

A Driving Decision Strategy (DDS) Based on Machine Learning for an Autonomous Vehicle

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Abstract - A current autonomous vehicle determines its driving strategy by considering only external factors (Pedestrians, road conditions, etc.) without considering the interior condition of the vehicle. To solve the problem, this paper proposes “A Driving Decision Strategy(DDS) Based on Machine learning for an autonomous vehicle” which determines the optimal strategy of an autonomous vehicle by analyzing not only the external factors, but also the internal factors of the vehicle (consumable conditions, RPM levels etc.). The DDS learns a genetic algorithm using sensor data from vehicles stored in the cloud and determines the optimal driving strategy of an autonomous vehicle. This paper compared the DDS with MLP and RF neural network models to validate the DDS. In the experiment, the DDS had a loss rate approximately 5% lower than existing vehicle gateways and the DDS determined RPM, speed, steering angle and lane changes 40% faster than the MLP and 22% faster than the RF[1].

Key Words:: Autonomous Vehicle, Machine Learning, Genetic Algorithm .

1. INTRODUCTION

However, as the performance of self-driving cars improves, the number of sensors to recognize data is increasing. An increase in these sensors can cause the in- vehicle overload. Self-driving cars use in- vehicle computers to compute data collected by sensors. As the amount of the computed data increases, it can affect the speed of judgment and control because of overload. These problems can threaten the stability of the vehicle. To prevent the overload, some studies have developed hardware that can perform deep- running operations inside the vehicle, while others use the cloud to compute the vehicle's sensor data. On the other hand, collected from vehicles to determine how the vehicle is driving. This paper proposes a Driving Decision Strategy(DDS) Based on Machine learning for an autonomous vehicle

which reduces the in-vehicle computation by generating big data on vehicle driving within the cloud and determines an optimal driving strategy by taking into account the historical data in the cloud. The proposed DDS analyzes them to determine the best driving strategy by using a Genetic algorithm stored in the Cloud. Currently, global companies are developing technologies for advanced self-driving cars, which is in the 4th stage. Self-driving cars are being developed based on various ICT technologies, and the principle of operation can be classified into three levels of recognition, judgment and control. The recognition step is to recognize and collect information about surrounding situations by utilizing various sensors in vehicles such as GPS, camera, and radar. The judgment step determines the driving strategy based on the recognized information. Then, this step identifies and analyzes the conditions in which the vehicle is placed, and determines the driving plans appropriate to the driving environment and the objectives[4].

2. RELATED WORK

It executes the genetic algorithm based on accumulated data to determine the vehicle's optimal driving strategy according to the slope and curvature of the road in which the vehicle is driving and visualizes the driving and consumables conditions of an autonomous vehicle to provide drivers. To verify the validity of the DDS, experiments were conducted on the Desoto select an optimal driving strategy by analyzing data from an autonomous vehicle. Though the DDS has a similar accuracy to the MLP, it determines the optimal driving strategy 40% faster than it. And the DDS has a higher accuracy of 22% than RF and determines the optimal driving strategy 20% faster than it

Literature survey is the most important step in software development process. Before developing the tool it is necessary to determine the time factor, economy and company Traffic Redundancy Elimination, once these things are satisfied, then next steps are to determine which operating system and language can be used for developing the tool. Once the programmers start building the tool the programmers need lot of external support[3].

This support can be obtained from senior programmers, from book or from websites. Before building the system we have to know the below concepts for developing the proposed system.

3. EXISTING SYSTEM

k-NN, RF, SVM and Bayes models are existing methods with an advanced data exploration using machine learning algorithms, orthopedic disease prediction is still a relatively new area and must be explored further for the accurate prevention and cure. It mines the double layers of hidden states of vehicle historical trajectories, and then selects the parameters of Hidden Markov Model(HMM) by the historical data. In addition, it uses a Viterbi algorithm to find the double layers hidden states sequences corresponding to the just driven trajectory. Finally, it proposes a new algorithm for vehicle trajectory prediction based on the hidden Markov model of double layers hidden states, and predicts the nearest neighbor unit of location information of the next k stages[1].

