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REAL TIME ROAD TRAFFIC INTENSITY CONTROL

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Abstract:
The developing size of urban areas and expanding populace versatility have decided a quick increment in the quantity of vehicles on the streets, which has brought about numerous difficulties for street movement administration compelling voices in connection to activity blockage, mishaps and air contamination. Over the late years, analysts from both industry and the scholarly world were centering their endeavors on abusing the advances in sensing, correspondence what's more dynamic versatile advances to make the current Traffic Management Systems (TMS) more productive to adapt to the above issues in future scheming urban communities. Notwithstanding, these endeavors are still inadequate to fabricate a dependable and secure TMS that can deal with the predictable ascent of populace and vehicles in scheming urban communities. It controls the intensity of road traffic by considering certain characteristic features like traffic control, fleet control, incident management and value integrated accommodations that indulges utilization of several wireless concepts and computerized aspects in reducing the authentic time road traffic that indirectly avails in the drop down of un natural death of public especially due to the breach of traffic rules. We likewise give a careful study of the security dangers that may imperil the proficiency of the TMS and jeopardize drivers' lives. Nodal centers and action centers play key role while traffic congestion occurs, selection of optimal routes and in the maintenance of traffic management system.

Keywords: Traffic management system, nodal centers, action centers, sensors, big data

INTRODUCTION

In the developing countries like India, the originating population and the urbanization has its impact on traffic congestion. It leads to air pollution, emission of poisonous fuels and stress for the drivers therefore required measures have to be taken to reduce the negative effects of traffic congestion which has become a recurring problem globally. There are several intelligent transport mechanisms worldwide, but the decelerated infrastructure and cost effectiveness forbids the Indian commuters from putting the techniques in practice.

Traffic management is a highly focused area in the day to day life since it is a societal issue. Being stuck in traffic or start-stop driving associated with traffic congestion is one of the major reasons for increasing stress level among vehicle drivers. Rendering assistance through Nodal centers reduces the stress among the vehicle drivers. To avoid regretful issues of road traffic we ensure application of day-to-day computer technology. For active maintenance of traffic management we assure high and reliable travel and transport at all conditions, by preventing unexpected incidents and their impingement on the lives of people.

Though there are several intelligent traffic management systems there effects couldn't be used as our country doesn't follow the lane traffic so to make them applicable to the developing countries certain maintenance issues have to be focused.

The intelligent transport systems are actually a vast area i.e. interrelated among several backgrounds. To provide

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its best services we need to have an idea across various fields. Building road sensors need embedded systems background. Using mobile phones for sensing need mobile computing background. Analyzing sensed data needs signal processing or computer vision background. Communication among sensors and traffic control authorities need wired or wireless networking background. The traffic classification and prediction algorithms need machine learning or statistics background. Applications like traffic signal management need transportation engineering background.

The smart development of the day of day computer appliances can be used accordingly at various scenarios to reduce the adverse effects of traffic and provide a safe and interactive directed control to the commuters.

This project would mainly make usage of the sensors of various categories where each is specified for a different purpose. Several sensors being spread at different locations on the roads, lanes, junctions would collect the information of the current traffic. The information thus collected via sensors is then aggregated to avoid replication, considering the characteristics of data and time intervals. The collected information is stored at a warehouse for future processing and usage. The warehouse information can be handled with the concepts of big data.

Big data is a broad term for data sets so large or complex that traditional data processing applications are inadequate. Challenges include analysis, capture, carnation, search, sharing, storage, transfer, visualization, and information privacy. The term often refers simply to the use of predictive analytics or other certain advanced methods to extract value from data, and seldom to a particular size of data set.

Big data can be described by the following characteristics:
Volume – The quantity of data that is generated is very important in this context. It is the size of the data which determines the value and potential of the data under consideration and whether it can actually be considered Big Data or not. The name 'Big Data' itself contains a term which is related to size and hence the characteristic.

Variety - The next aspect of Big Data is its variety. This means that the category to which Big Data belongs to is also a very essential fact that needs to be known by the data analysts. This helps the people, who are closely analyzing the data and are associated with it, to effectively use the data to their advantage and thus upholding the importance of the Big Data.

Velocity - The term 'velocity' in the context refers to the speed of generation of data or how fast the data is generated and processed to meet the demands and the challenges which lie ahead in the path of growth and development.

Variability - This is a factor which can be a problem for those who analyse the data. This refers to the inconsistency which can be shown by the data at times, thus hampering the process of being able to handle and manage the data effectively.

Veracity - The quality of the data being captured can vary greatly. Accuracy of analysis depends on the veracity of the source data.

