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A Survey Of Various Algorithms In congestion Detection In Vanet

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Abstract

In Today's era traffic Congestion is of big issue everywhere in the world. So to combat with this problem many sensors and devices where designed and also many algorithms where implemented which can overcome this problem in some amount. The invention relates to the field of traffic jam discovery, and relates to a traffic jam identifying system and method. Vehicles can directly communicate with each other and with infrastructure; an entirely new paradigm for vehicle safety applications can be created. New challenges are created by high vehicle speeds and highly dynamic operating environments. New requirements, necessitated by new safety-of-life applications, include new expectations for high packet delivery rates and low packet latency. Vehicles generate and analyze large amounts of data, although typically this data is self-contained within a single vehicle. With a VANET, the prospect of awareness for the vehicle or driver drastically increases. Here we define such type of communication and data flow between vehicles and infrastructure. The survey report of previous done work is also mentioned. Here in this paper we discuss various implementations which were already done over traffic congestion detection and also we do the comparison of many of these implementation or the algorithms.

Keywords:- vanet, v2v communication, ITC, v2i communication .

1. INTRODUCTION

Traffic on road is a major problem today. Lots of hours and tons of fuel are wasted everyday by vehicles jammed in traffic. This is fact that million tons of fuel is wasted today due to increase of traffic intensity [1]. In today's Technology vehicles themselves have the ability to compile and analyze traffic data and communicate it to the drivers in a layout that will allow them to make smart decisions to avoid congested areas. Communications between vehicles can be attained either through vehicle-to-vehicle (V2V) communications and/or vehicle-to-infrastructure (V2I). Vehicular ad-hoc networks (VANET) [15] are a form of mobile ad-hoc networks (MANET) that provide communications between adjoining vehicles and nearby fixed equipment. Congestion detection algorithms are planned so that we can detect areas which are of high traffic density and low speeds. Each vehicle captures and flows information such as location and speed and route that information received from other vehicles in the network. Congestion detection is one of the many applications of VANETs and it is not designed to be used as means for automated driving but rather as a tool to deliver information to the driver that will help him/her make decisions to avoid heavy traffic [7]. Designing a traffic congestion detection system will have great influence on the budget, the surroundings and society in general allowing us to spend less time stuck in traffic and more time doing some creativity.

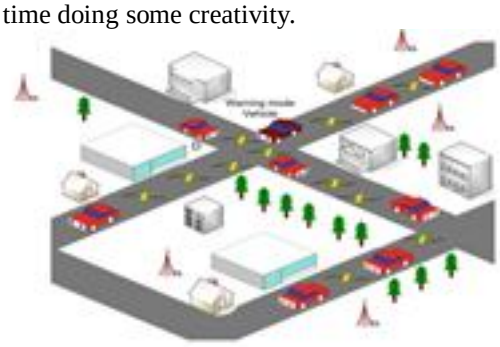

Fig 1. VANET Concept

The Vehicular Ad-hoc Network (VANET) has been studied in many fields [Figure 1] since it has the ability to provide a variety of services, such as detecting nearing collisions and providing warning signals to aware the driver. The services provided by VANET are often based on association among vehicles that are furnished with relatively simple motion sensors and GPS units. Awareness of its precise location is vibrant to every vehicle in VANET so that it can provide accurate data to its aristocrats. Currently, typical localization techniques integrate GPS receiver data and measurements of the vehicle gesture. However, when the vehicle passes through the backgrounds that create a multipath outcome, these techniques fail to produce the high localization accuracy that they attain in open surroundings. Unfortunately, vehicles often travel in environments that cause a multipath outcome, such as areas with high buildings, trees, or tunnels [1]. This research is designed to minimize the effect of multipath outcome with respect to the localization accuracy of automobiles in VANET. The planned procedure first detects whether there is a noise in the vehicle location than it will estimate that is caused by the multipath outcome using neural network procedure. It then takes benefit of the communications among the VANET vehicles in order to obtain more information from the vehicle's neighbors, such as distances from target vehicle and their location s estimates [7]. The proposed technique assimilates all these pieces of information with

the vehicle's own data and applies optimization techniques in order to minimize the location.

2. LITERATURE SURVEY

Some of the Algorithms related to congestion detection are described below:

Fukumoto et al [3] proposed a system that uses vehicle based GPS systems to discover and disseminate traffic congestion statistics, then the system is called COC for VANET. This system maintains and disseminates three types of information: Raw Information (level 1), density information (level 2) and congestion areas information (level 3). With COC, each vehicle collects original information that each vehicle has by communicating each other, and creates contents which may be convenient for drivers, by examining original statistics. COC deliver the examined contents to other vehicles. Then the result of simulation shows that COC provide timely information of vehicular accidents and congestion to drivers [2]. COC (Contents Oriented Communications) is a new real-time based communication system. COC exchanges the information that consists of own status each other and acquired by environments. COC analyzes the situation of the neighbor vehicle in present time. Additionally, COC shares the examined information among vehicles. Through this, people will recognize the vehicular accidents and congestions in real-time by using COC [2].

