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Traffic Prediction for Intelligent Transportation System using Machine Learning

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ABSTRACT

This project's goal is to develop a method for quickly and accurately estimating traffic flow data. Everything that affects how much traffic is moving on the road, including as traffic lights, collisions, demonstrations, and maintenance that creates delays, is referred to as the "traffic environment." If the decision-maker is well-informed beforehand on all of the aforementioned elements as well as extra actual events that have an influence on traffic, they may make an informed decision. Additionally, it promotes the development of autonomous vehicles. The tremendous increase in traffic data over the preceding few decades has led us to adopt big data strategies for transportation. Even though there is various traffic prediction models used in current traffic flow forecasting approaches, they are still inadequate to address events that can occur in the real world. As a result, we began attempting to use traffic statistics and algorithms to estimate traffic flow. Given the wealth of data points available to the transportation system, it is difficult to anticipate traffic flow with precision. In this research, combining techniques from machine learning, genetics, soft computing, and deep learning, we want to analyse the vast amount of data related to the transportation system. The training of autonomous cars is supported by the recognition of traffic signs using image processing techniques.

Keywords —Traffic Environment, Deep Learning, Machine Learning, Genetic Algorithms, Soft Computing, Big Data, Image Processing

1. INTRODUCTION

Numerous economic sectors, the government, and individual travellers all need accurate and pertinent traffic information. It assists in reducing traffic congestion, improving the efficiency of transport management, and encouraging better travel choices among drivers and passengers in order to minimise CO_2 emissions. The advancement of Intelligent Transportation Systems (ITS) has increased the precision with which traffic flow is predicted. It is

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believed that it will help advanced public transportation systems, passenger information systems, and traffic management systems all thrive. A number of sensor inputs, including inductive loops, radar, cameras, mobile global positioning systems, crowd sourcing, and social media, are used to calculate traffic flow dependence based on current traffic and historical data. Due to the increasing use of both traditional sensors and new technologies, which has resulted in an explosion of traffic data, we have entered the era of huge data transit volume. Data-based management and control of transportation is already widespread. Although most of the approaches and models for analyzing traffic flow employ flat traffic models, the size of the data set leads them to fail in a number of different ways.

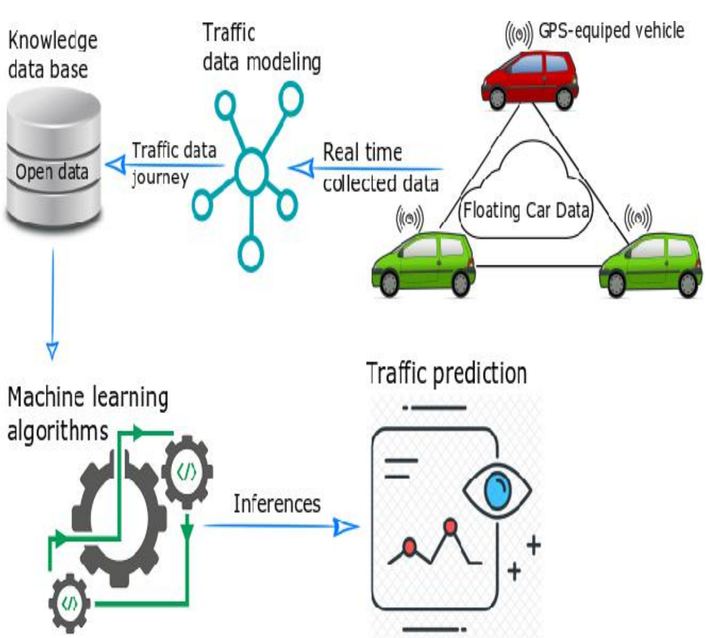

Fig 1: Traffic flow prediction

In-depth learning concepts have lately caught the interest of both educators and entrepreneurs because to their ability to handle category issues, natural language comprehension, dimensionality reduction, objects recognition, and motion modelling. DL uses multi-layered neural network concepts to identify the essential characteristics of data at every level, from the most fundamental to the most complicated. They are able to locate a sizable quantity of structure in the data, which ultimately helps with data visualisation and the formulation of perceptive hypotheses. Many ITS departments and researchers are concentrating on the creation of autonomous vehicles, which have the potential to significantly improve transportation networks and reduce the risk to human life. One of the main advantages of this idea is time savings. Recently, automated safe driving has drawn a lot of interest. Utilize driver assistance technologies, driverless cars, and traffic sign recognition to provide timely information (TSR).

