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Traffic Sign Detection

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Abstract: ***Traffic signs are important to ensure smooth traffic flow without bottle necks or mishaps. Road Symbols are the pictorial representation having different necessary information required to be understood by driver. Road signs in front of the vehicle are ignored by the drivers and this can lead to catastrophic accidents. This paper presents an overview of the traffic sign board detection and recognition and implements a procedure to extract the road sign from a natural complex image, processes it and it alerts the driver using text or voice command. It is implemented in such a way that it acts as a boon to drivers to make easy decisions.***
Keywords: Traffic Sign Detection, CNN

I. INTRODUCTION

Machine learning is an application of artificial intelligence (AI) that provides systems the ability to automatically learn and improve from experience without being explicitly programmed. Machine learning focuses on the development of computer programs that can access data and use it learn for themselves. Traffic sign detection and recognition have become a popular field in the computer vision sector, as it plays a vital role in assisting the driver with understanding the signs and following traffic rules as well as creating an autonomous driving system. Traffic signs consist various unique shapes and a range of colors, which is why it is easily noticeable by the human eyes. The same features can be used for the computers to distinguish and classify the traffic signs. Traffic sign detection is usually based on the shape and color attributes of traffic signs, and traffic sign recognition is often used with classifiers, such as convolutional neural networks (CNNs) discriminative features.

II. LITERATURE SURVEY

In Paper [1] proposes algorithms for the automatic detection of traffic signs from photo or video images and their classification to provide a driver alert system. The photos feature red and blue and other colour information. The identified indications are then categorised as triangular, squared, or circular forms based on their shape properties. Traffic signs are divided into the following categories based on colour and shape: danger, information, obligation, and prohibition. The performance of the whole system is increased by the inclusion of novel elements in both the detection and classification algorithms. A straightforward and effective algorithm for triangular and circular traffic signs detection in intricate nature environments is given in [2]. The picture is initially segmented and binarized. Then, for each contour that was taken from the binarized picture, the convex hull is determined. The matching convex edge of the convex hull replaces some of a contour's concave portion. The contour is then roughly converted to a polygon. The triangular traffic signs are those contours that can successfully be approximated to a triangle, while the circular traffic signs are those contours that can successfully be approximated to an ellipse with random least squares fitting. The findings of the experiment indicate that deformed traffic signs may be detected at a rate of 86.79 percent with improved occlusion. Numerous studies on the detection and identification of traffic signs have been conducted recently. The majority of them, however, were only tested in limited circumstances, such as using cameras with high resolution and sensitivity, in a highway setting or along a roadside with a lot of trees and a few obstructive items. The segmentation and detection phases of a quick and reliable traffic sign detection system are presented in this paper [3]. A variable segmentation stage that comprises twofold segmentation, one with higher criteria and the other with lower criteria, is meant to increase system dependability and effectively reduce the significant computational burden for shape-based detection. The accuracy rate must be at least 86.7 in order to reliably detect cases in normal light using picture sequences. Numerous studies on the detection and identification of traffic signs have been conducted recently. The dataset used in the trials was captured with a VGA camera in an urban location with a number of distracting things that emerge on the side of the road and target objects that are occasionally partially obscured under a variety of lighting situations, from dark or overcast sky to brilliant condition. This paper [4] suggests a system that can recognise and categorise various traffic sign kinds from photographs.

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This work varies from previous publications in that it use symbols that are widely recognised and is not constrained to a small number of symbols, as many other papers are. In this study, 28 signs which are in use all around the world are employed for categorization. For purposes of detection and recognition, two distinct neural networks have been deployed; one classifications signs and the other shapes. The training and validation datasets were created via image augmentation. The first classifier was trained on 40,000 photos, using 28,000 positive images (pictures of traffic signs) and 12,000 negative images (pictures of no traffic signs). and 2400 positive photos and 1200 negative images were utilised to train the second classifier out of 3600 total images. The region of interest is extracted from the processed photos and put into two CNN classifiers for classification. This study [5] proposes a technique for traffic sign identification and recognition that makes use of an ensemble of convolutional neural networks (CNNs) for the detection of the sign and image processing for its recognition. Since CNNs have a high recognition rate, using them to carry out different computer vision tasks is beneficial. For the CNN's implementation, TensorFlow is employed.

III. PROPOSED SYSTEM

We describe the proposed architecture for Traffic Sign Detection.

