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Survey on Automation in vehicles using Prediction and Classification Techniques, Deep Learning and IoT

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Abstract - *Autonomous driving is a trending phenomenon now a days. As every vehicle in the nearby environment use the automation in some pattern. The autonomous driving is manly dependent on technologies like image processing, deep learning, Convolutional Network and IOT. There are various vendors like Google, Morgan Stanley, Uber, Rinspeed-Samsung, Nvidia, VolksWagon, etc. present who are carrying research in this topic in detail. This paper gives the survey on autonomous driving and various techniques and parameters which various authors and expertise used while completing and performing their research.*

Key Words: ***Deep Learning, Neural Networks, IOT (Internet Of Things), Image Processing, Convolutional Network.***

1. INTRODUCTION

The automation in vehicles is necessary now in day to day life. The idea behind making the vehicles autonomous is that they can deal with the any distractions or obstacles in the absence of driver or some abnormal anomalies or due to some careless activity. The automation in vehicle can be performed considering various mechanisms which includes whether to take turn or not, overtaking phenomenon, sudden obstacles observance, parking mechanisms, when to stop and apply breaks, path consideration by observing traffic monitoring, various accessories related decisions (cooling system, entertainment).

The parameters and algorithms considered for autonomous driving includes distance measures (Application of applying break), various sensors and their applications, image processing algorithms, data set on distractions various obstacles and road track available, applications of neural network and deep learning as the network has to be trained for performing learning and giving prediction on what decision to be made. This paper covers detailed information for these mentioned phenomenon and a case study of working model on Automation in vehicle using IOT based techniques.

2. APPROACH

The decision making on the vehicles is needed in Automated Vehicle for deciding whether to take left turn or right turn by looking at the surface of the road, or looking at the road tracks, nearby vehicles, speed. These decisions are totally dependent on the output of Convolutional Neural Network. The convolutional neural network take input as images which were captured by the vehicle and classify it according to the testing dataset.

The basic approach for achieving the decision in Automation in Vehicle is mainly divided into four stages:

1. Take the input in the form of image.
2. Perform the pre-processing operations on the input image.
3. Giving the preprocessed output to neural network as input.
4. Generation of decision based on the output of neural network.

Fig -1: Decision Model

3. EXPERIMENTAL MODEL

The Experimental Models includes various parameters for implementing the Automation in Vehicles.

3.1. TRAFFIC SIGNAL DETECTION

Traffic signals are the most important parameters not only in Normal Driving but also in Autonomous Driving. Because there is no Driver Present in the car, and when the signal is not in the favor there is lot of chance of collision with other vehicles not only the collision but also various parameters like round turn, slow speed area, No Horn Area, and to stop from getting fined while driving we need the signal detection system.

Traffic signal detection can be achieved using the Convolutional Neural Networks with the MaxPool Mechanism.

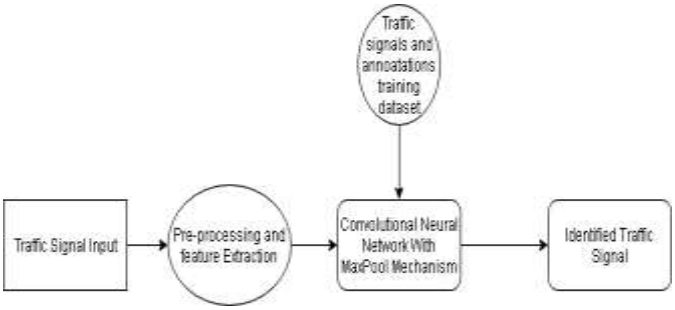

Fig-2: Traffic Signal Detection.

3.2 VEHICLE DETECTION AND BREAK MECHANISM

The vehicle detection and breaking mechanism is another parameter to be considered for Automation in Vehicles. This working model deals with the situation where there is condition of applying break, overtaking situation, by detecting the nearby vehicles and the distance measures with speed and acceleration calculation this task is achieved. There may situation arise when sudden vehicle is observed or sudden obstacle is observed, at that time the applicability of Break is needed to be measure, Checking Whether the applying break at that situation is feasible or not. For that purpose, we need to detect the nearby obstacles, vehicles.
The vehicle or Obstacle detection and identification is achieved by using the deep learning network, by use of taking the image input, the distance is calculated and according to the current situation of speed classification is performed that whether the break applied should be effective. This mechanism is mainly used in the sudden obstacles and distortion situation.

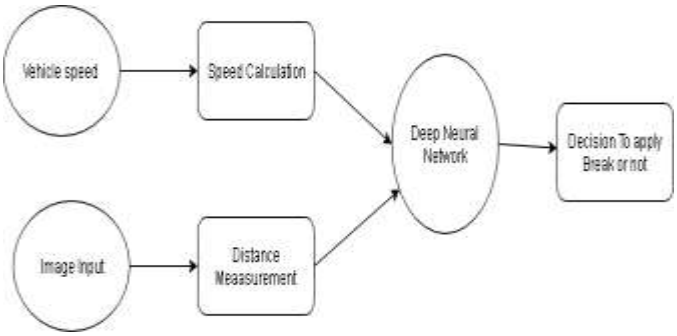

Fig-3: Vehicle Detection and applying breaks in sudden situations.

3.3 TRAFFIC MONITORING AND ROUTE SELECTION

Traffic monitoring and route selection is another approach. To have the vehicle work smoothly and efficiently and not to get stuck in the heavy traffic, which can lead it in more complex conflicts. The automated vehicle should be able to predict the traffic situation and should learn from the past experience so as to get help in future situation. The IOT based technologies are mainly used in the Traffic detection and predicting which route should be preferable at that situation is computed and selected for the work.

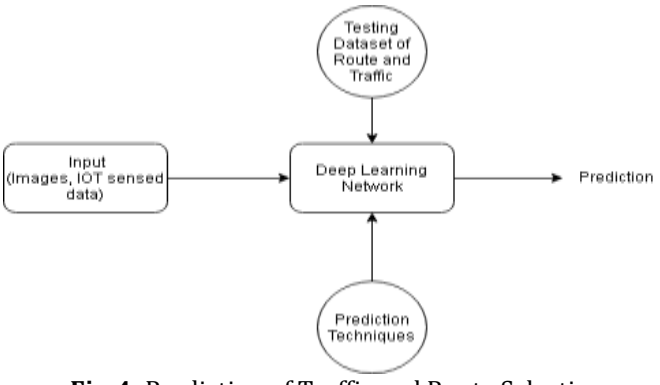

Fig-4: Prediction of Traffic and Route Selection

4. CONCLUSION

Automation in vehicles can be achieved using the phenomenon like vehicle detection, distance measurements, traffic signal detection, Traffic Prediction and Route selection.
This paper gives the touch to each of this phenomenon mentioned, and the by using the prediction, classification, Deep Learning, Convolutional Neural Network and IOT by which the automation can be achieved.

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