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Lane and Vehicle Detection

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ABSTRACT:

Lane and Vehicle detection is a challenging problem. It has attracted the attention of the computer vision community for several decades. Essentially, Lane and Vehicle detection is a multi-feature detection problem that has become a real challenge for computer vision and machine learning techniques. Although many methods are used for Lane and Vehicle detection, they are mainly used for classification rather than feature design. But modern methods can be used to identify the features that are rich in recognition and have achieved success in feature detection tests. However, these methods have not been fully implemented in the efficiency and accuracy of Lane and Vehicle detection.

We propose a new method to solve this we use data pre-processing and calibration in order to detect the lane and for vehicle detection we use various data samples in order to train the model and classify the data with accurate results. This model will be helpful for driver assistance and can be further developed for self-driving cars with reliable changes in the model.

Keywords: Calibration and Preprocessing.

1- INTRODUCTION

With the rapid development of society, automobiles have become one of the transportation tools for people to travel. In the narrow road, there are more and more vehicles of all kinds. As more and more vehicles are driving on the road, the number of victims of car accidents is increasing every year. How to drive safely under the condition of numerous vehicles and narrow roads has become the focus of attention. In order to increase safety and reducing road accidents, people are spending lots of

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money for the advancement in the driving techniques which ensures the safety. The technology makes man to think more to improve the safety to save the lives. The automobiles are more conscious of providing safety feathers like seat belts, air bags and strong body structures which provide the passive safety that may reduce the effects of an accident. Avoiding accidents and saving lives are one of great interest that all researchers and Automobile companies work on.

According to the WHO, each year lives of approximately 1.25 million people cost as result of road traffic crash. Between 20 and 50 million people suffer from non-fatal injuries, which sometimes incur disabilities. Road traffic injuries bring considerable economic losses to victims, their families, and nation. Therefore, in 2016 many firms or corporation has declared that they were and will participate in the development of the automatic vehicle.

The main motivation of this project is to help drivers. Vehicle accidents remain the leading cause of death and injuries in India and Asian countries claiming thousands of lives and injuring millions each year. Most of these deaths and injuries occur on the nation's highways. India ranks 1st in the number of road accident deaths across the 199 countries reported in the World Road Statistics, 2018 followed by China and US. In the year 2018 India has reported claiming 1,51,417 people have lost life due to accidents across various States and UTs as well as causing injuries to more than 4,50,000 people. 11% of the accident deaths around the globe are related to India.

National Highways which accounts 1.9% of road network throughout the country has 30% of the accidents and accounts 36% of the deaths through accident. State Highways which comprise 2.97% of the network in the country has 26.8% of the accidents and accounts 27% of the deaths through accident. Traffic Violations related to driving on wrong side accounted 6% of the accident related deaths.

Hence Safety has become more concern to the people travelling by vehicles on road. This is not only limited to India but throughout the globe.

2- EXPERMENTAL

In this experiment we are performing a task that is lane bordering and vehicle detection from a car. We keep a camera in front part of the car. The proposed system is a dynamic approach. This method uses machine learning techniques like SVM Classifier and Logistic Regression, in this method the video is divided into frames and each frame is used by the detector for identification of lanes and vehicles and after identification, borders are drawn on the path in which driver is supposed to go and anchor boxes are drawn on the vehicles ahead of them.