Complexity - Data management can become a very complex process, especially when large volumes of data come from multiple sources. These data need to be linked, connected and correlated in order to be able to grasp the information that is supposed to be conveyed by these data. This situation, is therefore, termed as the 'complexity' of Big Data.

There are several techniques used in the day to day life for detecting of various activities. Each of these activity specifications are embedded through the software and developed as a inbuilt chip and available in various convenient sizes in the form of sensors, kits etc. Among the several traffic monitoring techniques certain techniques can be specified as follows:

A. Magnetic Loops

These are special devices installed inside each traffic lane and acts as counters, by counting the vehicles passing over them. The magnetic loop is a continuous run of wire buried inside a traffic lane. The magnetic flux linked with the loop Changes whenever a metal object, such as a vehicle, is moved over the loop.

B. Camera Based Systems

These systems use dedicated video image processors, to Identify vehicles by analyzing images supplied by video Cameras, installed at specific locations on road segments.

C. Infrared Detectors

Passive infrared detectors use an energy sensitive photon Detector, located at the optical focal plane to measure the Infrared energy emitted by objects in the detector's field of View. Thus, when a vehicle enters the detection region of the Device, it produces a change in energy which is sensed by the photon detector.

D. Ultrasonic Detectors

Ultrasonic sensors use sound waves to determine the Presence or distance of an object. Ultrasonic detectors Transmit sound at 25 KHz to 50 KHz. A part of the

transmitted Energy is reflected back from the road or the vehicle to the receiver. By measuring the time taken for the sound echo to return, the distance of an object can be found. Traffic surveillance technologies provide the data for Intelligent Transportation Systems (ITS). Surveillance technologies are updated constantly to provide immediate past and real-time data of vehicle count, speed, classification and re-identification. No single surveillance system is best for all applications. Each has its own limitations, specializations, and capabilities.

The information collected via different sensors from the road is stored at a warehouse and is subjected to data cleansing techniques to collect the required information. The process of mining done at this level observes as a filter and passes the required information across various nodal centers. The nodal centers lookup the required characteristics demanded by the commuter and as per the requirement further transfers the data to the action centers where the relevant action appropriate to the event occurrence can be done.

The processing of the data deals with

1. Data sensing
2. Data storage
3. Data aggregation
4. Data mining

Here the data sensing level is collection of data across various sensors placed at different positions of the road traffic, storage of the collected information at a warehouse, avoidance of replicated copies is done using the aggregation of data. Also one needs to verify the authentication of data in case of value added services where the commuter can send the observed incident to the nodal centers for their assistance.

For ex: In case of information of the occurrence of an accident at a respective area is sent to the nodal center, it also needs to cross check the information in the data gathered at the respective sensor in its vicinity.

Once the mining techniques are applied and categorization of data is done the several actions are implemented at various nodal centers where each would collect certain relevant data with respect to a category. The various activities done are as follows:

a. Traffic Control
b. Incident management
c. Fleet control
d. Value added services

These are considered as various nodal centers and they would pass on the information to the appropriate action centers like police, ambulance, fire station, patrolling etc. To send the information across we make the usage of several access points as Wi-Fi hotspots.

Traffic control:

It deals with events like automatic management of the traffic lights to regulate the intensity of the traffic thereby provide a stress free and convenient drive for the commuters.

Figure 1:

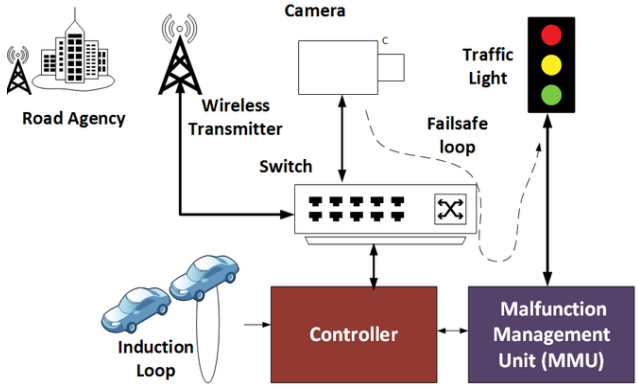

Figure 2:

Incident Management:

The incident management deals with the immediate action to be taken when unexpected scenarios occur like accidents break down of the vehicles break of traffic rules etc. This could be identified by using certain category of sensors called the acoustic sensors(they take the traffic intensity into account),Radar sensors(These are placed around the commuter vehicle would monitor the position of other vehicles especially implemented in driverless cars), Ultrasonic sensors(these sensors help in detecting the sound, if its greater than certain threshold then the occurrence of accident is possible).

With respect to the data gathered through application of these several sensors we could identify the level of abnormality in the event and take appropriate action through message passing across the hotspots available to the action centers.

