Traffic Flow Prediction using Random Forest and Bellman Ford for Best Route Detection

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***Abstract*—The purpose of this project is to design and develop a traffic assessment system. Traffic estimate is determined by the amount of traffic congestion. Traffic jams cause people to lose valuable time, energy and frustration every day. Congestion is a global problem that affects all levels of society. The most common causes of traffic congestion are any driver getting stuck in a traffic jam on their journey. Accidents such as road accidents and road accidents often lead to unexpected unforeseen delays. There are also bad weather conditions due to low traffic flow speeds. It is difficult to accurately estimate traffic flow due to the very large data of the transportation system. This fact prompted us to work on a traffic prediction system to accurately and timely assess traffic flow information. We plan to use machine learning for prediction and regression based algorithm for image detection to analyze the bulk data of the transport system, we will use various graphical user fronts for interactive application.**

***Keywords*—Traffic Flow, Random Forest Algorithm, Bellman-ford Algorithm, Yolo Algorithm.**

I. INTRODUCTION

Traffic flow shown in Fig.1is the study of interaction between the host and infrastructure which aims to understand and develop best route with efficient movements and reduced traffic congestion [1]. It depends on the real time and historical data which is collected via various resources like sensors, cameras, Global Positioning System (GPS), social medias etc. Various sectors like government, private and business uses traffic data for safe, smooth and efficient transportation. This helps them to make a better travel judgement on decreased traffic congestion, improved traffic operation efficiency and reduced carbon emissions.

In recent decades, intensive learning techniques have been used to address taxonomic issues and volcanic traffic data. In this paper, the dataset is classified and evaluated using a random forest algorithm to improve the estimation accuracy. The main advantage of this algorithm is high accuracy and low time. Image processing algorithms are used to retrieve images and enhance proper training of autonomous vehicles. Its development will increase the accuracy of traffic forecasting models. Currently, we have entered the era of using large amounts of transport data. Due to the use of these large dataset dimensions, most traffic prediction systems and models fail somewhat. Vehicle calculations and object detection are collected from images by loading the YOLO algorithm and the Bellman-Ford algorithm. The main advantage of ITS is safe and smooth road transport and carbon emissions reduction. Section II covers background study of similar papers and Section III describes the proposed system.

Fig 1: Traffic flow

II. BACKGROUND STUDY

A. *Parallel Control Management*

Fei-Yue Wang has introduced a system[2] for development efforts over the past decade in establishing a new mechanism for parallel control and management of parallel control systems. This control and management system is the result of the integration and integration of concepts and methods such as AI, Intelligent Control, Computational Intelligence, Intelligent Systems, Intelligent Space, Complex Systems, Complexity Theory, Social Computing, CPSS and Advanced Computing Technologies. Like agent programming and cloud computing. The concepts and methods in ACP-based approach, in particular the parallel system approach that includes both parallel control and parallel management, are well established, effective and widely accepted in solving real-world complex problems.

B. *Travel Time Prediction*

Chun-Hsin Wu, Jan-Ming Ho and D. T. Lee supports the vector machine here and demonstrates their success in SVR time series analysis and statistical practice. However, less work has been done for traffic data analysis. After several experiments, we propose a set of SVR parameters that can better estimate travel time. Results showing that the SVR predictor outperforms other baseline predictors. Demonstrates the applicability of the SVR for traffic data analysis.

C. *Decision Tree Methods*

The decision tree method is the system that Ying proposed
[3] as the most commonly used data mining method. It sets up a classification system for the development of prediction algorithms based on certain variables or for the target variable. Dividing the original input variables into important subgroups simplifies the complex relationship between the input variables and the target variables. Heavily distorted data is easy to handle and easy to understand. It may be subject to over fitting and subjectivity. It can limit visibility and simplicity. Strong relationship between potential input variables.

D. *Delegate Multi-Agent Systems*

Elise Huard, Dirk Gorissen and Tom Holvoet presented that this system every car has navigational system that, given
Due to the very interesting agents, it is difficult to see what priority the tuning parameter values will have. In a sense, however, this undecided can generally be seen as a loss of MAS. This does not eliminate the fact that it is a promising technology and our simplified system will give appropriate results for further investigation.

