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Agent based Road Traffic Management in Smart Cities using Cloud Computing

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Abstract - Increased traffic congestion and the associated pollution are forcing everyone in transportation to think about rapid changes in traffic processes and procedures . The project is aimed at solving the issues regarding the urban traffic faced by both the Citizens and Traffic police. Our project is designed in such a way that Intelligent transportation management system will provide services such as decision support and a standard development environment for traffic management strategies .It provides the user ,information about his proposed path for travelling ,suggests alternate path , sends alerts to the nearby hospitals in case of any mishap and enables traffic police to observe the real-time scenario for controlling and monitoring the situations. In this we are using A* algorithm for determining the shortest distance between source to destination. To deal with this problem, the proposed system also illustrates an urban-traffic management system using cloud IaaS.

Keywords – *Smartphone-based UTMS, Parallel Message Sending Algorithm, Real-Time Video Surveillance, Cloud IaaS.*

1. Introduction

We are proposing a new approach for pro-active and demand-responsive management of traffic. At the moment, these aspects are rarely found in an integrated system that can handle both the inquiries from the end-users side (i.e., the travelers on the road) and the management level of controllers and traffic operators. By intelligently combining both, we can decrease travel resistances which leads to less congested roads and consequently a more environment-friendly surrounding. Figure 1 gives an overview of UTMS (Urban Traffic Management System) based on cloud computing. The intelligent traffic clouds can provide traffic distribution maps to the TMS, traffic-strategy performance to the traffic strategy developer, and the states of urban traffic transportation and the effect of traffic transportation decisions to the traffic managers. It could also deal with different customer requests for services like storage service for traffic strategies and data, mobile traffic-strategy agents, and so on.

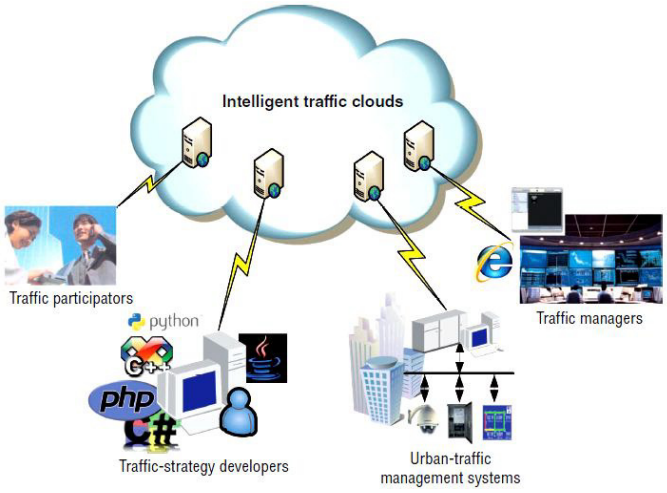

Fig 1: Environment for Road Traffic Management System.

2. Literature Survey

A real time personalized route recommendation system for self-drive tourist based on vehicle to vehicle communication. Long Liu, Jin Xu, Stehen Shaoyi Liao, Huaping Chen.L Liu al./Expert Systems with Application 41 Science Direct (2014) 3409-3417.

In this paper they developed a novel route recommendation system with real-time personal route

recommendation to self-drive tourist. It also provides vehicle to vehicle communication system and real time traffic information.

In this paper they use three main techniques. Firstly a vehicle to vehicle communication System (V2VCS), in this vehicle contains device that enabled with GPS, GIS and wireless communication modules which can directly with other V2VCS within a short distance [3].Secondly, a fuzzy set theory and the technology for order preference by similarity to ideal solution method are used to recommend route according to user's preference. Thirdly, a Genetic Algorithm is used to suggest and find appropriate route by considering all input values [3].

