Incident Based Traffic Classification Via Connected Vehicle

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Abstract : The motorists or driver are provided with opulent information travel environment with the help of connected vehicle technology. The developing size of towns and growing population mobility have decided a fast boom in the number of motors at the roads, which has resulted in lots of demanding situations for road visitors management authorities in relation to traffic congestion, accidents and air pollution. Over the latest years, researchers from each enterprise and academia were focusing their efforts on exploiting the advances in sensing, communiqué and dynamic adaptive technologies to make the prevailing traffic management systems (TMS) more efficient to deal with the above problems in smart cities .In any case, these endeavors are as yet deficient to construct a dependable and secure TMS that can deal with the predictable ascent of populace and vehicles in shrewd urban communities. In this paper, we present an exceptional survey of the various innovations utilized in the various stages included in a TMS, and examine the potential utilization of savvy vehicles and internet based life to empower quick and increasingly exact traffic congestion location and moderation. The connected vehicle solution is expected to be the next frontier for automotive revolution and the key to the evolution to next generation intelligent transportation systems. This paper focus on different data mining techniques used for decision concerning the cause of urban traffic congestion via connected vehicle technology.

IndexTerms **– Connected vehicle, Traffic Management system, Machine Learning..**

I.INTRODUCTION

Connected vehicle have critical point of interest over new advances currently showing up in the line of vehicles for example, radar, cameras and sensing equipment. The connected vehicle technology will enable you to be more cautious of unsafe circumstances a lot prior, hence it has more prominence than the on board vehicle sensing equiments.Connected vehicle innovation is likewise more affordable to introduce than radar and camera hardware in the vehicles.This will empower it to wind up standard hardware later on essentially all vehicles, not simply extravagance autos.A vehicle can recognize via its neighbor's if it's in a jam via cooperative VANET congestion detection. The communication characteristics of a VANET are mostly based on a message called BEACON, transmitted by each vehicle every 0.1 seconds. The message contains time-stamped basic vehicle state information, such as sender ID, position, direction, current speed, with optional information also possible[2].

It is important to note that the number of vehicles utilizing the limited road network foundation has seen a huge development. One noteworthy outcome of this expansion is identified with the driving issues that range from traffic blockage control to driving security and ecological effect. The effective and timely response of traffic authorities is important to save the individual's life, community security or money related circumstances like robberies or incidents[6].Furthermore, ongoing street traffic measurements uncover another amazingly genuine concern which is the expanding number of vehicle crashes.

A traffic management system(TMS) offers capacities that can possibly be utilized to decrease road traffic congestion and guarantee a superior travel involvement for commuters. The foundation period of a TMS system is Data Sensing and Gathering in which information from heterogeneous road network is observed for hardware measured traffic parameters and report the readings to the central entity[7]. In this manner, this information is gathered during the data fusion, processing, aggregation stage to extricate valuable traffic data. The following stage ,data exploitation utilizes the procured data to process to find the optimal routes and different other road measurements. In the last stage, service delivery the TMS conveys this learning to the end clients.The currently deployed technologies for road traffic surveillance still suffer from a lack of traffic parameters measurement accuracy and real-time report of events that occur on the roads.The data fusion can lead false alarm generation which lead to clash of road network. The data fusion and processing consumes lot of time and the result is not accurate.

A key innovation that is promising answer for dependable and fast traffic data monitoring and collection is Machine to Machine (M2M) communication. The data collection from various applications is fostered in field of academia and industrial researchers with M2M technology.In M2M learning, a sensor assembles traffic information and sends it by means of remote correspondence/cell/3G/LTE systems towards one or different servers for handling purposes.In addition, it is predictable that this innovation will essentially improve the precision of information accumulation and lead to greater flexibledeployment of sensors on the streets. M2M over LTE systems is relied upon to be a key part of future TMS.The M2M innovation gives a very appealing answer for information accumulation in urban regions because of its administration benefits in terms of decreased information detailing delay, high effectiveness, and low unpredictability [8].

II. Related work

The paper [1] provides various wireless connectivity's for vehicles enables the communication between vehicles and their internal and external environments. In this paper the author tells about the inter-vehicle communication, intra-vehicle communication and vehicle to internet communications (V2I), vehicle to road side units (V2R) communications and their characteristics. He compares various wireless technologies used in the transportation network in road for the automation of traffic. The author has discussed about the potential challenges in above fields and future enhancement for that. The disadvantage of this is these technologies cannot combat with the harsh environment of traffic communications. Further he tells about the various wireless technologies existing and as an improvement for that V2X connectivity which is low cost, about latency and reliability of

monitoring purposes and vehicle information system must be designed to deliver appropriate information to drivers. In paper[3] then author does a survey of various traffic management systems(TMS) existing to control the increasing number of vehicles in urban areas .In this paper the author has survey various traffic data sensing and gathering, data fusion, processing and aggregation techniques, existing TMS services. The paper also compares the accuracy, scalability level, application environment, data source constraints, data source of ARIMA neural networks, statistical models, GPS data based techniques. This also discuss about the vehicular wireless network used for traffic management system and various security threats against the system. Hence the paper has a vision in improving the various TMS systems and their robustness which help in predicting traffic jams and measures can be taken accordingly. The paper [5] focus on the vehicular adhoc networks for communication between vehicles. In particular the events caused due to Non recurrent like incidents, work zone, accidents, special events are considered. The feature extraction based on NRC component which includes the trajectory travel time, speed, gap, travel time is done and compared with the exiting travel time. The naïve based classifier is used for the prediction model of traffic, the classifier assumes that the features are mutually independent .Later the Cooperative Process is done which prevents false positive non recurrent congestion .The simulation is done using the TAPAS cologne scenario dataset. As a result the system gives robust classification method for the non recurrent congestion using vehicular ad hoc networks (Vanet) the weka machine learning software is used for data analysis

III. System Implementation

In this paper the dataset obtained with the help of co-operative communication between vehicles. The data obtained, that is the causes of congestion which can be due to recurrent and non- recurrent events like weather, work zones, special events, and incidents are loaded to system. The next stages are preprocessing, feature extraction and prediction. The input that is the probabilities of the incidents is given and classified using different algorithms. The accuracy of classifying algorithms are compared.

