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REDUCING NUMBER OF ACCIDENTS IN INDIA USING RECOGNITION OF TRAFFIC SIGNBOARD AND DRIVER ALERT SYSTEM

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ABSTRACT

Road traffic in India is a big issue for the country. Because road traffic is expanding on a daily basis due to population growth and increased car consumption, it is critical to obey traffic laws with good discipline or the number of accidents will increase. Traffic rules include traffic sign boards and traffic signals that must be obeyed by everyone in the country. To provide full help to drivers in following traffic signs, we use Traffic Sign Board Detection and Voice Alert System, which allows us to limit vehicle speed and reduce the number of accidents. Following the system's identification of the sign, a voice alert is transmitted through the speaker to notify the driver. The proposed system also includes a segment in which the vehicle driver is informed to nearby traffic signs, allowing them to be aware of what laws to follow on the road. The goal of this system is to protect the driver, passengers, and pedestrians in the vehicle. The primary goals of this project are detection and recognition, as well as providing a voice alarm to the driver. The speed will be automatically adjusted based on the signboard.

KEY WORDS:

Traffic Sign Board Detection, Voice Alert System, Driver, Pedestrians, Road Accidents.

1. INTRODUCTION

Every year, millions of individuals are injured in car accidents. The majority of traffic accidents are the consequence of negligence, ignorance of the regulations, and disregard for traffic signs, both on an individual and societal level. The number of traffic accidents in India is concerning. This is demonstrated by the fact that around 56 accidents occur per hour, and more than 14 people are killed as a result of traffic accidents. When someone fails to heed traffic signs, they endanger themselves as well as other drivers, passengers, and pedestrians. All of the signs and signals help to maintain traffic order and are also intended to lessen the number and severity of traffic accidents. Some drivers consider that certain traffic signs are unnecessary. All traffic signs are strategically positioned to protect the safety of all drivers. These indicators indicate how fast drivers should drive. They help to maintain order on the roads and provide important information to drivers. Traffic signs contain a wealth of relevant environmental information that can assist drivers in learning about the changes in the road ahead and the driving regulations. Signs that have been removed from certain locations or are no longer visible due to wear and tear might endanger cars. They also advise drivers on when and where they should turn or not turn.To be an excellent driver, you must first grasp what the signs imply. Road signs are intended to ensure the safety of all drivers.

Our system's ability to detect, recognises, and infers road traffic signs will be a huge aid to the driver. An automatic road signs recognition system detects and classifies one or more road signs from live colour images taken by a camera. There have been many technological improvements, and cars with auto-pilot modes have been available. Autonomous vehicles have become a reality. The self-driving car business has experienced a surge. However, these amenities are only accessible in high-end vehicles that are not affordable to the general public. We sought to create a system that would help to ease the burden of driving. We discovered that the magnitude of traffic accidents in India is worrying after performing a survey. According to reports, over 53 accidents occur on the highways every hour. Furthermore, more than 16 people are killed per hour as a result of these catastrophes. When someone fails to heed traffic signs while driving, they endanger their own life as well as the lives of other drivers, passengers, and people on the road. As a result, we developed this technology in which traffic signs are automatically identified using the live video stream and spoken out to the driver, who may subsequently make the necessary decision. Another area of emphasis in our system is determining the user's location.

2. LITERATURE SURVEY

This section will deal with all the previous information related to brain tumor and several methods for identifying the road accident prediction. Literature survey is the most important step in software development process. For any software or application development, this step plays a very crucial role by determining the several factors like time, money, effort, lines of code and company strength. Once all these several factors are satisfied, then we need to determine which operating system and language used for developing the application. Once the programmers start building the application, they will first observe what are the pre-defined inventions that are done on same concept and then they will try to design the task in some innovated manner.

MOTIVATION

1) Recognition Of Traffic Signboard And Voice Alert To Driver Using Machine Learning

AUTHORS:

Framework employs an image preparation method to separate relevant information from the constantly flowing video. The proposed technique is divided into five sections: information collection, information handling and information layout, preparation, and testing. Framework employs a variety of image PARJANYA CA preparation procedures to enhance picture quality and eliminate non-instructive pixels, recognising edges. The highlight extractor was used to find the highlights of a photograph. To organize the images based on these features, an AI calculation called vector machine is used. In the event that the sign is highlighted, the voice sign will be made to warn the driver. There are many various types of activity sign boards, and they are divided into three categories: administrative signs, cautionary signs, and instructive signs. The indicators have four distinct shapes and eight distinct tones.

2) Traffic And Road Sign Recognition

AUTHORS: Hasan Fleyeh

This thesis describes a system for recognising and classifying road and traffic signs in order to create an inventory of them to aid highway engineers in their tasks of updating and maintaining them. It employs photos captured by a camera mounted on a moving vehicle. The system is divided into three stages: colour segmentation, recognition, and classification. Four colour segmentation methods are currently being developed and tested. They are a shadow and highlight invariant, a dynamic threshold, a de la Escalera algorithm modification, and a Fuzzy colour segmentation algorithm. Hundreds of photos are used to test each algorithm, and the shadow-highlight invariant approach is eventually chosen as the best performance. This is due to its resistance to highlights and shadows. It is also durable because it has been tested in a variety of lighting, weather, and time of day settings. This method achieved a successful segmentation rate of approximately 97%. A fuzzy shape recognizer is used for traffic sign recognition. Fuzzy rules were established to determine the shape of the sign based on four shape measures: rectangularity, triangularity, ellipticity, and octagonality.

