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TRAFFIC SIGN BOARD DETECTION USING CNN

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ABSTRACT

In recent years Traffic sign board detection is a crucial task. It is imperative that traffic signs be automatically detected and recognised by computer technology due to the growing demand for vehicle intelligence and the development of self- driving cars. These days, convolutional neural networks (CNN) are used to perform an increasing number of object identification tasks. The majority of computer vision problems, both old and new, have been improved by convolutional neural networks due to their high recognition rate and quick execution. This project uses a convolution neural network to develop an algorithm for recognising traffic signs. Which results in high accuracy predictions.

Key Words: Convolution Neural Network, Tensorflow, Traffic Sign Recognition, Machine Learning,

I. INTRODUCTION

Machine learning algorithms are more important than ever. Among the applications of machine learning, spam filtering, speech interpretation, facial recognition, and road sign identification are just a few. In order to drive safely, you must abide by different traffic signs, such as traffic lights, turn left or right, speed restrictions, no passing of heavy vehicles, no entrance, children crossing, etc. Similarly, in order to reach accuracy, autonomous vehicles must comprehend these indicators and make choices.

Friendly thing by including images through cloud storage. Traffic signs classification is a way for identifying the class to which a traffic sign belongs.

II. EXISTING METHOD

In the existing system the Traffic sign board detection is detected using the Image Processing technique. They used the image segmentation method which makes to divide the image into multiple parts. This is typically used to identify the objects or relevant information in thedigital images. The image is applied to the segmentation after the grey scaleconversion and edge detection.

A pixel colour in an image is a combination of three colours Red, Green, and Blue (RGB). The grey scale conversion is a methodology which converts the RGB image into the grayscale image. In the edge detection boundaries of object within an image is found through Canny Edge detection is a technique used to extract the useful structural information from different objects.

After the segmentation the feature extraction and comparison is done. In the existing system techniques like K-means clustering, Lidar and vision based, Video streaming and used Matlab for Processing Finally the output is displayed on the Screen. As the MATLAB code increasethe complexity and has less accuracy than compared to other trending techniques. This models also have the problem with Redundancy and Cost related issues.

