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Use of Machine Learning in Automobile Industry to Improve Safety Using CNN

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Abstract: ***Vision-based vehicle steering system cars can have three main roles: 1) road access; 2) an obstacle to find; and 3) signal recognition. The first two have already been taught many years and there have been many positive results, but a sign of traffic recognition is a less readable field. Road signs provide drivers with the most important information on the road, to do driving is safe and easy. We think road signs should play the same role of private cars. The color and shape are very different from the natural environment. The algorithm described in this paper uses this feature. It has two main parts. The first, to find, uses color range to separate image analysis and shapes to get symptoms. The second, in stages, uses the neural network. Some effects from natural forums are shown. On the other hand, the algorithm works to detect other types of marks can tell a moving robot to perform a specific task that place.***

Keywords:
- ***Traffic signs***
- ***CNN***
- ***Cars***
- ***Image processing***
- ***Classification***

I. INTRODUCTION

This Project aims to identify road and route signs. This application is used to locate and separate one or more road signs from within the live color images captured by the camera. Attempts to create an on-board warning system to notify a person with a disability by using warning signs. This project also aims to identify the line mark. The line detection system helps to avoid accidents as security is the main goal of the system. Such systems have the goal of obtaining lane marks and warning drivers in the event of a car deviating from the lane. systems into customer cars. These systems help to significantly improve the safety and implement a crucial step on the way to autonomous driving. Among other tasks solved with computer vision, the traffic sign recognition (TSR) problem is one of the most well-known and widely discussed by lots of researchers. However, the main problems of such systems are low detection accuracy and high demand for hardware computational performance, as well as the inability of some systems classify the traffic signs from alternative countries.

II. LITERATURE REVIEW

Design for road signage, recognition, and intelligent vehicle transfer systems. The acquisition of road signs and recognition (TSDR) is an important component of advanced driver assistance systems (ADAS). It is designed to improve driver safety by quickly detecting and explaining road signs. However, such systems still face the inability to accurately detect symptoms. Then in each paragraph a brief description is given, followed by a concluding statement. Finally, the transmission of known signals is briefly investigated.

Installing an Active Network in Real-Time Route Findings Many road accidents are caused by distractions and driving fatigue. To protect drivers, the real-time tracking system using a camera mounted inside the car is designed for safe driving. The system calculates the flow rate according to the angular relationships of the parameters and sends the appropriate warning signal to the drivers. Test results show that the system is working successfully in a real-time environment.

Traffic Sign Acquisition Based on Neural Network Cascaded Convolutional Neural Detector binary area pattern (LBP) and AdaBoost classifier combined to exclude interest circuits (ROI) to select a circular area. Next, discarded CNNs to reduce bad samples of Traffic Line Recognition lines. Compared to standard CNN, our CNN consists of three convolutional layers and part of its partition has been replaced by a vector support machine (SVM). The German road sign benchmark is used, and the test results show that theproposed method can achieve competitive results compared to the technical methods.

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III. IMPLEMENTED METHODS (ALGORITHM) / FINDING / OBSERVATION

A. Technology Used

Machine learning: Machine learning is the use of artificial intelligence (Al) which gives systems the ability to automatically learn and develop from experience without being clearly planned. This is therefore used to identify road signs where images are not clearly visible. Also, to check that the vehicle has a tendency to deviate from the route is identified using ML. Image editing Photos are fed as input and the application is enabled to identify images.

B. Existing System

As the Project which we need to build concentrates on smart cars which is a developing field in automobile industry and tech industry.

C. Limitations of the Existing System

Prediction of worn/damaged signs cannot be done. Change of lane detection during driving is difficult to predict.

D. Proposed System

Initial step is to train model with many samples of images of traffic signs. Then we use the images captured by the camera present in car. We feed these images to the trained model. We use tensor flow to build the neural network to process the images to detect the traffic sign. Traffic lane is detected using image processing. Then depending on the images if the feed image had traffic sign, then the display must be displayed with the traffic sign name which had detected. And warning must be given if there is a tendency of change of lane.

E. About Cnn

In machine learning, a convolutional neural network (CNN, or ConvNet) is a class of deep, feed-forward artificial neural networks that has successfully been applied to analyzing visual imagery. Convolutional networks were inspired by biological processes in that the connectivity pattern between neurons resembles the organization of the animal visual cortex. Individual cortical neurons respond to stimuli only in a restricted region of the visual field known as the receptive field. The receptive fields of different neurons partially overlap such that they cover the entire visual field.

