Traffic Sign Board Recognition and Voice Alert System Using Convolutional Neural Network

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Abstract:

Road signs are necessary to provide a safe and orderly flow of traffic. The failure to read traffic signs or to interpret them appropriately is a key contributor to auto accidents. In order for the driver to make the appropriate judgments, the proposed system assists in identifying the traffic sign and giving a voice alarm to him or her through the speaker. Convolutional Neural Network (CNN), which aids in recognizing and categorizing traffic sign images, is used to train the suggested system. To improve the precision of a given dataset, a set of classes are established and trained.A voice alert is broadcast through the speaker after the technology recognizes the sign to inform the driver. The proposed system also has a component where drivers of moving vehicles are informed of nearby traffic signs so they are aware of the laws they should observe. The intended system's main objective is to keep the driver, passengers, and pedestrians safe.

Keywords: Convolutional Neural Network (CNN), Voice Alert,Traffic Signs, Passengers, Drivers.

1. INTRODUCTION

Traffic sign board recognition and voice alert systems are technologies designed to assist drivers by detecting and interpreting traffic signs and providing them with audio alerts or warnings. These systems typically use a combination of computer vision techniques and machine learning algorithms to examine the images or video streams captured by cameras mounted on vehicles. In recent years, the rapid increase in urbanization and the ever-increasing number of vehicles on roadways have brought to light the urgent requirement for more sophisticated traffic management systems. Recognizing traffic sign boards in a timely and accurate manner is an essential component of guaranteeing road safety. This is because traffic sign boards provide drivers with information that is vital to their safety. Taking into consideration the importance of this matter, our study is focused on the creation of a sophisticated Traffic Sign Board Recognition and Voice Alert System that makes use of the capabilities of Convolutional Neural Networks (CNNs).

Convolutional neural networks (CNNs), which are a fundamental component of computer vision, have shown extraordinary performance in picture categorization tasks.

We intend to improve the accuracy and effectiveness of traffic sign identification by utilizing the capabilities of deep learning. This will allow us to make a contribution to the overall safety and effectiveness of road networks. The suggested system makes use of cutting-edge neural network architectures that have been trained on huge datasets. This enables the system to recognize and understand a wide variety of traffic signboards in a variety of different environments.

In this research, we give a complete exploration of the approach that was utilized in our system. Specifically, we explain the architecture of the Convolutional Neural Network, the dataset that was utilized for training, and the preprocessing procedures that were utilized to ensure that the recognition was accurate. In addition, our technology goes beyond simple optical recognition by including a voice warning mechanism. This mechanism provides drivers with real-time audio signals, which in turn improves their situational awareness and response times.The incorporation of cutting-edge technology into our work has the ability to reduce the number of accidents that occur on the roads and to enhance the overall management of traffic. This is the reason why our work is so important. Through the utilization of computer vision and artificial intelligence, our Traffic Sign Board Recognition and Voice Alert System offers a significant advancement in the direction of the development of roadways that are both more intelligent and safer. The subsequent sections of this paper will provide an explanation of the design, implementation, and evaluation of our system. We will also give empirical evidence of the system's effectiveness and reliability in situations that are based in the actual world itself.

2. LITERATURE SURVEY

The most important step in the software development process is the literature review. This will describe some preliminary research that was carried out by several authors on this appropriate work and we are going to take some important articles into consideration and further extend our work.

1) Indian Traffic Sign Board Recognition and Driver Alert System Using Machine Learning

AUTHORS: Yadav, Shubham & Patwa, Anuj & Rane, Saiprasad & Narvekar, Chhaya

Sign board recognition and driver alert system which has a number of important application areas that include advance driver assistance systems, road surveying and autonomous vehicles. This system uses image processing technique to isolate relevant data which is captured from the real time streaming video. The proposed method is broadly divided in five-part data collection, data processing, data classification, training and testing. System uses variety of image processing techniques to enhance the image quality and to remove non-informational pixel, and detecting edges. Feature extractor are used to find the features of image. Machine learning algorithm Support Vector Machine (SVM) is used to classify the images based on their features. If features of sign that are captured from the video matches with the trained traffic signs then it will generate the voice signal to alert the driver. In India there are different traffic sign board and they are classified into three categories: Regulatory sign, Cautionary sign, informational sign. These Indian signs have four different shapes and eight different colours. The proposed

system is trained for ten different types of sign. In each category more than a thousand sample images are used to train the network.