1. Load the data set and Preprocess

The dataset includes the Car-ID's that vote for the highest probability of the cause of the traffic congestion. The causes are weather conditions, work-zone, special event, accidents, recurrent events. Preprocessing is done where the events are assigned the class for the feature extraction.

2. Feature extraction

The feature extraction is mainly done based on statistical features, graph based features,time series based features .In this paper the statistical information obtained from the traffic network is considered which are the probabilities of traffic congestion which includes non-recurrent events like weather, special-events, work zones, accidents and recurrent events .

3. Classification module

The traffic data classification is done using the bagging and the boosting classifiers and the regression of data is done using the logistic regression. The bagging classifiers is used to vote the cause of congestion called voting procedure and the booting classifiers provide knowledge to the system which is called belief functions. The logistic regression is also used to predict the car id which vote for the particular incident which cause the congestion

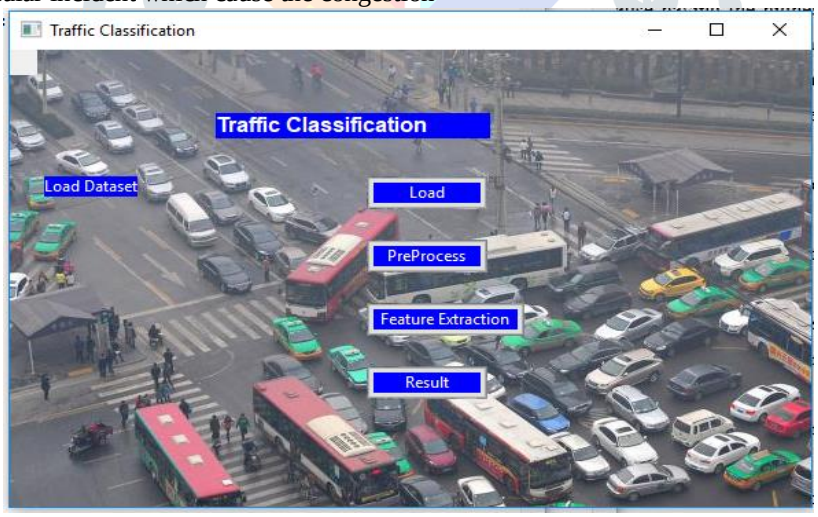

Fig 1.GUI for traffic prediction

IV. RESULTS AND DISCUSSION

The accuracy of the classifiers is given using graphical representation.

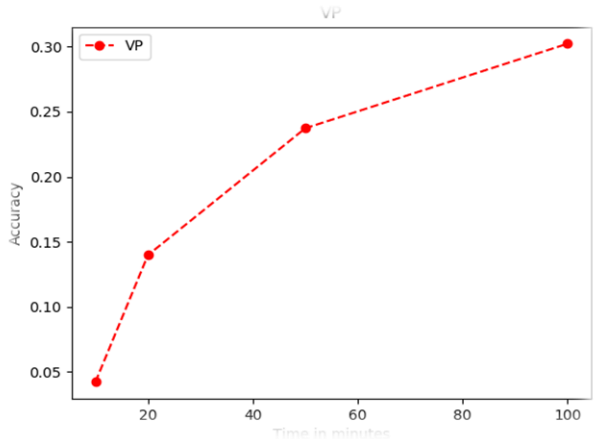

Fig 2.Voting procedure accuracy

In fig 2 the bagging classifier is used for voting procedure prediction, it is found more accurate than the belief functions.

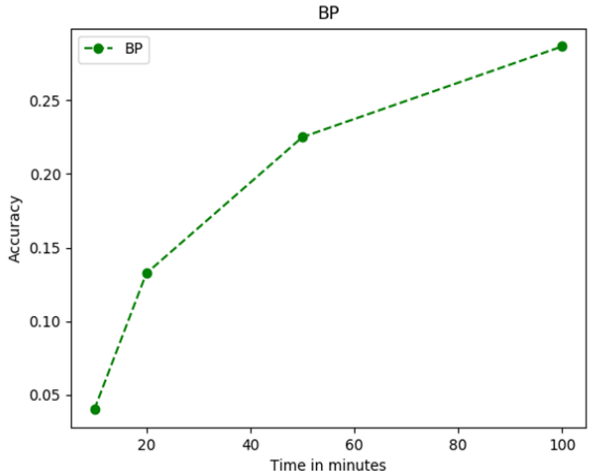

Fig 3.Accuracy graph of belief function

The belief function computed with the help of boosting classifier, from the fig 3 it is understood that the VP outperforms BF.

IV. Conclusion

The prediction of traffic in the distributed environment of urban areas is difficult as it is a heterogeneous environment. With the evolution of intelligent transportation system using the co -operative communication of vehicles the system has become more flexible. In this paper the predictive accuracy of the causes of traffic congestion is compared using bagging and boosting classifiers. The regression method is also implied on the data set to predict the car id's and its corresponding incident for the cause of congestion.

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