The below diagram depicts the architecture of the project

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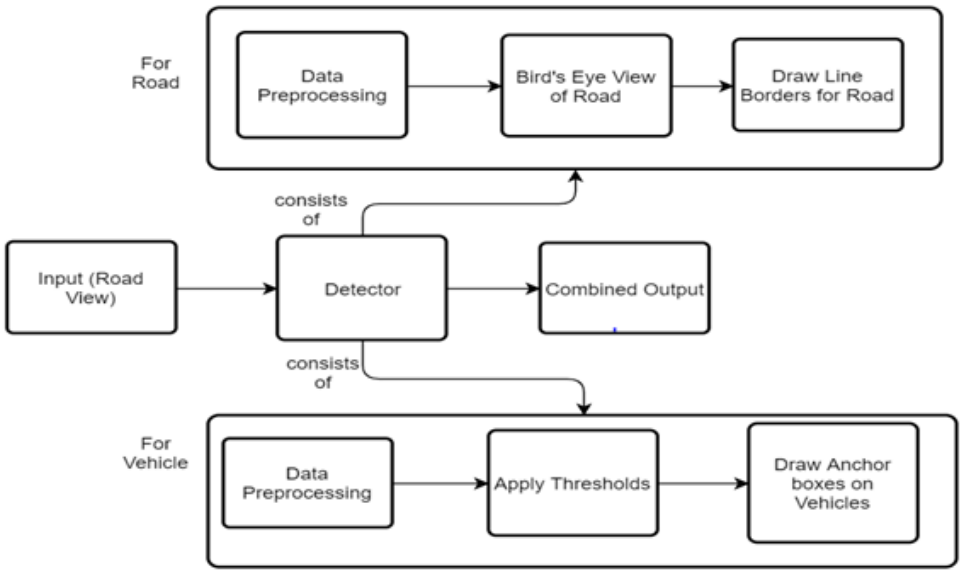

Fig 2.1 Architecture for the proposed system

The following objectives are achieved with the proposed system:

1. The accuracy of the system is improved, and it will be helpful for the driver for safety assistance.

2. The method followed in this system is a dynamic approach and it can work on huge datasets for training and identification for assistance for the driver.

3- RESULTS AND DISCUSSION

The aim of the program is to classify lane and vehicles from a video. Now-a-days, there are lot of problems related to accidents on the roads and short heighted people for better view as they can see only middle range view. To reduce that burden, we have proposed this machine learning model to automate such video analysis and provide a system to do that task for us. At first, we need to build training model using many images and 'Convolution Neural Network' using TENSOR FLOW Python module. Now, we can upload any video and then application will extract frames from uploaded video. Those frames will be analyzed based on the training model to predict its class such as Bordering of Lane and use anchor box on vehicles.

Below diagram depicts the flow diagram of the system.

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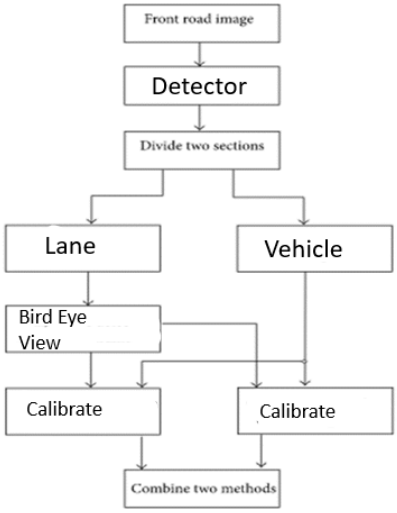

Fig 3.1 Flow Diagram for the system

The steps are as follows

1. Front road video is captured from the camera.
2. The captured video passes to Detector.
3. The detector divides itself into two segment that is Lane and Vehicle
4. In Lane Method Bird Eye View and Calibration technique is followed.
5. In Vehicle Method Calibration Technique is followed.
6. The two methods are combined to form a single output.

We get the following output.

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Fig 3.2 Output of the System with Lane bordering and anchor box on other side of road.

In the above picture, the lane has been bordered and there are vehicles on the other side even those vehicles are detected as well with anchor boxes.

Fig 3.3 Output of the System with Lane bordering and anchor box on same side of road.

In the above picture, the lane has been bordered and there is vehicle ahead. That vehicle is detected with anchor box.
As the vehicle proceeds ahead, the lane keeps on bordering in one direction in which the vehicle is moving and vehicles are detected with anchor boxes. This helps the drivers for safety assistance and short-heighted people to see far sight, near sight and vehicles ahead.

4- CONCLUSION

In this project lane and vehicle detection, the lane bordering will be helpful for the drivers to drive a vehicle in line and it will be helpful for short heighted people to have proper view of road. The anchor boxes are marked on vehicles will be helpful for the driver to know vehicles ahead of us and maintain distance between two vehicles. We would like to conclude that this model will be helpful for the drivers for safety assistance and avoid accidents at maximum extent. This project can be extended to adding more features like Pothole Detection, Traffic Sign Classifier and Collision Warning System. By adding of these features, it can be used for enhanced safety assistance system for the driver. By training the model from above features this project can be used for self-driving or autonomous cars etc. This will become an advanced system in future.

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