Real Time Traffic Management System using Cloud Infrastructure with Edge Clustering Mechanism

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ABSTRACT

In metropolitan cities addressing vehicular traffic management becomes very difficult due to the higher density of vehicles and the failure of sensor nodes. This encompasses to think the significance of the alternative technology for the existing one. The proposed work mainly focus on to analyse the data by setting up the data centre with the help of GIS technology which brings relationship between human generated data and machine generated data for extracting the features of them and validates traffic flow using simulation modelling techniques.

Cloud infrastructure is used to know the accurate data flow, density of vehicle, throughput time, waiting time on the cluster nodes which act as an agent and it collects the traffic information from all the platform of nodes and directs them to the base station where data can be stored in the data centre for analysis. Results will be predicted using reinforcement learning agent interaction mechanism.

KEY WORDS : Real Time Traffic, Wireless Sensor Networks, Cloud Infrastructure, Edge Clustering,Density,reinforcement learning

I.INTRODUCTION

As a comprehensive review of existing urban traffic management schemes. The main challenges associated with congestion control, average waiting time reduction, prioritizing emergency vehicles and the design requirements of intelligent traffic system are discussed to provide an insight into the goals of urban traffic management. With the large number of research activities and the excellent progress that has been made in traffic management systems in recent years, challenges for further research remains. an real research for the actual system may come up with real time traffic data, reliability and run time has to be solved for the demand in need .when it comes to intelligent cloud virtual strips can be used for the queuing technique to reduce interference. Designing a promising traffic management system to provide smooth traffic flow in non-recursive congestion situation can be an interesting issue for future research.

II.LITERATURE SURVEY

The failure rate based on reliability study has come over the last decade, the adoption and use of technologies like Mobility, Cloud and Social Platforms, has made it possible for common, middle class users to use small, focused applications for making their life easier and comfortable. Even Though we have been referring to Smart Cities and communities for some time now, let us look at how use of Information and data available to us can be used to really create some smart services, which in a true sense provide us with better living. Let us look at a key case, which impacts us, almost daily: traffic management. Use of technology and real time analysis can actually lead to a smooth traffic management.

Over the year 1996 the affordability and higher purchasing power, it has become very easy for a common person to own a vehicle. The number of cars sold last year in India was few times more than cars sold 20 years back. Also transformation and filtering has come in to play for an comfortable lifestyle, it also creates a problem in terms of road congestion and traffic pile up around our cities. So how can we use data and information easy and smooth? as present Connecting Traffic Management System (Traffic signals and Traffic Command centers) with a GIS enabled digital road map of the city and using the power of analytics is a key to smooth traffic management. Using real time analytics of data from these sources and linking them to some trends, we can manage traffic flow

much better. Imagine a car driver getting an SMS when he is driving towards the City Center, guiding him to roads which are less congested and helping to identify a parking slot.

By bringing all those scenarios agent is built for heavier interactions also Data analytics tools get data from the Traffic Management System, align this in real time with GIS mapping and parking management data provide information to the driver, thus help reducing traffic pile up. Also, information from these systems are being projected in real time on digital screens installed at City Center entrances, guiding drivers to available parking slots and streets. This not only helps reduce congestion but also saves lot on time and fuel, thus making environment cleaner and better to live. Hence, a smart living experience.

III.PROPOSED MODEL

i. Implementation of novel reinforcement learning based agent interaction by setting up the data centre to analyse and maintain data for efficient results.
ii. Implementation of modelling and simulation methods for traffic flow for the prediction of traffic system.
iii. Implementation of GPS based interaction for video surveillance and broadcast system.
iv. Implementation of traffic matrix to improve traffic monitoring.