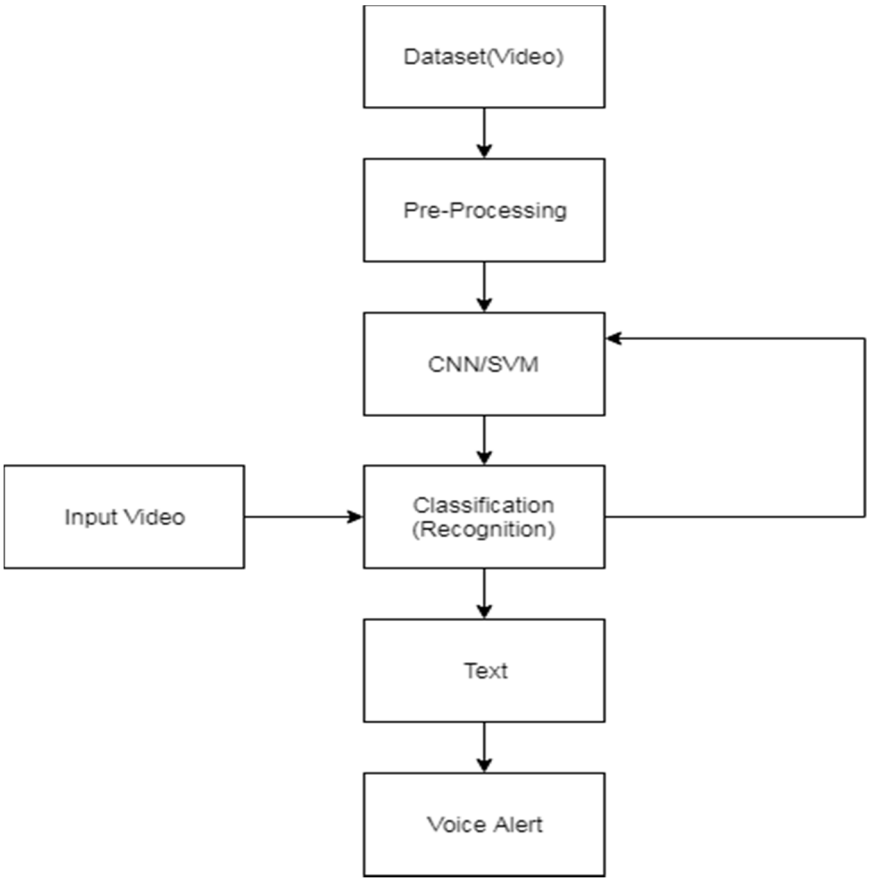


Fig:1 Architecture Diagram for Traffic Sign Detection

The architectural diagram provides a detailed explanation of the project's flow. We begin with the method begins by utilising a camera placed on a moving vehicle to record video of the road ahead. To improve image quality and lower noise, the video frames are preprocessed. This could involve methods like edge detection, smoothing, and contrast correction. The traffic signals in the preprocessed frames are categorised using convolutional neural networks (CNNs). The CNN utilises a number of convolutional layers to extract information from the preprocessed picture as input. After that, fully linked layers get these features for categorization. The sort of traffic sign in the image is predicted by CNN's output. This may be a speed limit sign, yield sign, stop sign, etc. The sort of traffic sign that was recognised might be output by the system as text, either on a screen or as an audio output. The motorist may also receive an auditory alert from the device informing them of the kind of traffic sign it has located. For instance, the system may announce "stop sign ahead" if it detects a stop sign.

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IV. IMPLEMENTATION

Before using the system, users must first create an account with a username and password. For users to register and log in, this would include creating registration and login pages. The device would employ a camera that was installed on a car to record video of the upcoming route. The system would analyse the video frames in order to recognise and categorise traffic signs in real-time. The technology would analyse video data to find and categorise traffic signs using a computer vision and deep learning algorithm. To identify and categorise various signals, the algorithm would be trained on a dataset of traffic signs. A user interface for the system would show the video footage shot by the camera and highlight any detected traffic signs. The system will alert the driver of any pertinent information as well as the type of traffic sign it has identified. The technology offers a warning system that sends visual or audible notifications to the driver whenever a traffic sign is recognised. Informing the motorist of the type of traffic sign identified and any pertinent information may be done by text or audio notifications.

V. SCOPE OF FUTURE USE

We will attempt to present a voice alarm that can be built to support many languages in light of the rising globalisation and multiculturalism of cities. Drivers who speak different languages will be able to get notifications in their chosen language. We will upgrade transportation systems and optimise traffic flow, smart city projects may utilise traffic sign detection. For a more complete picture of traffic patterns and road conditions, the technology may be combined with other data sources, such GPS and meteorological information.