Fig.1 COC for VANET

If we face to some congestion, we don't know why the congestion occurs and how long the congestion is. If we use COC in this case, vehicles will exchange their information related to their own status from GPS at first. The status consists of the location, time, speed, direction, etc. Secondly, each vehicle will analyze a surrounding traffic situation from exchanged information. Finally, with that information we can prevent from the vehicular accidents and congestions by using the analyzed information. The main characterization of COC for VANET is that vehicles exchange the information like GPS (Global Positioning System), and distribute and share the analyzed traffic information. In COC for VANET, we introduce two important functions, i.e. the exchanged information type and the composition of buffers [2]. The information is exchanged, preserved and analyzed based on these two definitions. This exchanged information is defined in an application layer. In COC for VANET, vehicles exchange the information like GPS (Global Positioning System). Moreover, vehicles deal out and share the same analyzed traffic information. For example, the analyzed traffic information is the information of the vehicular accidents and congestions, or the information on emergency vehicle under approach. Donrbush et al from the University of Maryland proposed a novel system for congestion detection in VANET: Street Smart that uses clustering as a data aggregation technique to combine related recordings of unusually slow speed. Street Smart uses clustering algorithms which will work over a distributed network where each node will analyze the collected statistics and eliminate the need for a central entity. Clustering is the process in which we combine data points that are similar with each other to some extent. StreetSmart main contribution is of collecting the real time congestion information which is nearby accurate and which is quite needful for traffic information. There are several centralized approaches to collect live traffic information, among them one is street-smart. However these systems are costly enough to implement them on roads. The objective of the scheme is to create a system that could be implemented with technology generally available in cars today. Specifically the system would use the Global Positioning System (GPS) to determine current location and speed, and a wireless networking communication medium such as 801.11 A, B or G, or 802.15.[3] When vehicles travel through congested roads the traffic device will track the speed of all the vehicle. From the traffic that each vehicle experiences it builds a local traffic map. As vehicles come close to each other they exchange their speed maps with each other. Through these interactions each peer in the system is able to build a map of expected speed on every road, even those they have not visited.[3] In a VANET the nodes are highly mobile, so many of the vehicles will not be able to participate in the network. As a result of which the nodes in the network are often disconnected, and any network which does not form properly will be said as partially connected. In street-smart author developed distributed clustering algorithms that will function in that environment using an epidemic diffusion model. Street-smart is designed to address the needs of drivers. This system does not exchange information on every section of road instead it only exchanges summary information on areas of unexpected traffic. Relating with many similar works we do not expect that all drivers should agree on street Smart Traffic, it is designed to perform well only with small fraction of total drivers participating in the network. This is a noticeable difference of street smart as compared with all other proposed VANETs work. Due to the quick changes found in VANETs we cannot depend on a fully connected network. We present a distributed clustering algorithm that does not require constant connectivity. The motivation of the algorithm is every node ought to keep a compressed version or detail of each alternative nodes traffic info. This info is then expressed as a outline statistics for numerous clusters. Nodes exchange outlines statistics exploitation epidemic communication. Each

node that is taking part calculates higher level clusters from the outline statics gathered domestically and from the network. Francisco M. Padron propose a distributed, cooperative traffic jam detection and dissemination system exploitation VANET that creates economical use of the channel, maintains location privacy, and provides drivers with period of time info on traffic congestions over long distances[14]. His work focuses on the development of a system for traffic congestion detection: Vehicular Over-the-air Traffic Information Gathering (VOTING), that's capable of sensing traffic congestion areas in period of time with knowledge collected and disseminated by vehicles using V2V communications, deprived of the requirement for any external infrastructure (such as antennas, satellites, etc.), and developing the tools for interactively simulating and visualizing the behavior of this and future congestion detection systems on a myriad of scenarios. At the core of analysis is that the Vehicular Over-the-air Traffic operation system (VOTING for short). VOTING relies on a straightforward idea: decision by majority. A congestion space is created once an huge majority of vehicles probing a selected geographic area and are moving significantly slower than the utmost denote guideline. Speed limits area unit out there to the vehicle's laptop via deposit map info like that employed in today's vehicle navigation systems [14]. There are 3 major algorithms in which this work makes a major contribution:

- VOTING, a distributed congestion detection algorithm that constructs and broadcast traffic congestion material from data which is obtained directly from vehicles by forming an ad hoc network. This innovative algorithm was designed in such a way so that it doesn't require the unique vehicle IDs that may negotiation location privacy. The algorithm also provides a proficient use of the communications channel by only re-transmitting collected data and not retransmitting location data for every single vehicle.
- A simulation environment for VANETs: It is designed on top of JIST/SWANS, to permit simulations of Vehicular Ad-Hoc networks at all level.
- A Visualization and Simulation Control Module that cooperates with the simulation engine allows the researcher to notice condition of the nodes of the network in either real time or as playback of a finished simulation run. This module also allows the researcher to control the simulation "time" and change properties of either the environment or of particular nodes during a simulation run.