DISADVANTAGES OF EXISTING SYSTEM:

1. less efficiency and need more are to explored for strategies

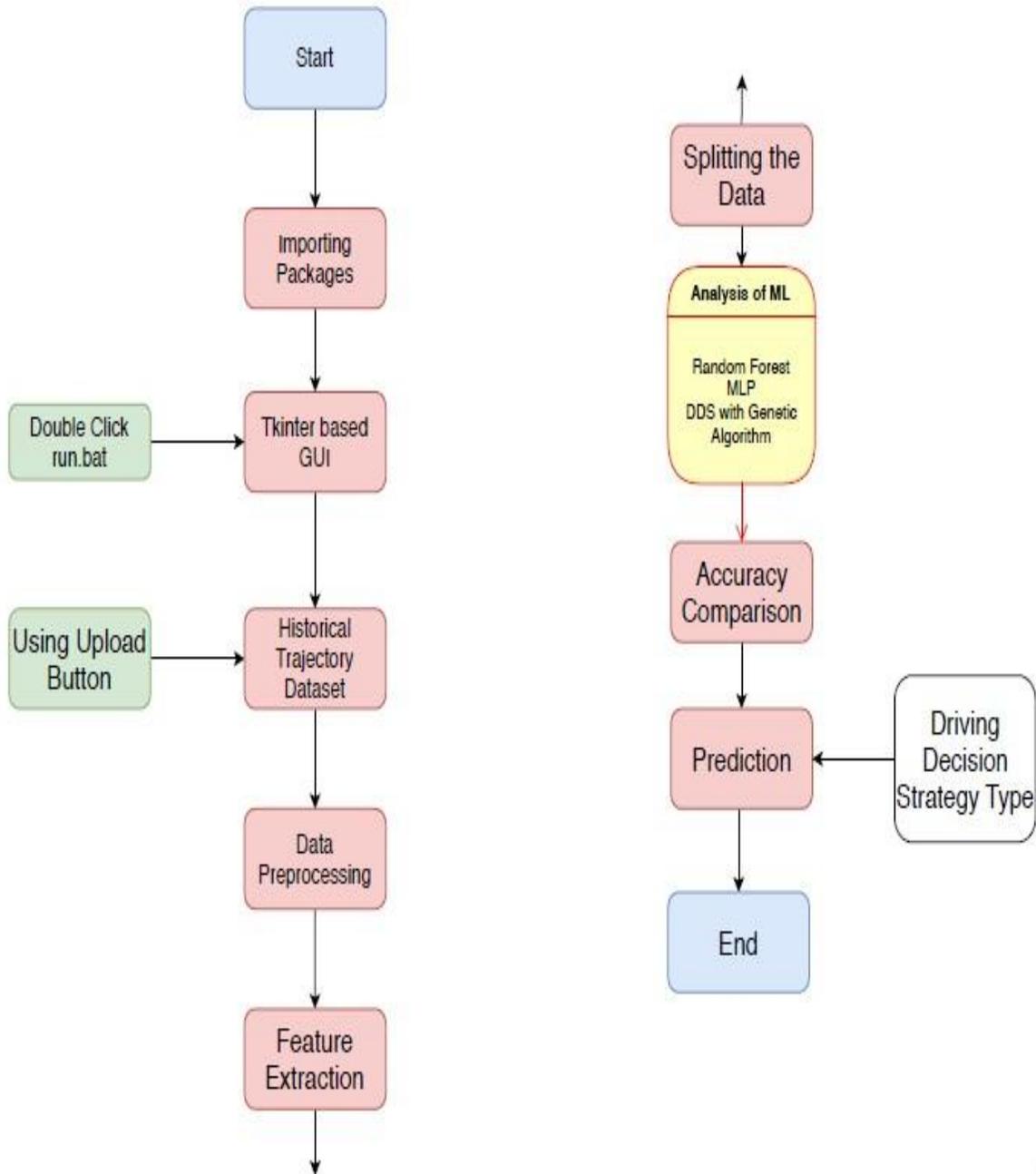
3. PROPOSED SYSTEM

Here we proposes “A Driving Decision Strategy(DDS) Based on Machine learning for an autonomous vehicle” which determines the optimal strategy of an autonomous vehicle by analyzing not only the external factors, but also the internal factors of the vehicle (consumable conditions, RPM levels etc.). The DDS learns a genetic algorithm using sensor data from vehicles stored in the cloud and determines the optimal driving strategy of an autonomous vehicle. This paper compared the DDS with MLP and RF neural network models to validate the DDS. In the experiment, the DDS had a loss rate approximately 5% lower than existing vehicle gateways and the DDS determined RPM, speed, steering angle and lane changes 40% faster than the MLP and 22% faster than the RF[3].

ADVANTAGES OF PROPOSED SYSTEM:

1. These improvements system to control the vehicle based on sensor data

5. SYSTEM ARCHITECTURE:



System Model

6. SYSTEM IMPLEMENTATION

6.1MODULE DESCRIPTION:

1.Upload dataset : we get the sensor data from the Kaggle website.

2.Data Preprocessing : after getting the data we have to remove the unwanted data from the dataset like null values, unwanted rows, unwanted columns.