2. LITERATURE SURVEY

1) Vehicle Kinetics and Support Vector Machines in Collaboration with Infrastructure Agents for Accelerated Incident Detection across Transportation Networks

Authors: **Ma, Yongchang, Chowdhury, Mashrur, Jeihani, Mansoureh, Fries, Ryan**

This work describes a paradigm for identifying traffic accidents using vehicle dynamics, such as speed profile and lane-change behaviour. The Vehicle-Infrastructure Integration (VII, also known as Intelli Drive) concept, in which infrastructure and cars work together to enhance mobility, envisions the use of this strategy. Framework analyses kinetic data produced automatically to identify vehicle driving experiences using in-car intelligent software based on the Support Vector Machine (SVM). Roadside Infrastructure Agents (sometimes referred to as RSUs: Roadside Units) collect driving information from several vehicles and assess the outcomes in relation to predetermined standards to identify the incident. The Metropolitan Freeway Network in Baltimore, Maryland, and a simulation network that had been tested and calibrated in rural Spartanburg, South Carolina, are the two places where the writers present their assessments of the system. They came to the conclusion that the VII-SVM system has never met any major differences in identification performance between the old network and the new network. They came to the conclusion that the universal VII-SVM technology could be used and benefited by all transport networks.

2)A Decentralized Approach for Anticipatory Vehicle Routing Using Delegate Multiagent SystemsAuthors: **Qin Yu, Tao Jiang, Aiyun Zhou, Lili Zhang, Cheng Zhang & Pan Xu**

Real-time traffic information is used by modern automobile navigation systems to divert traffic and ease congestion. Sadly, these technological advancements only respond when there is heavy traffic; they do not prevent needless traffic delays from occurring. Predictive vehicle routing has promise in this situation since it permits controlling vehicle routing using traffic reference data. This paper presents a decentralised approach to predictive vehicle routing. This approach is especially useful in complex, dynamic circumstances. This approach is based on representative multi-agent systems, specifically an eco-centered coordinating mechanism inspired by ants. Ant-like organisms that investigate the region on behalf of the vehicles, anticipate traffic bottlenecks, and spot them are in charge of guiding them. This approach is completely described, and it is contrasted with three other routing methods. To conduct tests, a simulation of a real-world traffic situation is employed. The studies' findings show a significant performance increase over the most difficult testing methodology, i.e., traffic message channel based routing strategy.

3) Dedicated Short-Range Communications Technology for Freeway Incident Detection: Performance Assessment Based on Traffic Simulation Data.Authors: Xuehu Wang, Yongchang Zheng, Lan

Gan,XuanWang,XintingSang,XiangfengKong,Jie Zhao

On a remote road, automatic event detection and drive-time monitoring using short-range communication technologies are assessed. Using the CorSim traffic simulator, the evaluation replicated the traffic and occurrences on a rural road. During post-processing, the simulation's output data are converted into probe and beacon data. A driving time threshold and counter were used to create an event detection system. The alarm is activated when the counter reaches a certain threshold. After this method is tested on a few sample data files, the driving time threshold and counter alarm level are set to the appropriate values. These ideal values are used to the probe and beacon data to determine how quickly the algorithm can detect various traffic events. Analysis shows that the system can recognise events properly and quickly. A variety of factors are altered during simulation and analysis to determine how they impact system performance. Each parameter was shown to have a considerable influence on detection time, and the effects were consistent with logical hypotheses. In general, larger traffic volumes, more severe accidents, more transponders, shorter read distances, and closer event detection distances are all related to shorter distances. To the reader below you, incidentally.

4)Freeway Incident Detection Using Kinematic Data from Probe VehiclesAuthors: Qin Yu, Tao Jiang, Aiyun Zhou, Lili Zhang, Cheng Zhang & Pan Xu

Based on the acceleration and speed characteristics of the highway probe vehicles, this research proposes an event detection method. As a result, it may be inferred that a probe vehicle slows down from its usual speed as it approaches a noteworthy occurrence and then picks up speed again after it has past the event. A calibrated microscopic traffic simulation model's incident data set was utilised to evaluate the algorithm's performance in identifying events at different probe vehicle percentages in the traffic stream. The results were compared with those of multi-layer feed-forward neural network event detection techniques, which use measurements of volume, velocity, and occupancy acquired at fixed places as inputs. When there are 30% of probe vehicles in the traffic stream, the innovative probe vehicle approach may achieve a comparable detection rate and indicate the detection time compared to the neural network model.

3. SYSTEM ANALYSIS

3.1 EXISTING SYSTEM

In recent years, there has been a noticeable increase in the usage of social media and media platforms as a source of information to track down traffic jams, events, and natural disasters (earthquakes, hurricanes, fires, etc.). Twitter feeds may be used to detect earthquakes and typhoons by using SVM as a

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binary classification for good events (earthquakes and typhoons) and poor events (other events) (non-events or other events). focus on using Nave Base (NB) classification and popular NLP approaches to analyse Twitter stream data in order to detect industrial fires.