Vehicles transmit info each distribution interval. The broadcasting interval is mounted and equal for all taking part vehicles, however, the algorithm doesn't need that vehicle's clocks ought to be synchronized; every vehicle ought to transmit at a special time as long because the time between transmissions is much near that of alternative vehicles within the network. In alternative words, associate degree correct clock is needed; the clock from the GPS system would be a decent rival for keeping time in an exceedingly sensible implementation. The congestion detection algorithmic rule (VOTING) is enforced inside the simulator as a separate module at the application layer. By posting events at constant time intervals, every vehicle will participate within the congestion detection. The quality radio communication entities area unit wants to broadcast info from vehicle to vehicle. Here they designed a visual image tool that enables researchers to work out the strengths and weakness of a selected congestion detection algorithmic rule by showing them however the system behaves beneath a selected scenario. This is often a vital issue for the event of effective congestion detection algorithms. Having the ability to regulate the step of the simulation additionally because the simulation run, network and application parameters with immediate feedback permit the research worker to settle on the simplest strategy or to get faults.

Real-life simulation of enormous transport networks should be controlled by the visualization image tools. There should be several mechanisms or tools to see at numerous levels. The research worker should be able to either see the entire network or a sub-area of it to induce a lot of in-depth detail. Author conferred VOTING: a distributed, cooperative algorithm for traffic congestion detection exploitation VANETs that conserves driver privacy, saves information measure and doesn't need any external infrastructure however uses vehicles themselves, associate degree ample resource in today's highways, and gathers and become distributors of knowledge. we tend to conferred the effectiveness of the system in an exceedingly style of situations through the utilization of a versatile framework for simulation and visual image designed and developed to assist within the analysis of VANETs and alternative sorts of networks. The author showed how VOTING progresses upon existing traffic congestion solutions that rely on road and network infrastructure in terms of cost, ease of deployment and reliability. He also showed that how his solution addresses location privacy concerns and makes an efficient use of the network channel by transmitting accumulated data in the form of congestion sections. Additionally, they presented a flexible simulation and visualization system that extends JiST/SWANS, a powerful wireless network simulator, by providing support for VANETs and by adding visualization and interactivity, allowing researchers to visualize the simulation, control simulation time and interact with it while it is running. Table 1 shows a comparison between the most relevant related work discussed in Section 1.3 and our proposed solution [14].

Table 1. Comparison of Congestion Detection and Dissemination Systems

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	VOTING	StreetSmart	COC for VANET	NAVTEQ	Dash Navigation
Requires Vehicle ids	No	Yes	Yes	N/A	Yes
Vehicles capture and transmit information	Yes	Yes	Yes	No	Optional
Only vehicles contributing use bandwidth	Yes	Yes	No	N/A	No
Requires Human Intervention	No	No	No	Yes	No
Distributed (or centralized)	Yes	Yes	Yes	No	No
Raw location information is rebroadcasted	No	Yes	Yes	N/A	Yes
Requires Road Infrastructure	No	No	No	Yes	Yes

Some more existing traffic congestion detection methods which are mentioned in short below:

1. Coil detection methods: coil with one detector works an equivalent; however it will give a most actual speed parameters. Coil detection strategies ought to be repaired or put in distressful traffic, and is probably going to have an effect on the lifetime of the road, simply broken, and a lot of elegant than single coil.
2. Detection coil: the road vehicle through the wire deep-rooted within the coil, magnetic flux lines through the interference of the coil and generates a voltage within the coil, the voltage is amplified by the high gain electronic equipment for the detector relay to attain detection functions. However there's no directional coil detection technique, the detection space isn't clear, repair or install interrupting traffic, poignant street life, simply broken.
3. Microwave detection methods: by spreading microwave signals, vehicle radio detection and ranging reflector microwave, come back the detector relay antennas to realize detection functions. Microwave notice on strategies cannot detect a stationary or slow moving vehicle, at risk of external influences, once the selection of domain values transmitted wave inappropriate vulnerable persons or things, leading to false consciousness.
4. The video detection method: a picture pickup space of a camera close to the detection purpose, a malicious program for image process, identification, thereby police work the vehicle. Higher detection correctness by the weather and therefore the value of video detection technique notices the brightness round the space affected.

The existing traffic jam detection strategies usually solely attain mounted, indistinct traffic info detection, like info on the complete road congestion, road traffic conditions can't be achieved for the detection info.

5 CONCLUSION

Here in this paper we presented some of the work done by other researchers and how they tried to detect a congestion area through various different methods. The comparison between various algorithms in table 1 shows that how they all are different from each other and they does their detection of congestion. From the above many works we come to know that mostly the detection is done through vehicle to vehicle communication. Here vehicle send messages to different vehicles through various sensors or through different devices. Similarly they detect their congestion area but we can do it through many different ways also. From all these work we can learn that how we can implement our work by checking their faults. The work on this study shows how efficient systems that detect and disseminate traffic congestion information can help us move towards a future where the driver is empowered with real-time traffic information that enables efficient routing and produces a more efficient use of our road infrastructure.

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