3.Train and Test Model : after preprocessing the data we have to split the data into two parts training data and testing data.

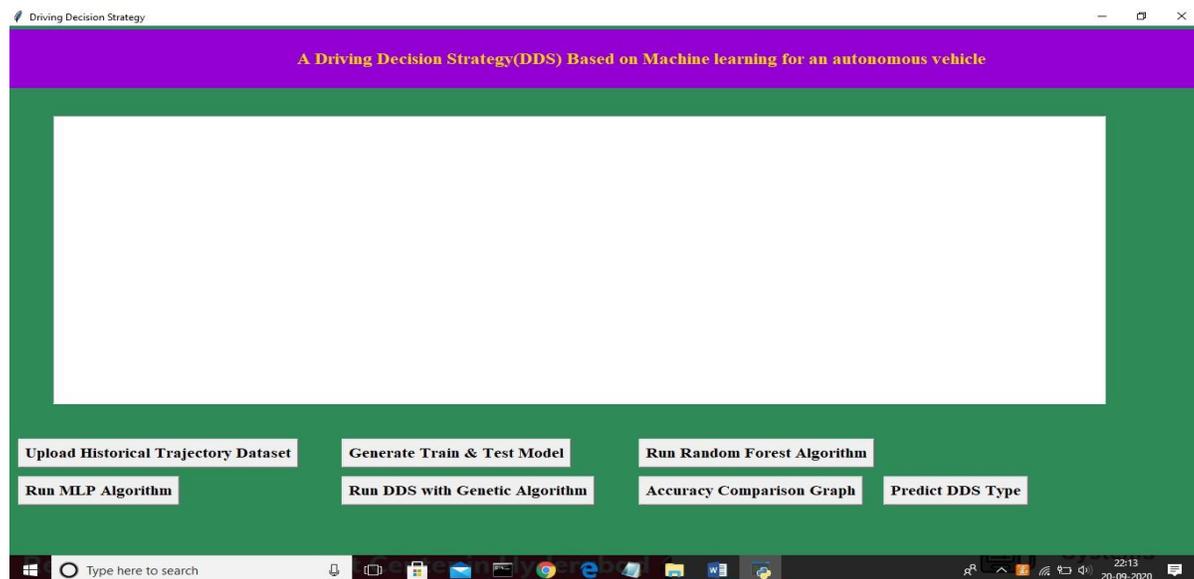
4.Run Algorithm : we have to test machine learning algorithms to find the best algorithm with best accuracy by training the data and testing the data to algorithms.

5.Accuracy graph : Finally we plot the graph of all the algorithms with accuracy.

