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AN EXHAUSTIVE REVIVES APPROACH USING IOT FOR SMART TRAFFIC FLOW PREDICTION

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ABSTRACT

The cluster of vehicle density on the roads is significantly growing, making the management of traffic motion, especially in the metropolitan cities more and more complex, critical and challenging. One of the key method is to adopt for having smooth traffic flows and better mobility is to rely on 'Real-time' traffic monitoring systems. Traffic flow is predicted using RF camera by capturing images frequently, then translating to suitable compatibility and later encoded and stored in advanced ARM processors. The information which we obtained will be stored in Cloud using GPRS thus making every cloud browser to access to database server. Suitable packages for accessing to Global data base server will be dumped into algorithm kit. Knowing the information about near-by future one can smartly plan their journey and also can predict the traffic link with smallest traffic density and enables smooth mobility of vehicles using the concept of IOT.

Index terms: Cloud server, Cloud browser, Internet of Things, RF camera image capture.

INTRODUCTION

The Internet of Things (IoT) is a recent trend to meet industry standard and it is multi-disciplinary. In the latest approach of IoT user consider it is a fusion of smart, sensor enabled objects and the server networks that operate with them. Design Engineers have to cogitate many experiments from implementation of sensors chips along with microcontroller through to network connection via wireless networks that ensure objects to detect independently their environment, interconnect with former objects, and interrelate with Internet based amenities and cloud built requests.

The enlarging infrastructure of state-cities and speedy increasing population density have determined a sudden increase in the number of vehicles on the roads, due to which there are ample critical challenges for traffic management authorities in Road transportation network. As from literature survey, Company professional as well as Prototype academia striving their constant focus on leveraging the improvement in Communication, Network Sensing and Dynamic withstand technologies to build the conventional Traffic Monitoring Structure (TMS) for Road transportation system The concept of Smart-cities refers to structured control of cities using Hardware resources in association with Communication/Networking protocol to ensure smooth traffic in Metropolitan cities. As a rule of law, the aim is to find out and nurture various department of transportation, which motivates to have naval Road transportation systems based on Hard Real-time systems, i.e. Traffic Monitoring Structure(Core system) (TMS/CS) for withstanding congestion, road safety and establishing green programmes(reduced oil utilisation, various gas radiations or energy conservation). In view of this matter, efforts are under-matured to construct a trusted and secured TMS/CS to regulate the anticipated population rise and vehicle density in Metropolitan cities.

An advance TMS/CS approach works to meet some of the needs to fulfil critical demands of Road infrastructure. An expected accuracy required by the short-distance traffic analysis and Hard Real-time congestion information can be obtained. The above impact will cause building and optimising short-distance forecast information which is relevant on present traffic density and enables much detailed decisions on determining the best possible path, changing the priorities of the lane, altering traffic decision sequences, etc. An advance TMS/CS capable of providing a visual based tool that will efficiently expose in On-time traffic update information related to slow cumbersome location, road incident situation and mobility level in every portion of road, along with it will find out appraisal journey time starting with one place to other and allows maximum functionality for substantial enhancement in the traffic mobility management and better response to critical incidents on the roads.

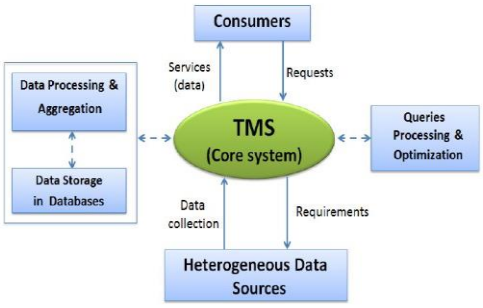

Fig1: Advance TMS/CS system

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Basic requirements of an advance TMS/CS for smart cities are:
1. The traffic condition should be very accurately estimated and to ensure optimum efficiency in order to handle emergency circumstances as compared to previous systems.
2. The system should have capacity to efficiently withstand the traffic congestion in road environment of changing dimensions and attributes.
3. The simulation of the Real-time road traffic analysis should be done and capable of visualising to suggest concerned authorities more efficiently control the road structure and provide route map for travellers.
4. It makes sure easiest and clear formation of present systems and innovative technologies, and establish control of the evolution of these systems.