Figure 3:

Figure 4:

Fleet control:

This mainly helps the public for convenient travel where the means of public transport like the arrival of city buses w.r.t various destinations, their count and their expected arrival times w.r.t the current traffic would be displayed to the public at the bus stops.

Figure 5:

Figure 6:

Value added services:

In this category the commuter assistance is given by providing him the optimal path for his travel once the specifications of source and destination are submitted. The application of Google maps provides the optimal path but here the traffic intensity is not considered.

The day to day advancement of the wireless networks introduced the concept of sensors. Day by day the drastic development of the electronics and digital sector lead to the availability of various category sensors used for various applications like house, medical, military and several monitoring activities. The sensors have now become low cost, low power, multifunctional. They are available in various sizes. These tiny sensors help us in data processing, data sensing and communicating components.

Figure 7:

Figure 8:

ARCHITECHTURE:

The architecture of this system would clearly give an idea of the overall arrangement of several modules present in this system. This would explain the layout of several techniques aligned at several levels of the project.

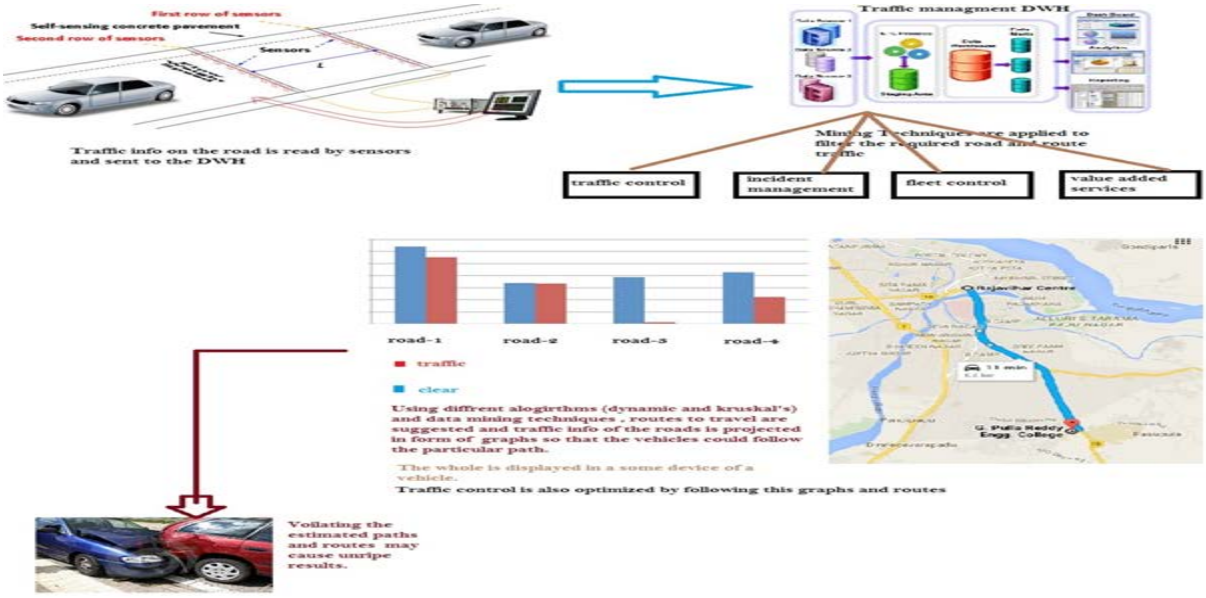

Figure 9:

The above shown architecture clearly explains the working alignment of several sectors present in the project.

The data is collected from various locations like junctions, intersection zones and this collected information is sent to a center where the information would undergo several transformations for future usage.

The collected information across by placing several sensors here and there at several locations is the collected at a storage location generally treated as a warehouse where this would contain several types of information collected from various zones at various time intervals and by using application of various category sensors like ultrasonic, geo stationary, acoustic, etc.

Further the processing of this collected information takes place ahead. As referenced earlier the Traffic management Systems is a vast area of research that is inter domain referencing.

The collected information at various time intervals and from various zones is stored at a warehouse which could be treated as our big data since this would have vast collection of information through several appliances like the sensors, cc cameras etc.

The stored information can be used not only for further processing and various management issues but also this warehouse can be used for historic data collection where this data would be used further for analytics of the traffic density over years, no of vehicles passing by a particular road, no of 4 wheelers, 2 wheelers which indirectly denote the economic background of the living population.

Thus the big data analytics can be applied on this historic data and several interesting features like the living of the economy, people's interest towards advanced vehicles, traffic intensity, and enhancement of roads can be noticed. This could be applied further as a future enhancement in the field of big data analytics.

