Predicting Traffic for Intelligent Transport System Using Machine Learning Algorithms

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Abstract*— The goal of this paper is to create a tool that can estimate traffic flow accurately and on schedule. Information. Everything that can generate a traffic jam on the road is considered part of the traffic environment, including traffic lights, accidents, rallies, and even road repairs. If we already know something, This is pretty close to all of the above and many other things. There are numerous everyday life situations that might impact traffic, thus a driver should be aware of them. Alternatively, the rider can make an educated choice. It's also beneficial in terms of Self-driving cars' future Traffic data has become more important in recent decades. have been growing at a rapid rate, and we've progressed to Transportation-related big data concepts Predictions available. Some traffic prediction models and methodologies are used for traffic flow are still unsuitable for dealing with real-life situations applications. this fact motivated us to work on a solution to the traffic flow forecasting challenge data and models on traffic forecasting is time-consuming because the data for transportation is available the flow will be precise the system is enormous we intended to employ a machine in this project algorithms for learning genetics soft computing and deep learning to use big data to analyse the transportation system complexity has been greatly decreased algorithms for image processing are also being developed engaged in the recognition of traffic signs which eventually aids in the proper training for self-driving vehicles.

Indexed Terms*— Traffic Environment, Deep Learning, Machine Learning, Genetic Algorithms, Soft Computing, Big Data, Image Processing.

I. INTRODUCTION

Various Business sectors and government agencies and individual travellers require precise and appropriately traffic flow information. It helps the riders and drivers to create better travel judgement to alleviate tie up, improve traffic operation efficiency, and reduce carbon emissions. the event and deployment of Intelligent installation (ITSs) provide better accuracy for Traffic flow prediction. it's accommodated as an important element for the success of advanced traffic management systems, advanced public transportation systems, and traveller information systems.

[1]. Real-time traffic and historical data collected from various sensor sources, including as inductive loops, radars, cameras, mobile Global Positioning System, crowd sourcing, and social media, are used to determine traffic flow dependency. Traffic data is exploding because of the vast use of traditional sensors and new technologies, and that we have entered the time of an outsized volume of information transportation. Transportation management and control are becoming increasingly data-driven. [2], [3]. However, there are already many traffic flow prediction systems and models; most of them use shallow traffic models and are still somewhat failing thanks to the big dataset dimension. Recently, deep learning concepts attract many persons in volving academicians and industrialist because of their ability to cope with classification problems, understanding of natural language, dimensionality reduction, detection of objects, motion modelling. DL uses multi-layer concepts of neural networks to mining the inherent properties in data from rock bottom level to the best level. they'll identify massive volumes of structure within the data, which eventually helps us to visualise and make meaningful inferences from the information. Most of the ITS departments and researches during this area also are concerned about developing an autonomous vehicle, which might make transportation systems much economical and reduce the danger of lives. Also, saving time is that the integrative good thing about this concept. In current decades the many attentions have made towards the safe automatic

driving. it's necessary that the knowledge is provided in time through driver assistance system (DAS), autonomous vehicles (AV)and Traffic Sign Recognition (TSR). Although already many algorithms are developed for predicting the traffic flow information. But these algorithms don't seem to be accurate since Traffic Flow involves data having an enormous dimension, so it's not very easy to predict accurate traffic flow information with less complexity. We will use Genetic, Deep Learning, Image Processing, Machine Learning and also Soft Computing algorithms for prediction of traffic flow since plenty of journals and research paper suggests that they work well when it involves Big-Data.

II. METHODOLOGY

To improve the safety and efficiency of road transportation systems the Intelligent Transportation system (ITS) has used computer electronics and communication technologies to deliver traveller information the biggest benefit of ITS is to ensure that road transit runs smoothly and safely reducing carbon emissions is also beneficial from an environmental standpoint it gives the automotive or vehicle sectors a lot of opportunity to improve their passengers safety and security traffic grows regardless of the number of vehicles on the route and the capacity of the existing road network is insufficient to manage such a large load this problem can be solved in two ways the first is to construct new roads and highway lanes to ensure that vehicles can operate smoothly it necessitates additional acreage as well as considerable infrastructure for maintenance resulting in a high cost of expenditure in some cases such as in the city many difficulties entered the network this piece of property is not suitable for road and lane expansion the second strategy makes efficient use of the existing road network by employing some control measures the expenditure is also reduced by applying these control measures. The government or traffic managers can save money by employing these control measures, and they are cost-effective models. In this control, strategies predict potential traffic congestion on the roads, and travellers are directed to take alternate routes to their destinations. [4]

Machine learning methods include deep learning, which is a powerful tool for dealing with massive amounts of data.