In 2008, Miron Klosowski [1] proposed a system to detect traffic congestions based on the wavelet transform and suggested having a wireless network interface. SholinKyo et al. [2] used IMAP-VISION real time image processing board to detect and track vehicles in wet weather in order to reduce visibility problems on highways. Li Li et al. [3] used time spatial image and edge detection to estimate congestions in the form of a video. Glasl et al. [4] uses an adaptive boost method to predict congestions according to traffic data that previously provided about the road by counting lane changes and traffic density. There are various other informers have been used the mobile traffic cell information to detect traffic occupancy in certain areas. W. Pattara-atiko et al. [5] used Cell Dwell Time (CDT) to detect congestions, with higher CDT values indicating worse congestions. Chang Ande et al. [6] estimated traffic congestion using GPS data equipped in a floating car by calculating the link average speed which may give information about congestions on roads. Some of the methods such as the CDT and GPS methods need more infrastructures and incur higher costs than expected. Besides, images are not incorporated.
So in order to overcome all the above faced difficulties and to exploit the technologies here user presents a development of a system of management and control of traffic congestion using the concept of IOT (Internet Of Things), the role of this system is to alert decision makers at every moment of the threshold value reached by traffic congestion to take the necessary measures to resolve the problems that appear in traffic jams. One of the modules of that system presents an optimization of vision based vehicle detection and vehicle counting.

BRIEF STUDY OF OVERALL TRAFFIC MONITORING STRUCTURE

A Traffic Monitoring Structure(Core system) (TMS/CS) enables opportunities that will efficiently be used to lower the traffic occupancy, enhance reaction time to incidents, and make sure a healthy journey for travellers . As shown in Figure 2, Traffic flow management has various units and every unit plays a significant role in enhancing the monitoring and management of the traffic control flow in the metropolitan cities. The prominent phase of a TMS/CS is Data Sensing and Gathering *(DSG)* in which diversified road managing equipment measure various traffic factors (i.e road portion occupancy and speed etc.) and intermittently report these values to a central base entity. It is followed by data feeding, which are then fused and integrated in the Data Fusion, Processing and Aggregation(DFPA) phase to grab essential traffic entities. In the next phase, Data Exploitation (DE), takes this acquired information from the processed data to calculate: short term traffic forecasts, essential routes for the vehicles and other road traffic statistics. Lastly in the Service Delivery (SD) phase, the TMS/CS delivers this information to the end users (such as private companies, authorities, drivers etc.) using various devices such as smart phones, vehicles' on-board units, etc.

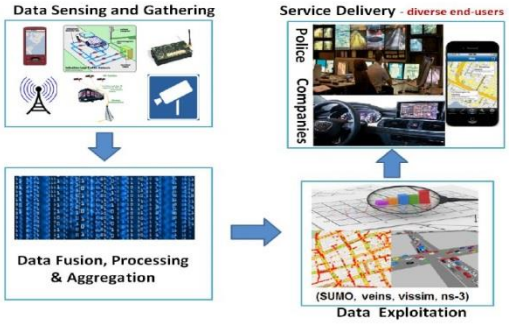

Fig.2: Traffic flow data management systems.

DESIGN AND IMPLEMENTATION METHODOLOGY

A major problem in getting traffic flow information in real time is that the vast majority of links is not equipped with traffic sensors. Another problem is that factors affecting traffic flows, such as accidents, public events, and road closures, are often unforeseen, suggesting that traffic flow forecasting is a challenging task. In this paper, user first use a dynamic traffic simulator to generate flows in all links using available traffic information, estimated demand, and historical traffic data available from links equipped with sensors. User implements an optimization

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methodology to adjust the origin-to-destination matrices driving the simulator. We then use the real-time and estimated traffic data to predict the traffic flows on each link up to 30 min ahead. The prediction algorithm is based on an autoregressive model that adapts itself to unpredictable events.

A. Existing System:

Traffic information estimation issue has been conducted in various different institutes where they focus on considering the essential factors that will lead to architect and design portion decisions. In practice, the below two parameters effectively manage a limited-term traffic information system.

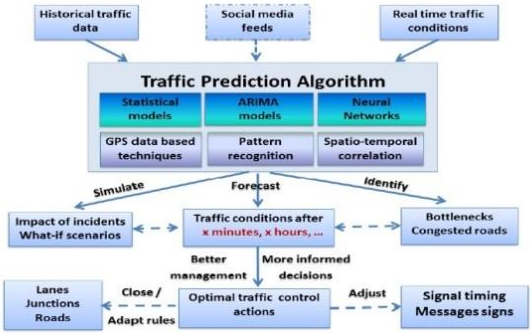

Fig.3: Conventional system

The first parameter, is its scope which will decide if the estimated model will be implemented as a Commuter Information Structure (CIS) or part of a TMS/CS and the location in which we install the system e.g. highway, urban places etc).