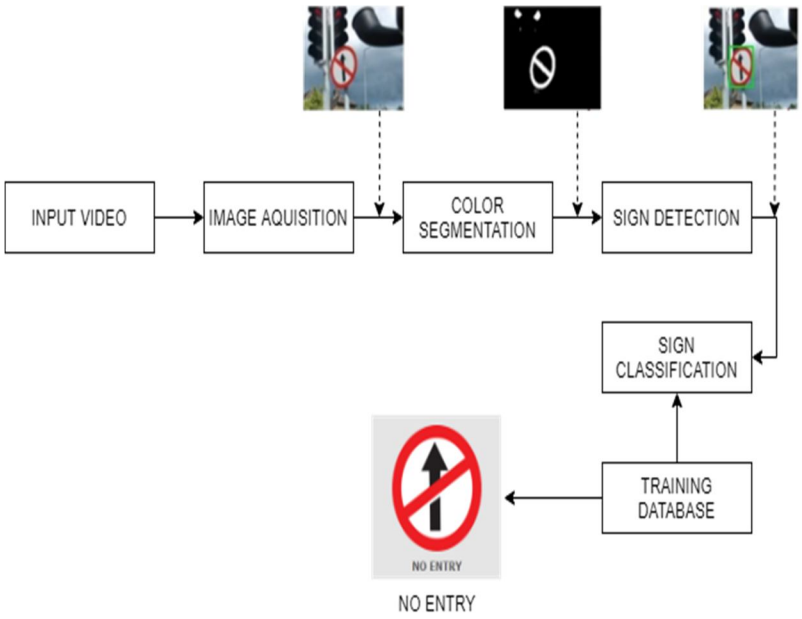


Fig. Architecture Diagram

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IV. RESULTS AND DISCUSSION [IF ANY]:

We implemented the road sign detection system using CNN and plotted the graph of training accuracy and validation accuracy and got an accuracy of 95% approximately. The blue curve in the graph represents the accuracy of model in detecting road signs correctly with respect to the epoch, which is the number of time the model is trained/iterated. The orange curve represents the validation set accuracy. This accuracy can be improved if we use image processing in the system and accuracy over 98% can be achieved.

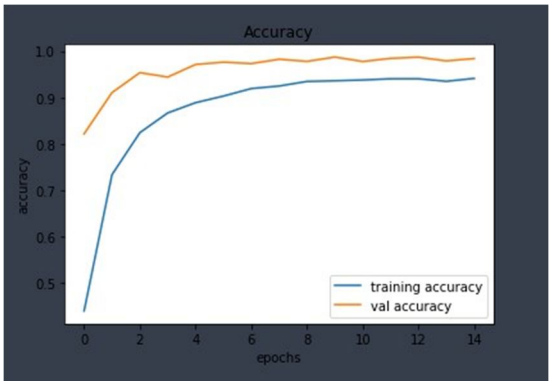


Fig. Accuracy Graph

We also plotted the loss vs epoch graphs for the model Blue line represents the training set loss and orange line represents validation set loss. Our aim is to minimize the loss. We can minimize the loss further by using image processing on road sign images captured by the system.

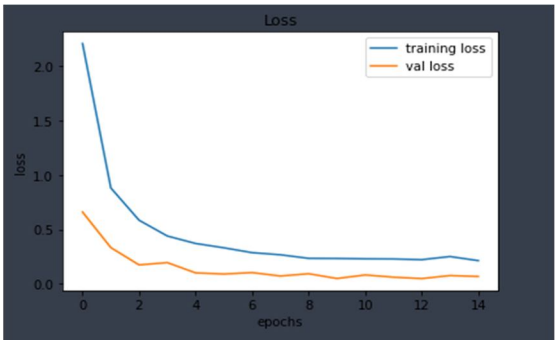


Fig. Loss Graph

V. CONCLUSION AND FUTURE SCOPE

A. *Future Scope*

Since we are implementing the project using machine learning which is a future technology. Doing a project on that would be a game changer in the industry. And the work could be implemented in the rapidly growing automobile industry which can not only contribute to businesses but can also avoid accidents and save lives. The existing systems are only available in recently launched, expensive, high- end vehicles (mainly cars) having certain limitations and may not be affordable to everyone. So, this newer system can be used which is more efficient and can be implemented using a dashcam and small device with display which can be installed in any vehicle whether it is a lower model car, two-wheeler, medium vehicle, or large commercial vehicle, etc.

B. *Conclusion*

Traffic signs provide valuable information to drivers and other road users. They represent rules that are in place to keep you safe and help to communicate messages to drivers and pedestrians that can maintain order and reduce accidents. Neglecting them can be dangerous. Most signs make use of pictures, rather than words, so that they are easy to you know what each picture represents, and that you use them to inform your driving. Failing to do so could result in a serious accident or a fine. Often due to various reasons, roads can be missed unknowingly. To avoid this, Road Sign detection system can help by always keeping an eye on the road and inform about the road signs it detects and can reduce the chance of missing out important road signs.