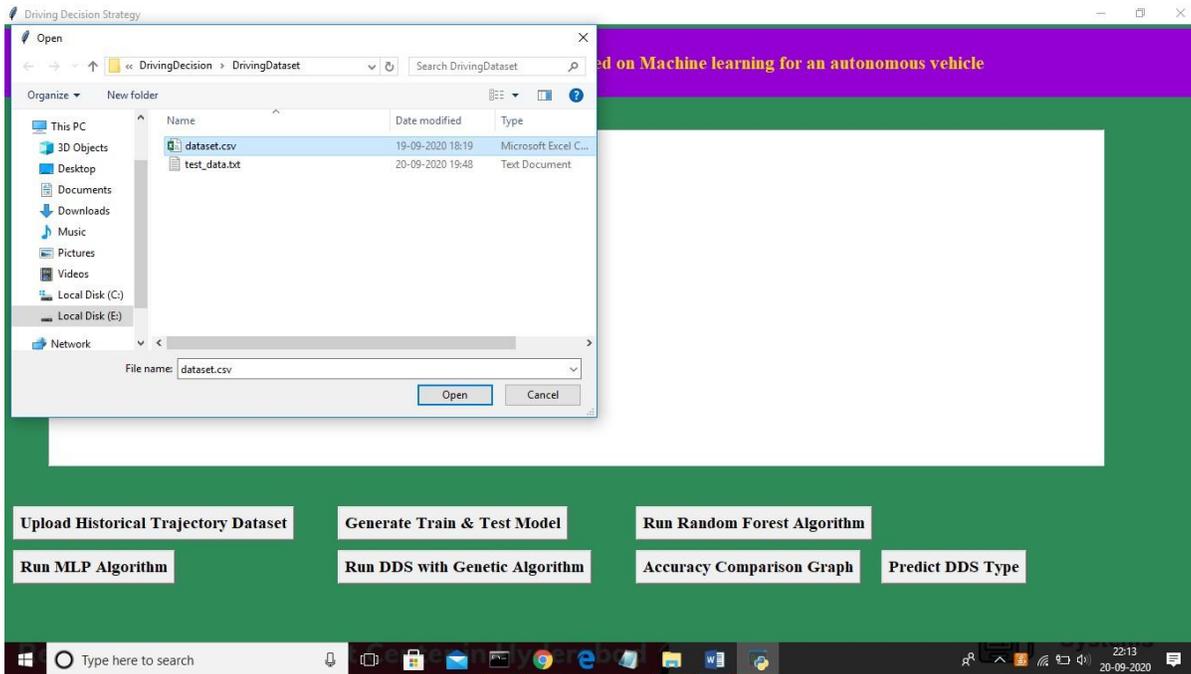
7. RESULTS AND DISCUSSION

7.1 OUTPUT SCREENS

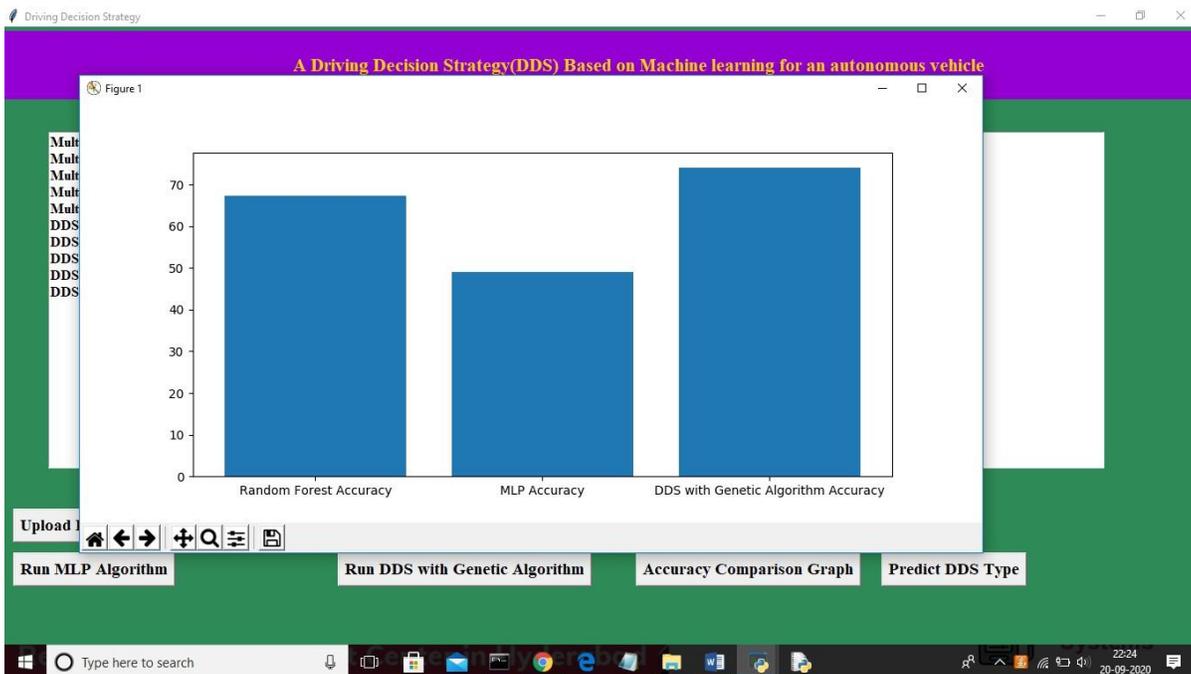
1. Now click on “Upload Historical Trajectory Dataset”



2. Upload the data and read the basic data information will be shown on the screen



3. Accuracy Comparison for all the models



8. CONCLUSION

This paper proposed a Driving Decision Strategy. It executes the genetic algorithm based on accumulated data to determine the vehicle's optimal driving strategy according to the slope and curvature of the road in which the vehicle is driving and visualizes the driving and consumables conditions of an autonomous vehicle to provide drivers. To verify the validity of the DDS, experiments were conducted on the DDS to select an optimal driving strategy by analyzing data from an autonomous vehicle. Though the DDS has a similar accuracy to the MLP, it determines the optimal driving strategy 40% faster than it. And the DDS has a higher accuracy of 22% than RF and determines the optimal driving strategy 20% faster than it. Thus, the DDS is best suited for determining the optimal driving strategy that requires accuracy and real-time[2]. Because the DDS sends only the key data needed to determine the vehicle's optimal driving strategy to the cloud and analyzes the data through the genetic algorithm, it determines its optimal driving strategy at a faster rate than existing methods. However, the experiments of the DDS were conducted in virtual environments using PCs, and there were not enough resources for visualization.

9. REFERENCES

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