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TRAFFIC SIGN BOARD RECOGNITION AND VOICE ALERT SYSTEM USING CONVOLUTIONAL NEURAL NETWORK

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Abstract - To ensure a smooth and secure flow of traffic, road signs are essential. A major cause of road accidents is negligence in viewing the Traffic signboards and interpreting them incorrectly. The proposed system helps in recognizing the Traffic sign and sending a voice alert through the speaker to the driver so that he/ she may take necessary decisions. The proposed system is trained using Convolutional Neural Network (CNN) which helps in traffic sign image recognition and classification. A set of classes are defined and trained on a particular dataset to make it more accurate. The German Traffic Sign Benchmarks Dataset was used, which contains approximately 43 categories and 51,900 images of traffic signs. The accuracy of the execution is about 98.52 percent. Following the detection of the sign by the system, a voice alert is sent through the speaker which notifies the driver. The proposed system also contains a section where the vehicle driver is alerted about the traffic signs in the near proximity which helps them to be aware of what rules to follow on the route. The aim of this system is to ensure the safety of the vehicle's driver, passengers, and pedestrians.

Keywords – Convolutional Neural Network, GTSRB Dataset, Traffic Signs, Voice Alert.

I. INTRODUCTION

There have been a lot of technological advancements and cars with auto-pilot mode have come up. Autonomous vehicles have come into existence. There has been a boom in the self-driving car industry. However, these features are available only in some high end cars which are not affordable to the masses. We wanted to devise a system which helps in easing the job of driving to some extent.

On conducting a survey we found that the magnitude of road accidents in India is alarming. Reports suggest that every hour there are about 53 mishaps taking place on the roads. Moreover, every hour more than 16 deaths occur due to these mishaps. When someone neglects to obey traffic signs while driving, they are putting their life as well the life of the other drivers, their passengers and those on the road at risk. Hence, we came up with this system in which traffic signs are automatically detected using the live video stream and are read out aloud to the driver who may then take the required decision. Another area of focus in our system is the idea of getting the location of the user using along with their location so that the driver will be notified in advance regarding the next approaching Traffic Sign.

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The following is a breakdown of the paper's structure: Section II summarises the literature review; Section III explains the technique and how the models work; and Section IV displays the Results and Analysis. The paper's conclusion is in Section V, while the Future Scope is in Section VI.

II. EXISTING SYSTEM

Yadav ET. Al. employed the Support Vector Machine technique. The dataset was divided into 90/10 for training and testing purposes, and it employs linear classification. To achieve the desired result, a series of phases called Color Segmentation, Shape Classification, and Recognition were followed.

Anushree.A ET. Al. used Raspberry Pi in detecting and recognizing Traffic Signs with much less coding. However, it requires the Raspberry Pi board at one's discourse for implementation which is quite costly.

S. Harini et.al. Introduced another way of Traffic sign recognition is picture intensive. A video is acquired and broken down into frames. Image preprocessing is done which includes separating the foreground and the background, thinning and contrast enhancement. The signs are then categorized as hexagonal, triangular, or circular in shape and transmitted for template matching after these operations. The objects with some definite shape are matched from the pre-trained algorithm.

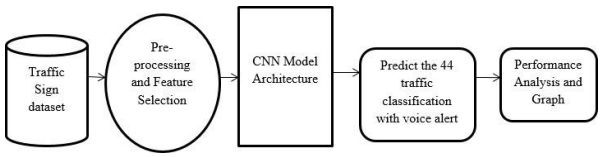
III. PROPOSED SYSTEM

In our proposed system, we develop the Traffic Sign Board Recognition and Voice Alert System using Convolutional Neural Network. Our system will able to detect, recognize and infer the road traffic signs would be a prodigious help to the driver.

The objective of an automatic road signs recognition system is to detect and classify one or more road signs from within live color images.

In this base paper we provide alertness to the driver about the sign using voice of the detected sign board. The system provides the driver with real time information from road signs, which consist the most important and challenging tasks. Next generate an acoustic warning to the driver in advance of any danger. This warning then allows the driver to take appropriate corrective decisions in order to mitigate or completely avoid the event.