Urban Traffic Monitoring By Vehicular Sensor Networks.Rong Du, Cailian Chen, Bo Yang, Ning Lu, Xinping Gaun, Xuemin Shen. IEEE transaction on vehicular technology,Vol.64,NO.1,January 2015

In this paper they used vehicular sensor network for traffic monitoring in urban transportation system. For that purpose they used probe vehicles (PVs), such as taxis and buses and floating cars (FCs), such as patrol cars for surveillance which act as mobile sensor for sensing the urban traffic. For estimating the traffic, mobile sensors send the reports to traffic monitoring center, since the sensing vehicles can not cover all the roads all the time, therefore TMC needs to estimate the un sampled data traffic matrix which is formed by using sensing reports. This estimation results are published by Traffic Information Center on Internet or Traffic Message Boards in the main street and on the elevated roads [4].

Patrol Algorithm is used to reduced the estimation error. And circuit patrol algorithm and greedy patrol algorithm is used to reduced the average entropy of samples and control the movements of FCs [4].

Cloud Computing for Intelligent Transportation System. Prashant Trivedi, Kavita Deshmukh, Manish Shrivastava. International Journal of Soft Computing and Engineering (IJSCE) ISSN: 2231-2307, Volume-2, Issue-3, July 2012.

Adaptive Platforms for Transportation Systems (Adapts) was proposed as a hierarchical Urban Traffic Management System. The three layers in Adapts are organization, coordination, and execution, respectively.
The organization layer, which is the core of our system, has four functions: agent-oriented task decomposition, agent scheduling, encapsulating traffic strategy, and agent management [3].The organization layer consists of a management agent (MA), three databases (control strategy, typical traffic scenes, and traffic strategy agent), and an artificial transportation system. . As one traffic strategy has been proposed, the strategy code is saved in the traffic strategy database. Then, according to the agent's prototype, the traffic strategy will be encapsulated into a traffic strategy agent that is saved in the traffic strategy agent database. Also, the traffic strategy agent will be tested by the typical traffic scenes to review its performance. Typical traffic scenes, which are stored in a typical intersections database, can determine the performance of various agents. With the support of the three databases, the MA embodies the organization layers Intelligence [1].

A Communications-oriented Perspective on Traffic Management Systems for Smart Cities: Challenges and Innovative Approaches. Soufiene Djahel, Ronan Doolan, Gabriel-Miro Muntean and John Murphy.IEEE Transaction on intelligent transportation system Vol.13 No.3 September 2013

They have present an up to date review of the different technologies used in the different phases involved in a TMS, and discussed the potential use of social media and smart cars to enable more accurate and fast traffic congestion mitigation and detection [4].

Use of Wireless Sensor Networks (WSNs),Machine to Machine (M2M),Social media, Mobile sensing communication for traffic data sensing and gathering. In M2M communication, a sensor gathers traffic data and sends it via wireless communication/cellular/3G/LTE networks towards one or multiple central servers for processing purposes. M2M technology support different classes of QOS, thus they can efficiently collect prioritized data from multiple sources and ensure that appropriate QOS is applied to each stream. They have further used data fusion, processing and aggregation techniques for further operations [2].

Use of ICT in Smart Cities. A practical case applied to traffic management in the city of Valencia. Marta Pla-Castells, *Member*, IEEE, Juan José Martinez-Durá, J. Javier Samper-Zapater and Ramón V.Cirilo-Gimeno.IEEE transaction on intelligent transportation system Vol.12 No.4 2015

This paper uses three modules for its implementation.
Collecting information: Management systems in a Smart City need access to information about the city status in order to be able to carry out adequate decision making. This information is collected through GPS, Citizens

through various channels like mobile devices, social networks or via mobile applications.

Storage and Data Access: Having decentralized repositories of information, that hold data relevant to the area where the user is located, using standard communication protocols, enabling the development of client applications.

Dissemination of information: Once the information has been collected and processed, it should be made available to citizens. The type of information that is received can be configured by users while current technologies allow the use of not only mobile devices but also embedded systems in vehicles or new elements such as glasses or smart watches [2].

3. Objective and Aim

To adapt and respond to traffic conditions in real-time and still maintain its integrity and stability within the overall transportation system.

To help Citizens get information about the Traffic situation on the routes they are going to follow. To get the suggestion for alternate routes so that citizen can travel wherever wants to. For alerting nearby Hospitals about the accidents taken place and to provide the medical facilities to the victim. For allowing Traffic police to verify the real-time situation in the particular area.