IV.CURRENT TRENDS IN TRAFFIC MONITORING

The system takes into account the organisational change in the transport administration implemented at the beginning of 2010, the national strategy for intelligent transport, and the current challenges in terms of transport system development. Based on primary customer needs and transport problems, the strategy outlines the main anticipated impacts of traffic management services and functions in different parts of the road network. As in the previous research with the number of traffic- control agents is the experiment takes 1,130 seconds. If we set the time threshold to 600 seconds, the maximum number of intersections in one experiment is only 12. This is insufficient to handle model major urban areas such as Beijing, where the central area within the Second Ring Road intersection contains up to 119 intersections, scale of several hundreds of intersections.

Based in this challenges this research brings out the architecture, for the approach and the current implementation of an advanced Traffic Management System (TMS) can able to optimise traffic admissible speeds, signal positions and signal patterns. Contacts can be potential as possible which can be predicted in advance and solved in real-time,while managing the order of trains, or using alternative routes if possible, and by issuing proper speed recommendations to train drivers. In this way, the TMS prevents or limits the number of unplanned stops and the accompanying journey time loss.

IV.PROPOSED WORK

The research has led to a novel system in which traffic signal controllers and the behaviour of car drivers are optimized using machine- learning methods: Suppose there are a number of cars with their destination address standing before a crossing. All vehicles communicate to the traffic signal sensor with their specific place in the queue and their destination address minimize the long-term average waiting time until all vehicles have arrived at their destination address. The learning traffic signal sensor controllers solve this problem by estimating how long it would take for a car to arrive at its destination address (for which the vehicle may need to pass many different traffic lights) when currently the light would be put on green, and how long it would take if the light would be put on red. To estimate the waiting times, we use 'reinforcement learning'. We solve the traffic sensor control problem by using a distributed multi-agent system, where cooperation and coordination are done by communication, learning, and voting mechanisms.

Task 1: How Smart Analytics can reduce Traffic Congestion on a busy road

1. Sensors connected to traffic signal keep sending information to a central server on number of vehicles piling
2. Analytics platform gets real-time data from sensors, traffic signals within 2km of intended junction & GPS mapping of roads (Through ARM processor & Arduino Board Kit)
3. When a threshold is reached, analytics software send a message to traffic display 1km before the signal(GPS)
4. Motorists driving towards signal are asked to divert to another road(LED Display on Traffic Signal)
5. When number of vehicles at signal decrease below threshold, message flashed on display stops urging drivers to drive towards signal(LED Display on Traffic Signal)
6. Installing similar system across city makes all signals congestion free

Task 2: How Smart Analytics can save life on road

1. Ambulance carrying a critical patient is driving at full speed towards hospital
2. Analytics platform gets real time data from sensors, traffic signals on the way to hospital and GPS mapping of all roads leading to hospital
3. A message is sent to the ambulance display panel in front of the driver informing him which the road to take
4. All signals towards hospital are asked to be on a particular colour (Red or Green) prompting ambulance to pass through
5. A message is also sent to hospital system prompting them to be ready, including an auto message to the doctor's phone to rush back if he is out(GSM & CLOUD)

Task 3: How Smart Analytics help prevent and catch crime

1. A criminal places a suspicious bag near a road side bus stop
2. CCTV camera keeps recording all activities including this one (Video Surveillance)
3. All information from CCTV, sensors on the road, criminal database and information from Police command centre is continuously fed to analytics platform which keeps analyzing the information and takes decisions(Predictive Analysis)
4. Based on the analytics, a message is flashed to police command centre and nearest public display asking public to remain away from the site(LED Display)
5. Police squad is dispatched to site to check bag contents and take necessary action
6. Video of person placing bag is flashed across police stations by command centre

VI.FUTURE WORK

When this project is delivered to the real world, traffic congestion may low and reaches accurate point since because we use predictive system which predicts present past a future .The factors can be considered which tends to become low such timedelay,number of shortest paths, average waiting time, video surveillance**.**The research outcome promises to bring the traditional cloud model may be fine for real-time applications, but for real time transactions alternative is necessary, by doing localized hosting at the network edge can save resources such as money, systems and remove delays .Also the sensor nodes can be replaced in case of failure as a maximum speed which will be taken care by agent.

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