Further to get the processed data from the warehouse and transform it across several nodal centers certain mining principles are applied. This may contain any type of mining strategy that would mainly concentrate on data cleansing activity and there by deliver a clean, relevant and efficient data for further processing.

The further processing done at this level is considered under several modules of the project whose adverse effects are regulated considering several computational techniques up to date.

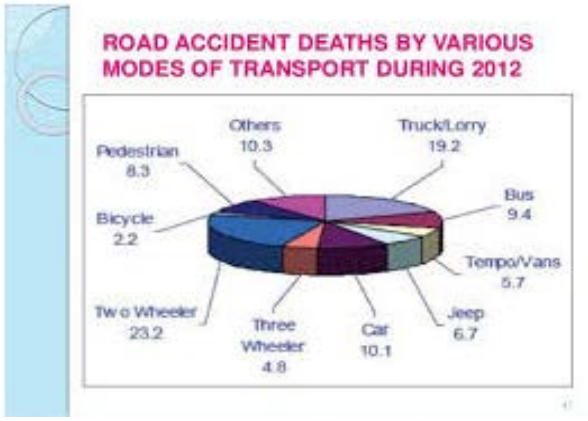

Figure 10:

MOTIVATION

The survey conducted by various news papers and public invoice revealed that nearly 70% of the deaths occurred day to day are un natural especially due to violation of the traffic rules. Thus traffic maintenance has become a issue of major concern globally. By providing proper guidelines and proper maintenance of traffic intensity the adverse effects of traffic could be reduced to a far extent. The present projects over development of smart cities require proper concentration on application of various updated technologies to provide a computerized traffic control.

OBJECTIVES

1. Traffic control
2. Incident Management
3. Fleet Control
4. Value added services

FRAMEWORK PROPOSED:

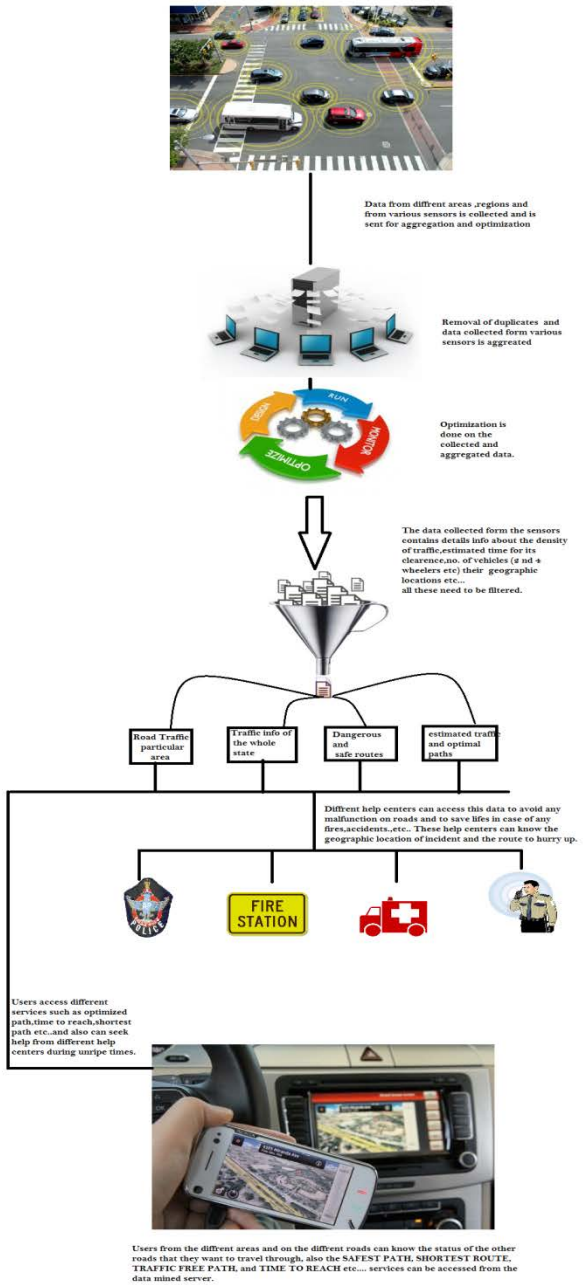

Figure 11:

CONCLUSION:

The working of this project controls the intensity of road traffic by considering certain characteristic features like traffic control, fleet control, incident management and value added services that indulges usage of several

wireless concepts and up to date computerized aspects in reducing the real time road traffic that indirectly helps in the drop down of un natural death of public especially due to the violation of traffic rules.

FUTURE ENHANCEMENTS:

This project can be enhanced in further direction concentrating on the warehouse historic data that not only saves the purpose of several activity management but on the other side serves as a base for the behavior analytics of the big data collected across several regions using various types of sensors.

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