4. Problem Statement

The problem in traffic analysis is segregating the conflicts of received updates from agent in the form of text or Image and analyzing them to verify whether the expressed opinion is correct or not through real time video surveillance. It also includes an aspect in which UTMS make sure whether the updates need special care to be taken by police or hospital facility.

5. Scope

It provides capability for monitoring and controlling the Traffic in the Cities. Using this concept we can easily get suggestions for the alternative ways to reach at the destination we wish to be at, by developing an android application. We are also providing the facility to the Traffic police to verify the real time Scenario at the place where any mishap has taken place. We are also informing hospital faculty so that the victim gets medical services on time.

6. Need

For reporting of nearby road incident people need a better and faster system. User's demand is high level of privacy, security and anonymity guarantees in order to participate in existing traffic management systems. Accurate travel time estimation should be done for improving commuters travel experience. According to recent statistics, road traffic congestion costs billions to the world economy. For instance aggregate delays of 4.8 billion hours and 1.9 billion gallons of fuel were wasted worldwide.

7. Architecture

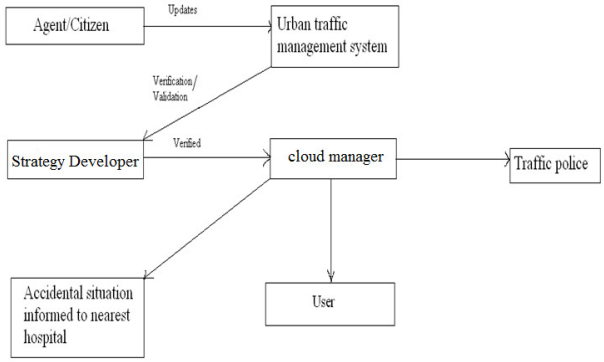

Fig 2: Traffic Management System.

Fig 2. Shows the overall architecture of UTMS i.e. Urban Traffic Management System. The Main components are

7.1 Agent

Agent can act as a citizen as well as agent. In case of receiving updates he act as citizen and in case of updating status he act as an agent. A citizen participating in the UTMS has to be register where, there phone number will be verified by an OTP method for verifying the citizen identity.

7.2 Urban Traffic Management System

It is an android app which will be used by citizen for getting the updates related to the path they want to travel. The UTMS will ask the citizen about the source and destination and suggest some alternate pat. Citizen has to select one path from the suggested paths. On the basis of selected path citizen will get the updates related to that path only. By getting Real-time traffic information the commuters can travel easily with respect to traffic.

7.3 Strategy Developer

We are considering a smart city. The cameras present in the areas will be connected to the server and from that incoming data which is in the type of images will be received per minute will then viewed by the strategy developer and he will further going to verify whether the updates sent by citizens are correct or not.

If the update is verified then they are forwarded to the cloud manager.

If the updates are unverified then they are discarded there only.

7.4 Cloud Manager

The verified updates are collected at the cloud manager. When any citizen request for a particular area's traffic information, it is the work of cloud manager to send these updates to the respective user.

In case of any update related to accident then the message will be forwarded to the hospital so that the victim gets faster treatment.

In case of heavy traffic message will be forwarded to the traffic control room to handle the traffic situation as soon as possible.

8. Existing System

Existing systems regarding Road traffic management in smart cities have some issues. This paper tries to overcome those issues. Google and some other technologies can provide the traffic related information. But it has some limitations. It can take more time to retrieve the information from all the places globally and make them available to the user [7].Therefore the real time information is tried to make available to user via the mobile application [8].Urban Transportation is the same kind of application made for user convenience.

9. Proposed System

9.1 Agent-Based Traffic Management Systems

The organization layer consists of a management agent (MA), three databases (control strategy, typical traffic scenes, and traffic strategy agent), and an artificial transportation system. As one traffic strategy has been proposed, the strategy code is saved in the traffic strategy database. Then, according to the agent's prototype, the traffic strategy will be encapsulated into a traffic strategy agent that is saved in the traffic strategy agent database. Also, the traffic strategy agent will be tested by the typical traffic scenes to review its performance. Typical traffic scenes, which are stored in a typical intersections database, can determine the performance of various agents. With the support of the three databases, the MA embodies the organization layer's intelligence.