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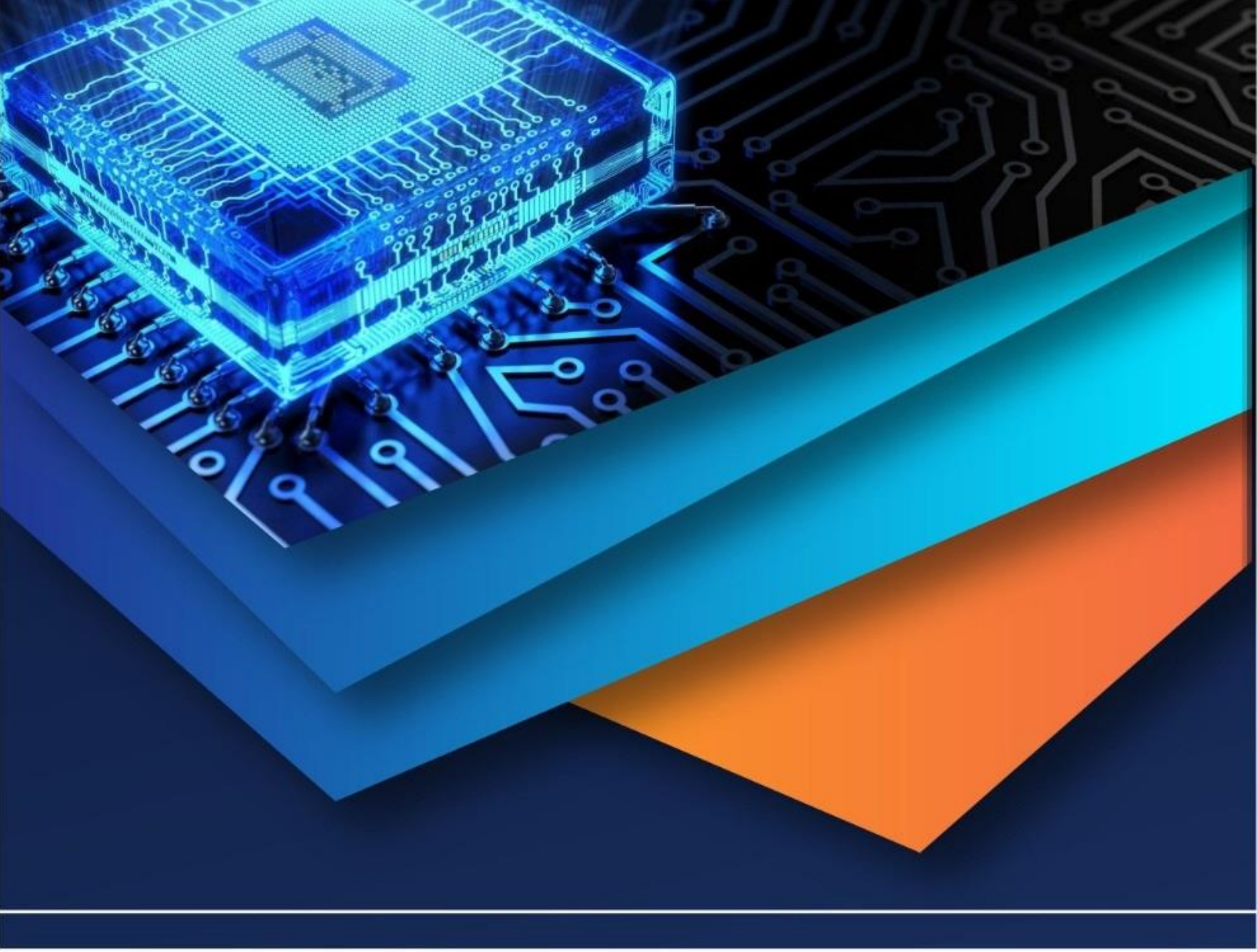
C. Aim of Project

This project is aimed towards reducing road accidents with the help of AI. This system is aimed to be used not only in new high-end cars but also in existing vehicles including older cars, bikes, heavy vehicles, etc. Lane detection and road sign detection system are used to avoid accidents as safety is main purpose of the system. Every year the lives of approximately 1.35 million people are cut short because of a road traffic crash. Between 20 and 50 million more people suffer non-fatal injuries, with many incurring a disability because of their injury. Road traffic injuries cause considerable economic losses to individuals, their families, and to nations. These losses arise from the cost of treatment as well as lost productivity for those killed or disabled by their injuries, and for family members who need to take time off work or school to care for the injured. Road traffic crashes cost most countries 3% of their gross domestic product. (Source: World Health Organization).

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