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III. PROPOSED METHOD

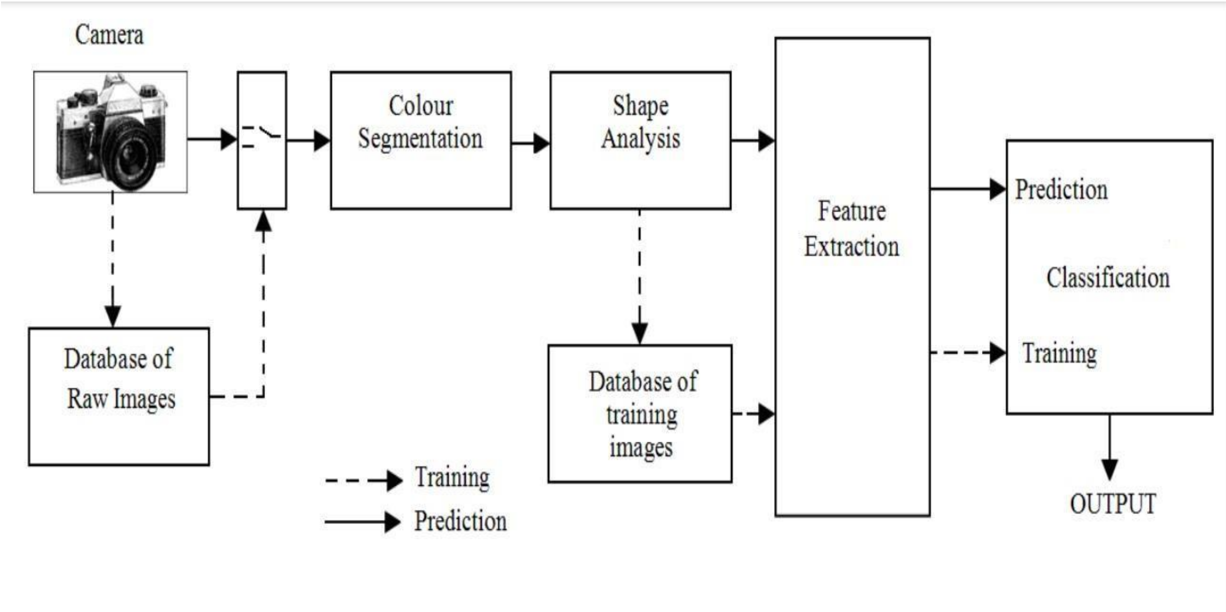

Figure: Working of Training and Prediction

In this model the tasks can be divided into two parts firstly a database for a Traffic sign board are collected we are using GTSRB dataset and the other is develop and design a deep CNN architecture for Traffic sign detection. The collected data set is given as an input to the proposed CNN architecture for training, validation and testing. Once the CNN is trained, it is ready to be used for classifying new images which were not part of the collected dataset.

The implementation of the classification algorithm for the Traffic sign detection task Combined with pre-processing and localization steps from previous works, theproposed method for Traffic sign board detection by Using CNN. The proposed classification solution is implemented using the Tensor Flow framework. The important aspects of the project are to trainthe dataset and extract the features of an image.

A system to detect and recognize Traffic signs should be able to work in two modes; the training mode in which a database can be built by collecting a set of Traffic signs that mapped to specific class as a label for training and validation, and a prediction mode in which the system can recognize a Traffic sign board which has not been seen before.

IV. WORKING

Convolutional neural networks (CNN) can be used to detect Traffic Sign Board. CNNs are a class of deep learning neural networks designed specifically for image processing tasks and are widely used in various computer vision applications such as object detection, image recognition, andMulti class recognition.

In the context of Traffic sign board detection, CNNs can be trained torecognize specific features and patterns in different traffic sign images that belong toa specific class. Model is trained with

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these images so that model can identifysign name of unknown sign, since it was previously trained with a same type of images that points towards actual sign class.

To train a CNN to detect Traffic sign board, you can use a dataset which consists of different types of images that belong to different classes, CNN uses this dataset to learn its ability to distinguishbetween different traffic signs. In this data set it consists of 43 classes i.e. it can predict up to 43 different signs after the model was trained.

CNN has been used in various research studies to detect and classify traffic signs with promising results. However, it is important to note that the effectiveness ofa CNN in detecting Traffic sign board depends on the quality of the dataset used for training and the robustness of the characteristics learned by the network.

V. RESULTS

The Performance of a CNN-based traffic sign detection system is evaluated based on various metrics such as precision, recall, F1 score, accuracy, and mean average precision (mAP). These metrics provide a quantitative measure of the system's performance, indicating how well it can detect traffic signs and how many false detections it produces.

This CNN-based traffic sign detection systems have shown great promise in accurately detecting traffic signs from images. However, further research is needed to explore the optimal architecture and preprocessing techniques for achieving even higher levels of accuracy and robustness. High accuracy rates have been found when used, the modelarchitecture.

Figure: Output of the Model after training

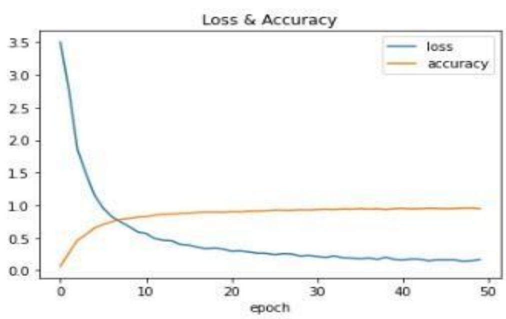

Figure: Graph of Accuracy vs Validation Accuracy.