III. PROPOSED SYSTEM

A.*Methodology*

In this system, the user enters their location details into the application. The application searches for the available routes within the specified locations and get the nearest CCTVs along the user's route. The vehicle detection in the route is done by using yolo model. The CCTV videos are converted into frames and then load yolo model to detect vehicles from the frames. The system loads the previous vehicle count data at a particular CCTV and train the Random Forest regression model using the loaded data. The Random Forest predicts the traffic using previous data and then stores the predicted values. A graph is created using all the predicted values and Bellman-Ford algorithm is applied to find out the best path from the graph. The final result will be updated to the user. The architecture is showninFig2.

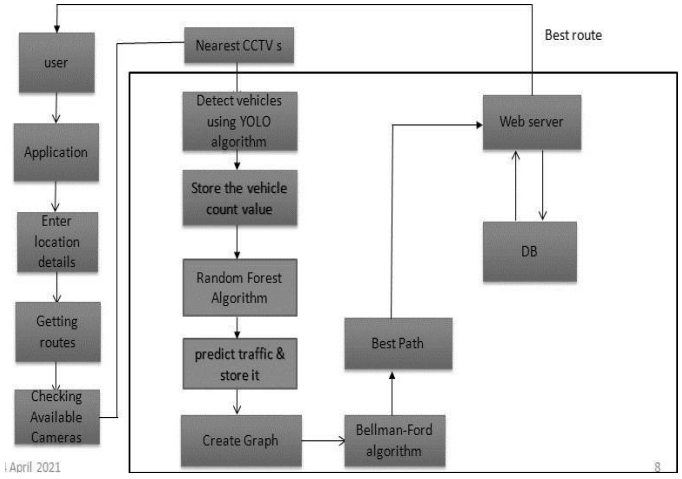

Fig 2: System Architecture

B.YOLOModel

the network map, is able to return all possible paths between two places. Since all cars share the same network object (singleton) we are able to cope with dynamically changing networks, however our solution is not at all scalable to larger networks. The inability of being able to visualize the simulation in real time made it difficult to understand what was going on in more complex scenarios. This also made it difficult to see whether certain results were due to the congestion control mechanism or due to the particular scenario. In addition, a Delegate-MAS system may be hard totune.

This is a real-time monitoring [4]system in our system, here is a video taken from our input road. The video is sent to the YOLO (You only Look once) algorithm for object detection. The algorithm uses the neural network for the complete image, and then divides the image into grids and ts the border box and the probabilities. We train the model so that the vehicles can be identified from the video. We take vehicle counts and estimate low, medium or heavy traffic in this area. Our proposed method is much more accurate than other methods because the algorithm can detect stationary vehicles and also ignores shadows and reflections.

C.RANDOM FOREST Algorithm

The Random Forest algorithm [5] has the characteristics such as high robustness, performance and practicability. The weather conditions, time period, special conditions of road, road quality, vehicle count are used as model input variables to establish traffic prediction system. Finally results show that the models established by using random forest algorithm has 87% accuracy and generalization error is low and can be effectively predicted. Moreover the calculation speed is fast and it has stronger applicability to prediction of congested condition.

Pseudocode:

1. For training set of length N,sample N instances at random with replacement.
2. Grow a tree on bootstrap training set using a specified number of random features.
3. Repeat step 1and 2 for the set number of estimators.
4. Average predictions or take majority vote.

D. BELLMAN-FORD Algorithm

To get the shortest path[6] between a source and destination locations, we use Bellman-Fords shortest path algorithm, which has been widely used to solve several problems including network routing and optimal route planning in navigation systems. In this paper, we use Bellman-Ford algorithm as a shortest path algorithm by considering the measurement of travel time instead of the distance between edges in the graph. Using the following algorithm and based on measurement of the travel time in each road segment, Bellman-Ford algorithm can give a supplementary advantage because the distance cannot reflect road traffic state, whereas the consideration of travel time can give us optimal prediction of road traffic state.

IV. CONCLUSION & FUTURESCOPE

Estimation of traffic congestion has been receiving more attention over the past few decades. With the development of infrastructure, every country is facing the problem of traffic congestion. Therefore, by estimating congestion, authorities can make plans and take necessary measures to prevent this. The proposed algorithm gives greater accuracy than the existing algorithms, which improves the complexity issues throughout the dataset. Additionally, we have plans to integrate web servers and applications. In addition, the algorithm will be improved for more accuracy.

V. REFERENCES

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