3.2 PROPOSED SYSTEM

We propose an intelligent system based on text mining and Naive Bayes algorithms for real-time traffic event recognition using Twitter stream analysis. The system utilises the most up-to-date text analysis and sample classification methodologies. By analysing, fine-tuning, and combining various processes, the intellectual system was created. determining which novel text classification technique is the most effective. The completed system uses the selected approach to track traffic occurrences in the field in real-time.

4. SYSTEM DESIGN

4.1 SYSTEM ARCHITECTURE

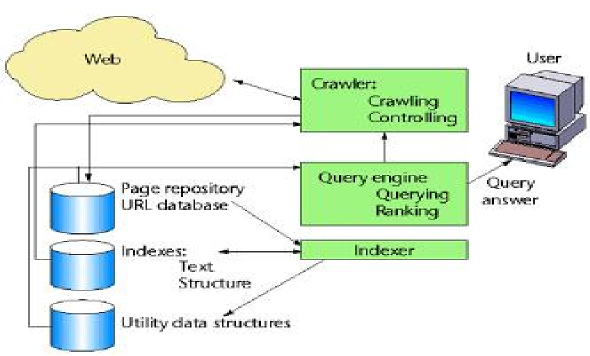

Fig 2: System Architecture

4.2 DATA FLOW DIAGRAM:

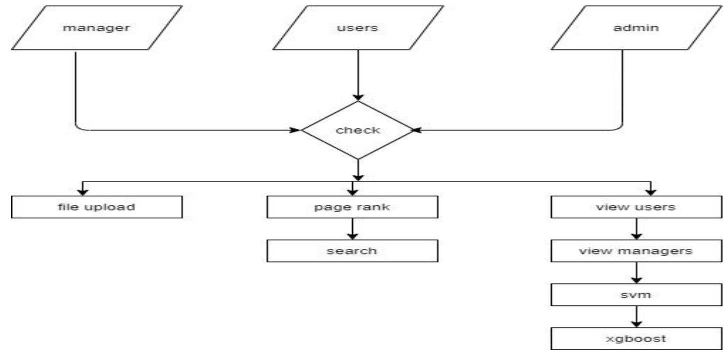

Fig 3: Data Flow Diagram

5. IMPLEMENTATION:

MODULES:

- **User**
- **Admin**
- **svm**
- **random forest.**

5.1 MODULES DESCRIPTION:

User:

The user may register first. When registering for more talks, he needs a functioning user email and mobile number. After registration, the administrator may activate the user. Once the admin customer has been enabled, the customer may log in to our system. After logging in, he may submit information to the traffic prediction. After entering the data, we can calculate the algorithm's estimate. After finding the svm method, we can find the random forest algorithm.

Admin:

The administrator may login using their credentials. He may immediately activate users after signing in. The enabled user will only be able to access our applications. The administrator may set algorithm estimates. The administrator supports both the vector machine technique and the random forest methodology. New data may be added to the admin record.

SVM

Support Vector Machine (SVM), a method of supervised machine learning, may be used to classification and regression issues. However, it is mostly used in taxonomy-related contexts. Each data point is represented using the SVM technique as a point in an n-dimensional space, where n is the number of features and each feature's value is a specific coordinate value. The classification is then built using the hyperplane, which clearly separates the two classes.

Random Forest:

comparable to the bootstrapping method of the Random Forest Decision Tree (CART) model. Assume there are 10 variables and 1000 observations in the population. With a variety of models and starting points, Random Forest tries to construct numerous CART models. For instance, the CART model is constructed using a random sample of 100 observations and 5 randomly selected initial variables. It repeats the process 10 times (let's say) and then assigns a final grade to each observation. The final estimate is produced by combining each estimate. This final estimate is the average of all preceding estimations.

6. Results:

Home page:

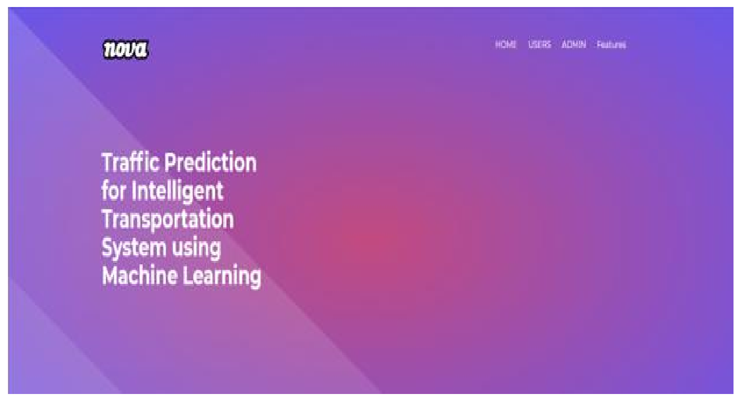

Fig 4: Home page

User Register Form:

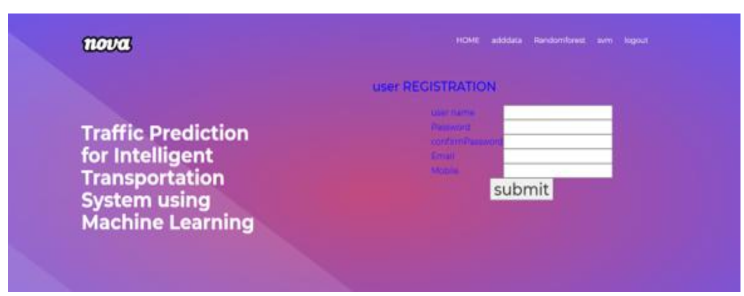

Fig 5: User Register Form

User Login Page

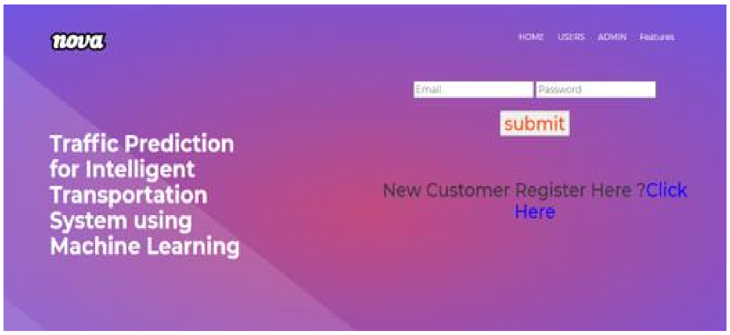

Fig 6: User Login Page

User Home Page

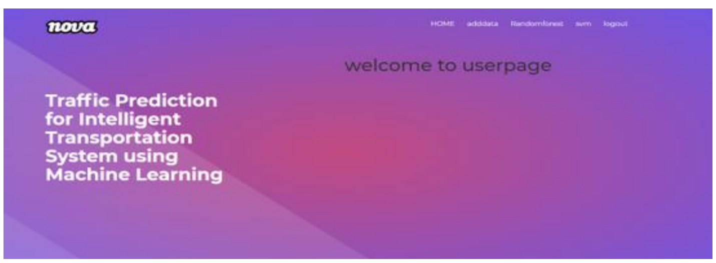

Fig 7: User Home Page

Add data:

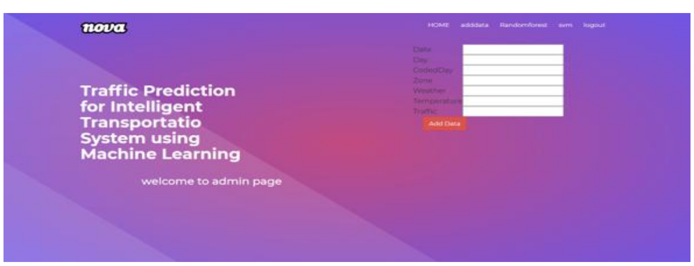

Fig 8: Add data

Random Forest:

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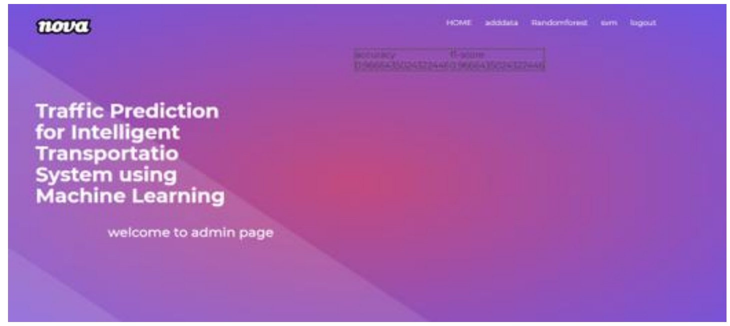

Fig 9: Random Forest

Admin login:

Fig 10: Admin Login

User details:

Fig 11: user details

CONCLUSION

Despite the importance of in-depth research and genetic algorithms in data analysis, the ML community has not given them much attention. The recommended method offers more accuracy than the present methods while also increasing the overall complexity of the data set. Additionally, we want to integrate the web server with the application. Furthermore, content algorithms are constantly improved for much greater accuracy.

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