IV. SYSTEM ARCHITECTURE:



V. IMPLEMANTATION MODULES:

- Dataset
- Importing the necessary libraries
- Retrieving the images
- Splitting the dataset
- Building the model
- Apply the model and plot the graphs for accuracy and loss
- Accuracy on test set
- Voice alert
- Saving the Trained Model

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MODULES DESCSRIPTION:

Dataset:

In the first module, we developed the system to get the input dataset for the training and testing purpose. We have taken the dataset from German Traffic Sign Benchmark single-image classification challenge held at the International Joint Conference on Neural Networks Link.

INPUT DESIGN

The input design is the link between the information system and the user. It comprises the developing specification and procedures for data preparation and those steps are necessary to put transaction data in to a usable form for processing can be achieved by inspecting the computer to read data from a written or printed document or it can occur by having people keying the data directly into the system. The design of input focuses on controlling the amount of input required, controlling the errors, avoiding delay, avoiding extra steps and keeping the process simple. The input is designed in such a way so that it provides security and ease of use with retaining the privacy. Input Design considered the following things:

OUTPUT DESIGN

A quality output is one, which meets the requirements of the end user and presents the information clearly. In any system results of processing are communicated to the users and to other system through outputs. In output design it is determined how the information is to be displaced for immediate need and also the hard copy output. It is the most important and direct source information to the user. Efficient and intelligent output design improves the system's relationship to help user decision-making.

VI. RESULT

Fig. 1. Traffic Signs Taken into consideration

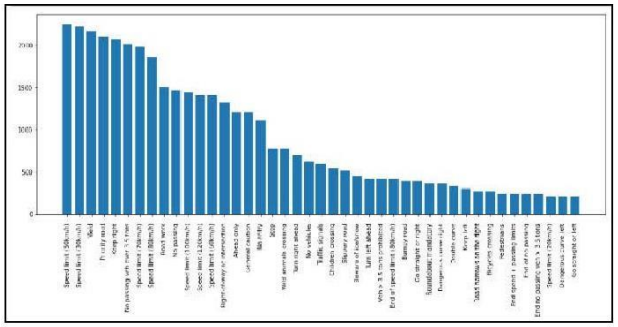

Fig. 2. Number of images per class in the dataset

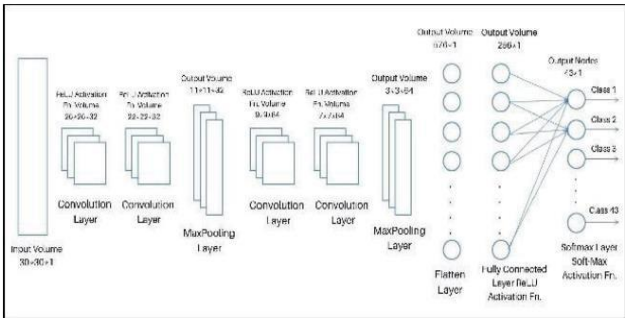

Fig. 3. Neural Network Representation

Fig. 6. No Entry Sign (Input)

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Method	Accuracy
AlexNet	92.63%
GoogleNet	80.5%
VSSANet	94.42%
VGGNet	98.03%
Trained Neural Network	98.52%

Table I. Accuracy of various models available

VII. CONCLUSION

The Traffic Sign Board Detection and Voice Alert System is implemented using Convolutional Neural Network. Various models under the CNN heading were studied and the one with highest accuracy on the GTSRB dataset was implemented. The creation of different classes for each Traffic sign has helped in increasing the accuracy of the model. A voice message is sent after recognition of the sign which alerts the driver, thus helping him/her take appropriate decisions. This paper is a significant advancement in the field of driving as it would ease the job of the driver without compromising on the safety aspect. Also this system can easily be implemented without the need of much hardware thus increasing its reach.

VIII. FUTURE SCOPE

The prototype can be expanded to include an inbuilt alert system with a camera in the vehicle's centre. Also, the feature of getting the estimated time for reaching that particular traffic sign can be added. This system can also be expanded for identification of traffic signals and hence prompt the user about the time to reach that particular signal and its status as well. The user can accordingly plan their trip start time and hence cross all signals without having to wait. Also the driver verification will be done with the help of an API providing the information about the license holder and the license number.

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