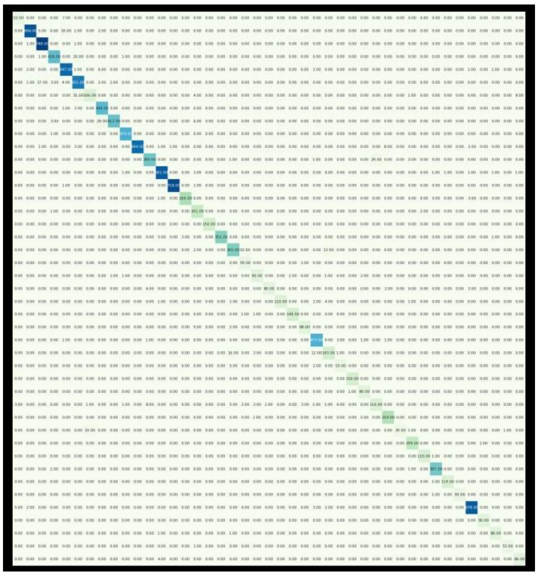

Figure: Confusion Matrix after testing

The confusion matrix represents the countsof predicted and actual values.

	precision	recall	f1-score	support
Speed limit (20km/h)	0.87	0.88	0.88	60
Speed limit (30km/h)	0.99	0.96	0.98	720
Speed limit (50km/h)	0.97	1.00	0.98	750
Speed limit (60km/h)	0.98	0.95	0.96	450
Speed limit (70km/h)	0.94	0.98	0.96	660
Speed limit (80km/h)	0.90	0.95	0.93	630
End of speed limit (80km/h)	0.84	0.71	0.77	150
Speed limit (100km/h)	0.92	0.99	0.95	450
Speed limit (120km/h)	0.99	0.92	0.95	450
No passing	0.98	1.00	0.99	480
No passing for vechiles over 3.5 metric tons	1.00	0.98	0.99	660
Right-of-way at the next intersection	0.96	0.93	0.94	420
Priority road	0.98	0.99	0.98	690
Yield	1.00	1.00	1.00	720
Stop	0.99	0.99	0.99	270
No vechiles	0.92	0.96	0.94	210
Vechiles over 3.5 metric tons prohibited	1.00	1.00	1.00	150
No entry	1.00	0.97	0.99	360
General caution	0.91	0.94	0.92	390
Dangerous curve to the left	0.82	0.98	0.89	60
Dangerous curve to the right	0.93	0.92	0.93	90
Double curve	0.99	0.89	0.94	90
Bumpy road	1.00	0.92	0.96	120
Slippery road	0.99	0.99	0.99	150
Road narrows on the right	0.96	0.98	0.97	90
Road work	0.95	0.99	0.97	480
Traffic signals	0.87	0.79	0.83	180
Pedestrians	0.84	0.88	0.86	60
Children crossing	0.99	1.00	1.00	150
Bicycles crossing	0.92	0.99	0.95	90
Beware of ice/snow	0.80	0.77	0.79	150
Wild animals crossing	0.96	0.96	0.96	270
End of all speed and passing limits	1.00	0.65	0.79	60
Turn right ahead	0.98	1.00	0.99	210
Turn left ahead	0.98	0.99	0.99	120
Ahead only	0.99	0.99	0.99	390
Go straight or right	0.99	0.99	0.99	120
Go straight or left	1.00	0.98	0.99	60
Keep right	0.99	0.98	0.98	690
Keep left	0.99	1.00	0.99	90
Roundabout mandatory	0.97	0.98	0.97	90
End of no passing	0.98	0.88	0.93	60
End of no passing by vechiles over 3.5 metric tons	0.91	0.96	0.93	90
accuracy			0.96	12630
macro avg	0.95	0.94	0.95	12630
weighted avg	0.96	0.96	0.96	12630

Figure: Classification Report

VI. CONCLUSION

Convolutional neural networks (CNNs) have many benefits over conventional computer vision techniques and have proven to be very effective when used for traffic sign detection. CNNs are a good option for creating efficient and effective traffic sign detection systems because of their scalability and real-time performance, as well as their capacity to identify traffic signs in a variety of lighting, weather, and viewing angles. Automating traffic sign detection systems using CNN can increase efficiency and decrease the need for human intervention. Furthermore, CNNs are effective at generalising to previously unobserved data, which makes them useful for identifying potential future changes to traffic signals.

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