VI. CONCLUSION

We have come to the conclusion that the system's primary objective was to identify traffic signs and provide text or audio alerts. We propose a smart driver alert system which detects and recognizes traffic sign board from video stream input and gives text or voice message to the driver. Using this technology, we can control traffic safely while reducing traffic accidents. a system that can recognise and categorise a variety of traffic signs in various settings. The results are mediocre, but they may be enhanced by experimenting with other neural network architectures. Future applications may potentially involve real-time detection and identification.

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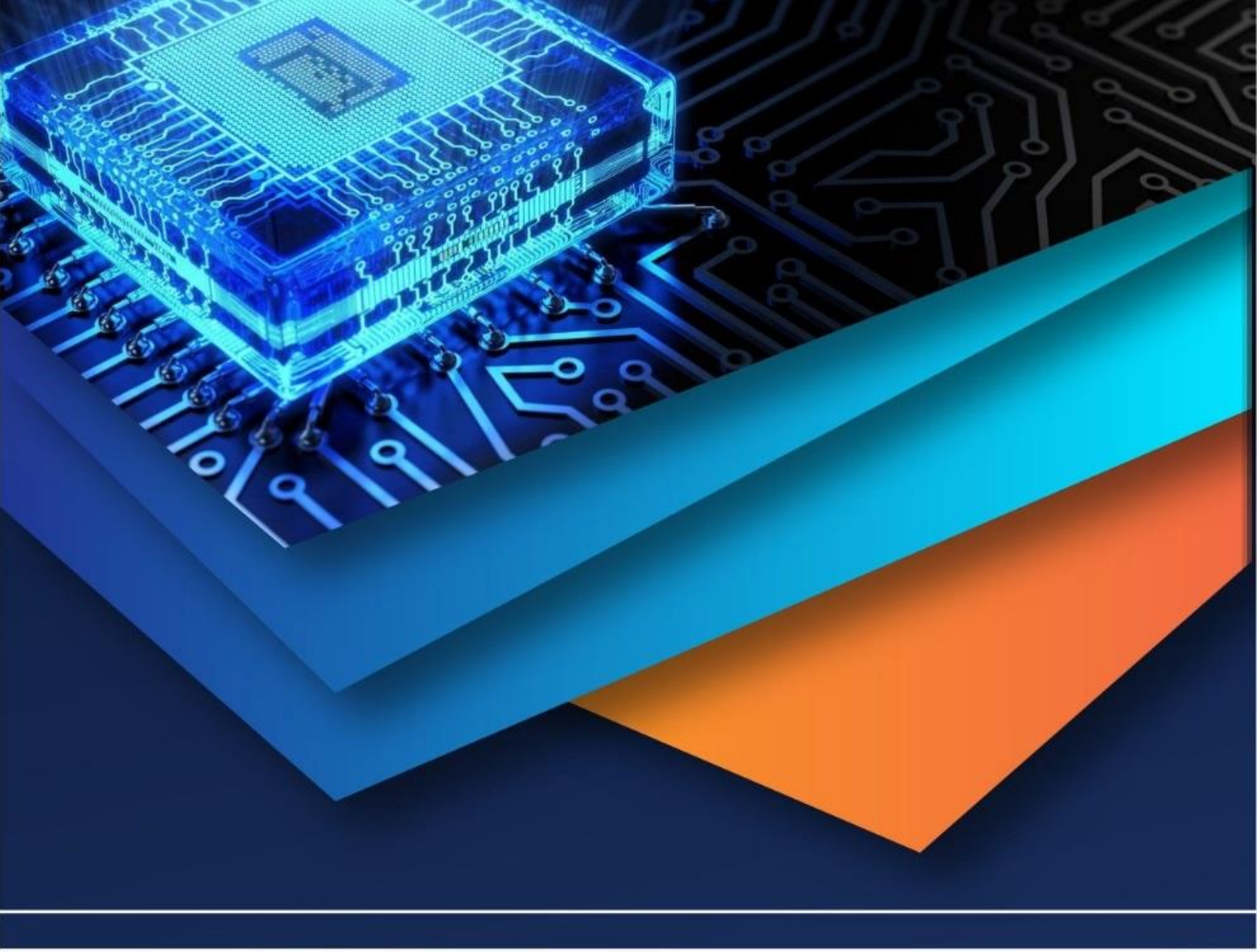
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