With complex radio data and large-scale topology, DL provides a means for adding intelligencies to wireless networks. Use neural network concepts in DL to detect network dynamics (such as spectrum availability, congestion points, hotspots, and traffic bottlenecks) with this function. [5]

The journey time is a critical part of ITS, and accurate travel time forecasting is also a difficult task for ITS development. Among the linear classifiers, the Support Vector Machine (SVM) is one of the most effective. It is advantageous to avoid data overfitting. SVM works well with tiny data sets that have fewer outliers. Another approach (Random Forest, Deep Neural Network, and so on) required more data but always produced extremely reliable models. Instead of trying to fit the most significant feasible roads between two classes while restricting margin violation, SVM supports linear and nonlinear regression, which we can refer to as support vector regression. SVR (Support Vector Regression) seeks to fit as many examples on the route as feasible while limiting margin violations.

Java, python and sklearn library are utilized to achieve the paper's goal. The program was designed with a minimal number of buttons so that user can navigate through it with ease. Also the user interface has been kept simple so that the web application can load quickly and without causing any issues for the user.

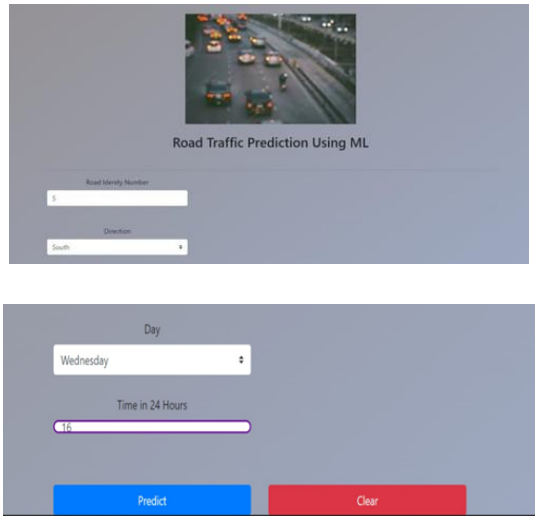

Figure I &II: Page Layout

III. ALGORITHMS

A. Decision Tree

We employed and tested different machine algorithms for achieving higher efficiency and accurate results. To identify classification and regression we have used a Decision Tree Algorithm (DT) in our model. Based on the parameters supplied, it's a graphical depiction of all possible solutions to a problem/decision.

B. Support Vector Machine

The SVM method was used to solve the problem. The SVM approach can help you find the best decision boundary, or hyperplane. SVM is used to find support vectors from various classes. When the number of features in the data set is enormous in comparison to the number of data points, we use SVM, a two class classifier. [6]

C. Random Forest

Random forest is a multi-class problem solver that can handle both numerical and categorical data. Random Forest is a classifier that classifies distinct subsets of a dataset using a number of decision trees. The random forest accumulates and anticipates data from each tree, then predicts the ultimate output based on the majority of votes, rather than relying on a single decision tree. [7]

D. Logistic Regression

Logistic regression is a useful analytical approach for classification issues. As it can compute probabilities and classify new data using both continuous and discrete datasets, logistic regression is an essential machine learning approach. Logistic regression can quickly discover the most helpful features for classification and may categorise observations based on a variety of data sources. [8]

Steps Involved in implementation-

1) Developed an app that can supply us with GPS coordinates.
2) Execute the suggested algorithm
3) Evaluate the dataset's matrix.
4) Split the dataset into two sections: training and testing.
5) Compare and contrast various machine learning algorithms.
6) Using a machine learning technique, predict the 45-minute interval parameters.
7) Draw a conclusion about traffic congestion.

IV. RESULTS

We graphed the results of comparing the accuracy of each of the four machine learning approaches.

Algorithm	Accuracy	Precision	Recall	Time
Decision Tree	88%	88.56%	82%	108.4sec
SVM	88%	87.88%	80%	94.1sec
Random Forest	91%	88.88%	82%	110.1sec

Table I **:** Comparison of algorithms

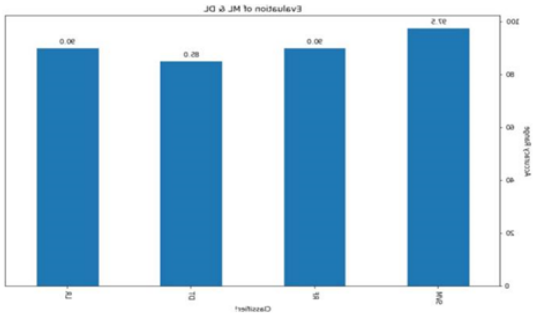

Figure III : Comparison of accuracies

Figure IV: Results

V. CONCLUSION AND FUTUREWORK

The proposed method gives increased accuracy it was designed to aid with more precise traffic movement forecast we will be further be able to enhance it in the future as deep learning technology progresses we looked into current traffic control systems and how they could be improved the proposed project concept seeks to be beneficial in traffic management in a smart cities we can apply this model to improve traffic flow

of parking systems criminal tracking and in in case of an emergency as a consequence residents will receive improved services resulting in satisfaction across all service sectors

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