2)A smart driver alert system for vehicle traffic using image detection and recognition technique

AUTHORS: S. Harini, V. Abhi ram, R. Hegde, B. D. D. Samarth, S. A. Shreyas and K. H. Gowranga

Road signs are important to ensure smooth traffic flow without bottle necks or mishaps. Road symbols are the pictorial representations 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 alerts the driver using voice command It is implemented in such a way that it acts as a boon to drivers to make easy decisions.

3. EXISTING SYSTEM

Traffic sign detection and identification using convolutional neural networks. ConvolutionalNeural Networks are used for road sign detection and classification as it takes an input image and then assigns weights to different aspects in the image and then differentiate them from each other. The traffic sign detection face difficulties like non-identical traffic signs and bad postage of signs. The solution to many of these problems CLAHE (Contrast Limited Adaptive Histogram Equalization) has been used in improving the contrast of different traffic sign images. The CLAHE algorithm can be used as a preprocessing step in traffic sign board detection to enhance the contrast and improve the visibility of traffic signs, especially in challenging lighting conditions. To understand the sophistication of an image in a better way, the network can be trained. After reducing the parameters and weights reusability, the architecture fits better with the image dataset. The architecture of the system is designed in such a way that it extracts important features from the traffic sign's images and classifies them under various categories.

Limitations of the Existing System:

1. Occlusion and Partial Visibility
2. Illumination and Lighting Conditions
3. Limited Training Data
4. Variability in Traffic Sign Boards
5. Generalization to New Environments

4. PROPOSED SYSTEM

The aim of this proposed system is to ensure the safety of the vehicle's driver. The proposed system helps in recognizing the traffic sign and sending a voice alert through the speaker to the driver. The proposed system is trained using convolutional neural network (CNN). A set of classes are defined and trained on a particular dataset

to make it more accurate. We give awareness of the driver about the sign utilizing voice of the distinguished sign board.
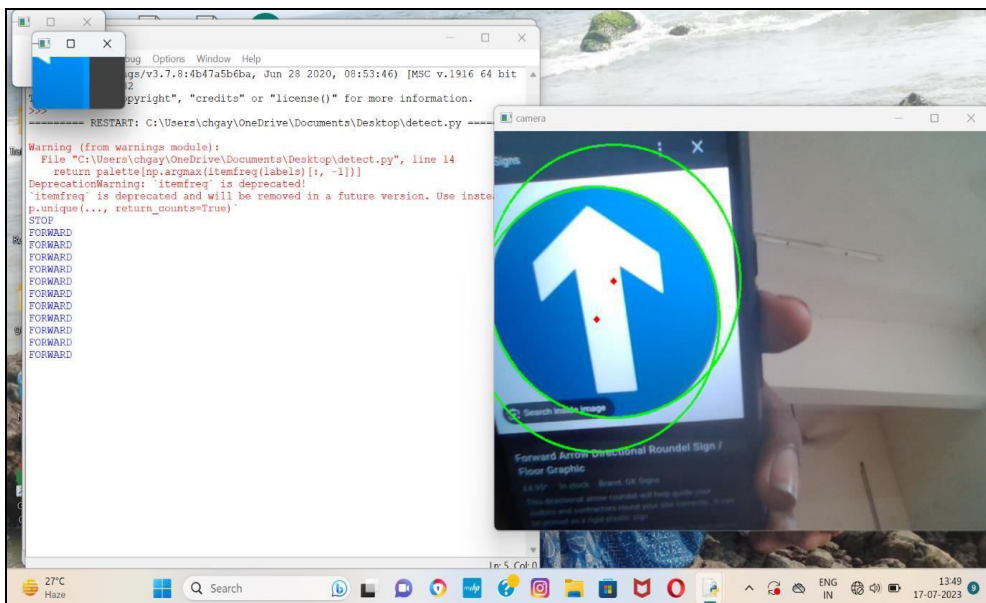
5. EXPERIMENTAL RESULTS

