V. RESULT

The observations recorded were carefully analysed and critically viewed by the observers.The above proposed mechanism is better than the current mechanism in India. In the current mechanism more number of traffic officials are required and still it is not working properly. Most of the police officials are busy in cutting the chalans and checking driving licences, vehcile's papers etc. whereas public is busy in breaking them , which leads to accidents and traffic jams. Current system involves lots of corruption and crime rate is also not controlled. But with this proposed mechanism all the problems can be controlled and this system can serve best to reduce the accidents and the crime rate to a great extent.

VI. CONCLUSION

The proposed solution with different cases provides efficient and easy approach for vehicle's at the signal. The sensor detection methods used are more accurate and error prone. This cloud based solution can be controlled and monitored at a single point in case of emergency situations. This system also provides solutions for different cases in every possible way, with proper traffic regulation methods. This system can help in controlling and reducing the crime rate to a great extent. The experiments were performed and the outcomes were represented in bar graph form which clearly shows its success. The proposed mechanism can ought to be improved further in future with the intelligent and much more accurate and appropriate cloud based solutions.

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