As a second parameter we focus on resolution of the traffic information which can be significantly depends on the appropriate forecasting sky sill and step. The sky sill subjected to the extent of extra time in which the traffic situations can be forecasted, whereas step defines the time interval upon which the prediction is made. The prediction accuracy decides the choice of the Sky sill and Step values, therefore it defines time interval of both values are required to reach exact prediction. However, considering the work done in [2], the forecasting accuracy is the reciprocal of the forecast sky sill duration. The Highway Capacity manual (2000), and few works in the literature survey, have suggested 15 min/30minas the obvious value for Sky sill. The most chosen value for Step is 5 min duration because of the high switching of the traffic data flow. Hence, depending on the application one can adjust Sky sill and Step values according to the demand for a particular application.

B. Proposed System

Traffic flow is predicted using video-surveillance camera by capturing images continuously, then converting to suitable compatibility and later encoded and stored in advanced ARM processors. The information which we obtained will be stored in Cloud using Ethernet-WAN thus making every cloud browser to access to database server. Suitable packages for accessing to Global data base server will be dumped into algorithm kit. Using the information about near-by future one can smartly plan their journey and also can predict the traffic link with smallest traffic density and enables smooth mobility of vehicles.

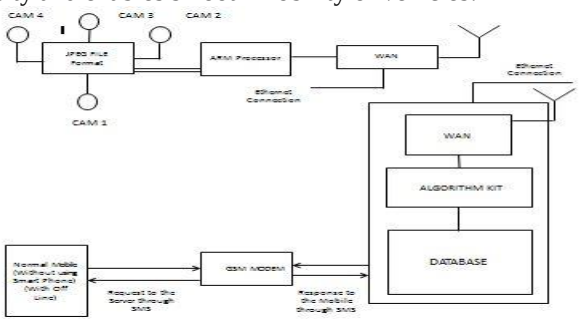

Fig.4: Proposed System

RESULTS

A. Cloud server:

In this we will store the traffic update information constantly in the cloud server by placing centralized server considering all parameters. Here we are using IR(InfraRed) sensor to count down the vehicular density. A suitable LCD may be provided to display the traffic information for Traffic forecasting and Traffic routing. Fig 5 indicates the scenario in which user can monitor and upload traffic density information in the cloud server.

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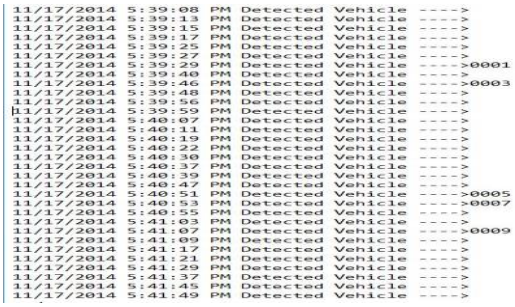

Fig.5: Data collection

B. Cloud browser:

A. This is the way through which end users i.e commuters can access to the cloud data to get traffic information and stay updated. The designed User Interface is very much user friendly and can get the information at finger tips.

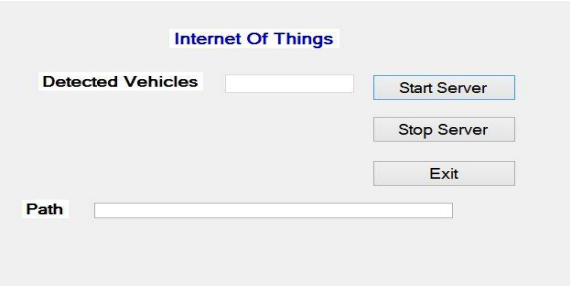

Fig.6:Data analysis

CONCLUSION

The cluster of vehicles on the roads keeps on increasing frequently, making the management of traffic flow, especially in the metropolitan cities becoming more and more complex and challenging. One of the key enablers for having smooth traffic flows and better mobility is to depend on 'Real-time' traffic monitoring systems. These systems allow Lead Engineers to implement intelligent traffic management strategies such as the dynamic adjustment of timing and phasing of traffic lights and the adaptive road congestion charging. Moreover, better informed travellers will plan smartly their journeys and hence potentially contribute in reducing traffic jams.

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