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Intelligent Transportation Mechanisms Used for Predicting on Road Traffic

Rohit Jangral[1*], Sandeep Sharma[2]

[1,2]Dept. of Computer Engineering and Technology, Guru Nanak Dev University, Amritsar, India

Corresponding author: rohitjangral16@gmail.com

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Abstract: The road traffic causes worst condition and severe side effects. These affects can be reduced in case density of traffic can be predicted in advance. The number of vehicles is growing as the population growth so the traffic management systems are required that handles traffic. Today traffic becomes very big issues in the world that leads to increased accidents and pollution. Towards this aspect intelligent transportation system is worked upon by many researchers. This work analysed a previous work that has been done towards the intelligent transportation system. The merits and demerits of various techniques also highlighted through this approach. Literature survey is presented interactively in the comparative form for best possible approach selection for future enhancement. Parametric comparison includes metrics classification accuracy, error rate , true positive rate , false positive rate and sensitivity.

Keywords: Intelligent transportation system, traffic, metric

I. INTRODUCTION

Intelligent transportation system is required in order to tackle the traffic at distinct locations within different part of the worlds. Internet of Things includes sensors that could be employed on road to note the traffic at particular interval of time. The implication of future predictions could be many. Some of the merits of early prediction of traffic include:

- Early prediction could leads to less chance of accidents.
- Least time consumption to reach towards destination.
- Emergency situations like ambulance can be handled efficiently with early prediction.
- Rerouting can be accomplished well within time by the application of traffic prediction.

In addition of the above, traffic problem could also leads to the pollution. This situation of pollution in current environment can be efficiently handled using the intelligent transportation system. The transportation system using internet of things includes sensors. Next section presents the comparison of existing techniques used to predict traffic in large networks for handling emergency situations.

The structure of the intelligent transportation system is given through the following diagram

Figure 1: Structure of intelligent transportation system

The vehicles requires for transportation in this case contains sensors. In addition road sides also contain sensors. These sensors emit display their current location. The simulation used adds the total vehicles at current location. Threshold values maintain if exceed for the current location shows overflow and rerouting is required in that case. Traffic monitoring unit considered gateways that are used to establish connection with the remote servers. There exists a traffic controller that is used to communicate the information extracted from the senor to the remote servers. The features extracted are compared with threshold values. In case threshold values are violated than emergency situation is predicted.

The structure for traffic prediction in general follows the architecture as under:

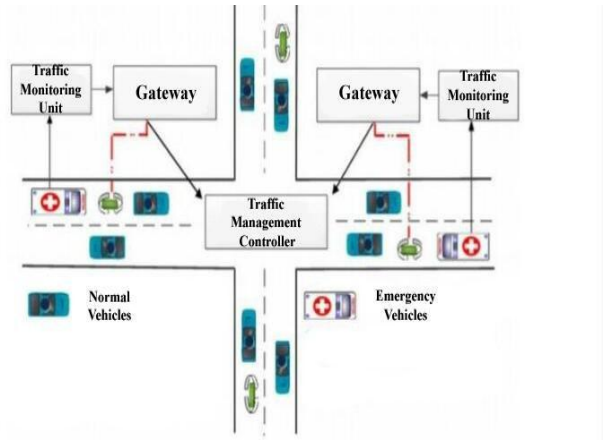

Figure 2: Traffic Architecture System using gateways

Next section presents literature survey of existing techniques used to predict traffic. Section 3 presents the parametric comparison of various techniques. Section 4 gives the problem definition. Section 5 gives conclusion and future scope, section 6 gives the references

II. LITERATURE SURVEY

This section describes the work which is already being towards the early prediction of traffic. This will help in rerouting and handling emergency situations like rerouting ambulance.

[1] Proposed fuzzy ontology based sentiment analysis mechanism for safe travelling. This mechanism checks for the state of the driver driving the vehicle. This leads to least chances of accident and also reroute the driver towards the nearest hospital. The classification accuracy is high in this case.

[2] Discussed the latest trends followed in the intelligent transportation system. The early transportation system follows optimization strategy such as genetic algorithm. The convergence of such algorithms is poor and requires faster convergence. The merits and demerits of optimization strategies are also discussed comprehensively through the discussed techniques.

[3] Proposed a mechanism using data mining to handle transportation problems. Dataset is collected from Ski resort lift website. The transportation mechanism handles this data and proposed a efficient mechanism of optimisation to predict the traffic in advance for rerouting.

[4] Proposed a survey of mechanism that are utilized to handle transportation system in smarter ways. It shows that non parametric techniques are computationally expensive and also they are not feasible for real time prediction.

[5] Proposed a technique that is spatial characteristic based and takes distance to gives prediction about real time traffic. It reduces the number of parameters to estimate the speed of vehicles and also includes the incorporating weather, incident data for forecasting traffic. It is efficient method that gives better accuracy for prediction in real time environment.

[6] Proposed a cloud and IOT based mechanism that is utilized for traffic management in urban system. It provides calculation of modelling components for monitoring and gives better accuracy. The calculation done is fast for the monitoring of data from cloud computing and provide intelligent system for management of urban traffic.

[7] Proposed ontology based fuzzy system that utilizes city features and transportation for prediction of traffic. It gives automatically the instruction to driver after analysing the data collected and save time. It preserves location privacy and accuracy is maintained.