9.2 Intelligent Traffic Module

With the development of intelligent traffic clouds, numerous traffic management systems could connect and share the clouds' infinite capability, thus saving resources. Moreover, new traffic strategies can be transformed into mobile agents so such systems can continuously improve with the development of transportation science.

9.3 Traffic-Strategy Agent Module

The more typical traffic scenes used to test a traffic-strategy agent, the more detailed the learning about the advantages and disadvantages of different traffic strategy agents will be. In this case, the initial agent-distribution map will be more accurate. To achieve this superior performance, however, testing a large amount of typical traffic scenes requires enormous computing resources. Researchers have developed many traffic strategies based on AI. Some of them such as neural networks consume a lot of computing resources for training in order to achieve satisfactory performance.

However, if a traffic strategy trains on actuator, the actuator's limited computing power and inconstant traffic scene will damage the performance of the traffic AI agent. As a result, the whole system's performance will deteriorate. If the traffic AI agent is trained before moving it to the actuator, however, it can better serve the traffic management system.

9.4 Intelligent Traffic Clouds Storage

We propose urban-traffic management systems using intelligent traffic clouds to overcome the issues we've described so far. With the support of cloud computing technologies, it will go far beyond other multi agent traffic management systems, addressing issues such as infinite system scalability, an appropriate agent management scheme, reducing the upfront investment and risk for users, and minimizing the total cost of ownership.

10. Conclusion

This paper has shown an analysis on the feasibility of deploying Smartphone-based UTMS. We have presented a model which gives correct information about the real-time traffic situations and further management for taking good care of it. We presented a comprehensive security and privacy-preserving architecture for Smartphone-based UTMS.

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References

[1] Long Liu,Jin Xu,Stephen Shaoyi Liao,Huaping Chen,"A real-time personalized route recommendation system for self-drive tourist based on vehicle to vehicle communication, " Expert System with Application 41(2014)3409-3417.

[2] Rong Du,Cailian Chen,BoYang,Ning Lu,Xinping Guan,Xuemin Shen,"Effective Urban Traffic Monitoring by Vehicular Sensor Networks,"IEEE transaction on vehicular technology,Vol.64,NO.1,January 2015.

[3] Prashant Trivedi,Manish Shrivastava, Kavita Deshmukh,"Cloud Computing for Intelligent Transportation System,"International Journal of Soft Computing and Engineering ISSN:2231-2307,Volume-2,Issue-3,July 2012 .

[4] Xi Yu,Fuquan Sun,Xu Cheng," Intelligent Urban Traffic Management Syatem Based on Cloud Computing and Internet of Things,"IEEE transaction on cloud computing,Vol.10,NO.1,January 2014.

[5] S. Kiruthik, N. Rajasekaran, "Non-contact Moving vehicle detection method based on electrostatic induction technique." , International Journal Of Scientific Research And Engineering Studies (IJSRES), Volume 1,Issue 5,Nov. 2014.

[6] Hangiang Luo, Kaishun Wu, Zhongwen Guo, Lin Gu And Lionel M.," Effective Urban Traffic Monitoring by Vehicular Sensor Networks.", IEEE Transaction On Parallel And Distributed System, Volume 23, No.7,July 2012.

[7] S. Tao, V. Manolopoulos, S. Rodriguez, and A. Rusu, "Real-time urban traffic state estimation with A-GPS mobile phones as probes," *J. Transp. Technol.*, vol. 2, no. 1, pp. 22–31, Jan. 2011.

[8] J. C. Herrera *et al.*, "Evaluation of traffic data obtained via GPS-enabledmobile phones: The Mobile Century field experiment," *Transp. Res. C,Emerg. Technol.*, vol. 18, no. 4, pp. 568–583, Aug. 2010.

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