From the below figures it can be seen that proposed model is more accurate in order to prove our proposed system.
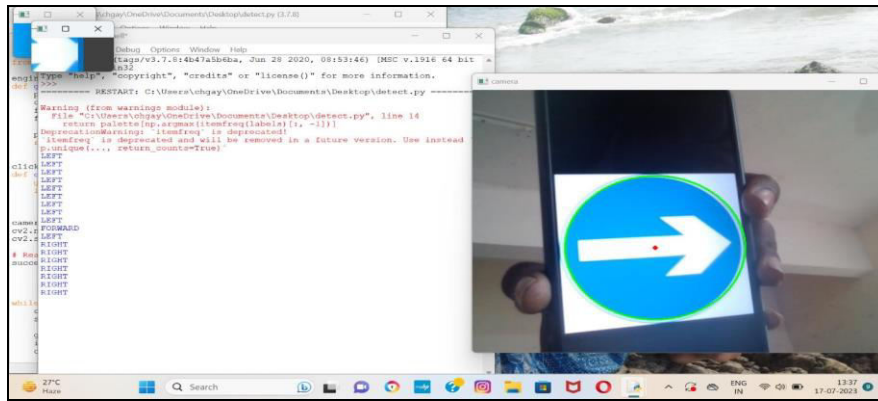
Home Page
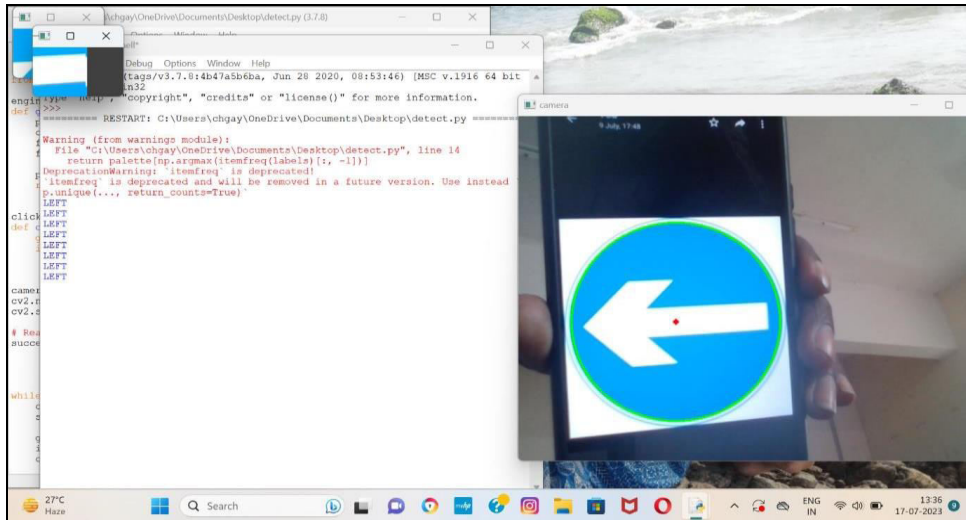
Explanation: In the above diagram When the left signboard is visible in front of the camera, the output of the text will be displayed on the shell as LEFT and give voice alert to the user.
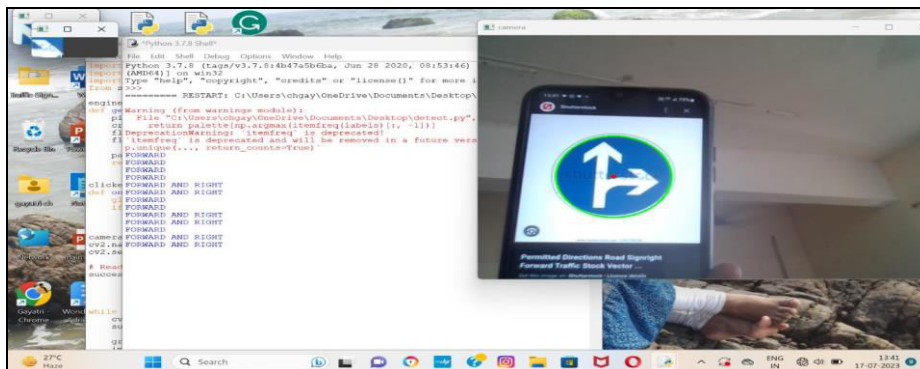
Output:

Explanation: In above diagram When the forward signboard is visible in front of the camera, the output of the text will be displayed on the shell as a FORWARD and give the voice alert to the user.

Output:

Explanation: In the above diagram When the right signboard is visible in front of the camera, the output of thetext will be displayed on the shell as a RIGHT and give voice alert to the user.

Result :

Explanation: In the above diagram When the forward and right signboard is visible in front of the camera, theoutput of the text will be displayed on the shell as a FORWARD AND RIGHT and give voice alert to the user.

6. CONCLUSION

The voice Alert and Traffic Sign Board Detection are controlled by the Convolutional Neural Network. Only the CNN model that performed the best on the dataset was used after comparing the other CNN models. The model's accuracy has increased as a result of the addition of new categories for each traffic sign. When the signal is identified, a voice message is delivered to the driver to inform them and assist them in making informed judgments. Because it would make driving simpler without compromising safety, this study could also constitute a significant

advancement in the realm of driving. This strategy will also be simple to implement without requiring a lot of hardware, broadening its applicability.

Declaration

1. All authors do not have any conflict of interest.
2. This article does not contain any studies with human participants or animals performed by any of the authors.

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