[8] Proposed modified KNN non parametric regression method that is used for predicting traffic. The results indicates that it enhance accuracy in traffic flow forecasting and also provides better information about traffic. It shows that relationship between input and output so that time consuming adjustment is not required.

[9] Confinement in sensor organize is considered for this situation. Limitation will rely on the separation. In the event that the separation is high than the confinement is hard to be performed generally limitation is moderately simple to be performed. So as to take care of the issues of the range based calculation extend free calculation is utilized. The range based calculation can't be operational if the separation between the hubs turn out to be high. The range free calculation does not think about the separation and henceforth perform better if there should be an occurrence of high separation between the sensor hubs.

[10] In the recommended system run free calculation is considered. For this situation the course data is inferred based on range free calculation. The range free calculation is autonomous of the separation. Additionally the expense related with the calculation is low. Progressively significant portrayal of the related work is exhibited as far as the accompanying:

[11] The related work portrays the work which is as of now done in the territory of separation vector steering. Out there vector steering every switch know the location of the following hub in grouping. In the recommended paper the exactness of range based calculation is dissected. The range based calculation is range or separation subordinate. At the

point when the separation is high then the precision of the calculation will begin to rot. The separation ought to be less if there should be an occurrence of the range based calculation. The idea of agreeable limitation will be utilized for this situation.

[12] Restriction in sensor organize is considered for this situation. Confinement will rely on the separation. In the event that the separation is high than the restriction is hard to be performed generally limitation is moderately simple to be performed. So as to take care of the issues of the range based calculation go free calculation is utilized. The range based calculation can't be operational if the separation between the hubs turn out to be high. The range free calculation does not think about the separation and subsequently perform better if there should be an occurrence of high separation between the sensor hubs.

[13] In the recommended strategy extend free calculation is considered. For this situation the course data is determined based on range free calculation. The range free calculation is autonomous of the separation. Likewise the expense related with the cal culation is low.

[14] The idea of the security is considered for this situation. The WSN when interacts with the quantity of various sorts of clients the security of the WSN is yielded. The different security issues and there corrections are considered for this situation. The pernicious hubs are dealt with for this situation.

[15] In the suggested technique range free algorithm is considered. In this case the course information is derived on the basis of range free algorithm. The range free algorithm is independent of the distance. Also the cost associated with the algorithm is low.

[16] The idea of the security is considered for this situation. The WSN when interacts with the quantity of various kinds of clients the security of the WSN is yielded. The different security issues and there amendments are considered for this situation. The malevolent hubs are taken care of for this situation. (Yang 2014) The omnipresent idea of WSN applications and their entrance to secret data, either detected specifically or picked up from their surroundings, makes them alluring focuses for corrupt people to subvert, trying to access the WSNs as well as disturb the collaborations of clients with both the systems and along these lines with their condition.

The literature survey discussed the problems initiated through the traffic management system and techniques that are researched over by researchers to overcome the classification accuracy. Next section presents the comparative analysis of parameters used within various literatures.

III. III. PARAMETERIC COMPARISON OF TECHNQIUES USED FOR TRAFFIC PREDICTION

Parameters that are most crucial in traffic prediction are considered for comparison in table 1. Below.
After the comparative analysis from the table it has been observed that classification accuracy is an issue that can be handled using clustering mechanism within the existing dataset mechanism. In addition, missing values can be removed or replaced with the relevant values to improve the classification accuracy.

IV. GAPS DISCOVERED IN EXISTING SYSTEM

In the existing literature it is observed that classification accuracy is at stake in case indifferent dataset with missing values is presented to the road traffic prediction mechanism. Optimization mechanisms are also not employed in order to minimise the false alarm rate. Error rate can be subsequently be reduced in case iterative approach is applied in place of direct approach. To accomplish this existing mechanism can be accommodated with the genetic approach but convergence rate of genetic approach is poor. So multilayer perceptron(MLP) can be hybridised with genetic approach to minimise the error rate within traffic prediction mechanism.

V. CONCLUSION AND FUTURE SCOPE

This work present the in-depth analysis of various techniques used to predict on road traffic. This prediction can lead to severe consequence in case classification accuracy is poor. The techniques involving ARIMA and SARIMA can be used for automatic prediction from large datasets. The problem of classification accuracy is not handled efficiently in existing literature since missing data can cause indifferent results and critical times. To resolve the problem optimization mechanism must be accommodated along with the existing system such as MLP.
The parameters that can be improved for future work includes classification accuracy, specificity, sensitivity and mean absolute error.

Table 1: Comparative study of parameters used within the existing literature

Parameter	Evaluation equation	Technique	Merit	Demerit
Classification accuracy	$\|x - x_a\|$ where x is actual value and x_a is	[17] Short term traffic prediction using	This model predict traffic with the	Large dataset shows deviation in result

	the approximate value	ARIMA	classification accuracy of 80-90%	
Mean absolute percentage error	$\frac{\lvert x-x_a \rvert}{x} * 100$ where x is actual value and x_a is the approximate value	[18] [19]Tree family data mining	MAPE value is reduced by 10-20%	Large dataset cannot be handled appropriately
Specificity	TP/(TP+FN) where TP means true positive rate and FN means false negative rate	[20]Tweet semantics	Specificity is improved by the margin of 0.25%	Classification accuracy can be improved further by handling the missing data if any within the dataset
Sensitivity	TN/N where TN is the true negative values and N is the negative result rate	[14]STARIMA	Sensitivity is handled efficiently using auto regression model	Classification accuracy can be improved using missing data handling mechanism

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