3) Autonomous Vehicle and Driver Assistance Systems Traffic Sign Board Detection and Recognition

AUTHORS: Y.D. Chincholkar and Ayush Kumar

Many systems have been developed in recent years that use image processing algorithms to detect traffic sign boards. Edge detection is employed to avoid the present method's segmentation issues. The problem with color-based segmentation is that adaptive thresholding fails in real-time applications. This proposed technique is yet another method for detecting traffic signs in video sequences. The first step in this work is the pre-processing of the video frame, which is accomplished through grey scale conversion and edge detection, and the second step is the object extraction.

3. EXISTING METHODOLOGY

Some existing methods deal with the automatic detection and recognition of traffic signs, which is a difficult subject with many relevant application areas, such as enhanced driver assistance systems, road surveying, and autonomous vehicles. While there is a lot of study on both the automatic detection and recognition of symbol-based traffic signs and the recognition of text in real-world settings, there is a lot less research on the recognition of text on traffic information signs. This could be attributed in part to the task's complexity caused by issues like as illumination and shadow, blurring, and sign deterioration. There are projects involving the detection and alerting of traffic signs. That project primarily functions as a mobile application.

LIMITATION OF EXISTING SYSTEM

1. The Support Vector Machine technology is used in one of the processes. The dataset was divided into 90/10 for training and testing, and linear classification was used. A sequence of processes dubbed Colour Segmentation, Shape Classification, and Recognition were used to get the desired result. The Raspberry Pi is used to detect and recognise traffic signs with very little coding
2. However, it requires the Raspberry Pi board for implementation, which is extremely expensive. Another method for recognising traffic signs is image-intensive
3. A video is collected and divided into frames. Image preprocessing is performed, which includes foreground and background separation, thinning, and contrast enhancement. The signs are then classified as hexagonal, triangular, or circular in shape and sent for transmission.

4. PROPOSED SYSTEM & ITS ADVANTAGES

By introducing the concept of traffic sign localisation for driver assistance, the suggested system adds a new dimension to our project. Using a single colour camera and a high precision GNSS (global navigation satellite systems) receiver, the position of the traffic sign may be determined with 1 metre accuracy. Another suggested use of GPS is assessing driving style, in which GPS data is acquired from a person's mobile phone while also recognising Traffic Signs in the vicinity. It aids in categorising driving styles as safe or aggressive.

ADVANTAGES OF PROPOSED SYSTEM:

The following are the benefits of the proposed system. They are:

1. High accuracy
2. Low complexity
3. High efficient
4. Accurate detection

5. PROPOSED DATASET

In this proposed application we try to implement the German Traffic Sign Benchmarks (GTSRB) Dataset is used. Fig. 1 shows the 43 different traffic signs that are considered to train the model. It has 51,900 single images distributed among the 43 classes including the training and the test dataset. The count of the number of photos per class is shown in Fig. 2. There is no ambiguity as the images are just focussed on the traffic signs and each of them is unique. The training dataset has different folders for each of the present classes. A CSV file is also present wherein the path of each image and its class and other details such as width, height is mentioned. Fig. 1. Traffic Signs Taken into consideration Fig. 2. Number of images per class in the dataset

Fig. 1. Traffic Signs Taken into consideration

6. IMPLEMENTATION PHASE

The step of implementation is when the theoretical design is translated into a programmatically-based approach. The application will be divided into a number of components at this point and then programmed for deployment. The front end of the application takes tkinter & Google Collaboratory and as a Back-End Data base we took GTSRB as input dataset. Python is being used in this instance to implement the present application. The following 3 modules make up the bulk of the application. They are listed below:

1. FEATURE EXTRACTION USING CNN EXTRACTOR

In order to indicate that the deep convolutional features learnt by plain CNN is discriminative enough for traffic sign recognition. Here we refer to the original and simple structure proposed in to build up the CNN. The difference is that an extra convolutional layer with 200 feature maps of 1×1 neuron is added before the fully connected layer CNN architecture.

The max pooling layer here is non-overlapping and no rectification or inner-layer normalization operation is used. Considering that the traffic signs images are relatively invariable in shape and the size of the samples in dataset varies from 15×15 to 250×250, here we assume that the influence coming from cropping and wrapping is considered neglectable. Thus, only images in bounding boxes given by the annotations are cropped and resized to 48×48 uniformly. Note that data augmentation is not used, which means that random deformation (translation, rotation, scaling, etc.) is not applied to the training set. Since CNN is used to extract deep features rather than conduct classification, the first eight layers of the CNN are taken out as a feature extractor while the fully connected layers are removed when training is done.

2. IMAGE CLASSIFICATION USING CNN

Neural network consists of individual units called neurons. Neurons are located in a series of groups-layers. Neurons in each layer are connected to neurons of the next layer. Data comes from the input layer to the output layer along these compounds. Each individual node performs simple mathematical calculation. Then it transmits its data to all the nodes it is connected to. CNN is a special architecture of artificial neural networks. CNN uses some features of the visual cortex. One of the most popular uses of this architecture is image classification.

3. VOICE ALERT MESSAGE

The classified traffic sign image will be converted into voice message

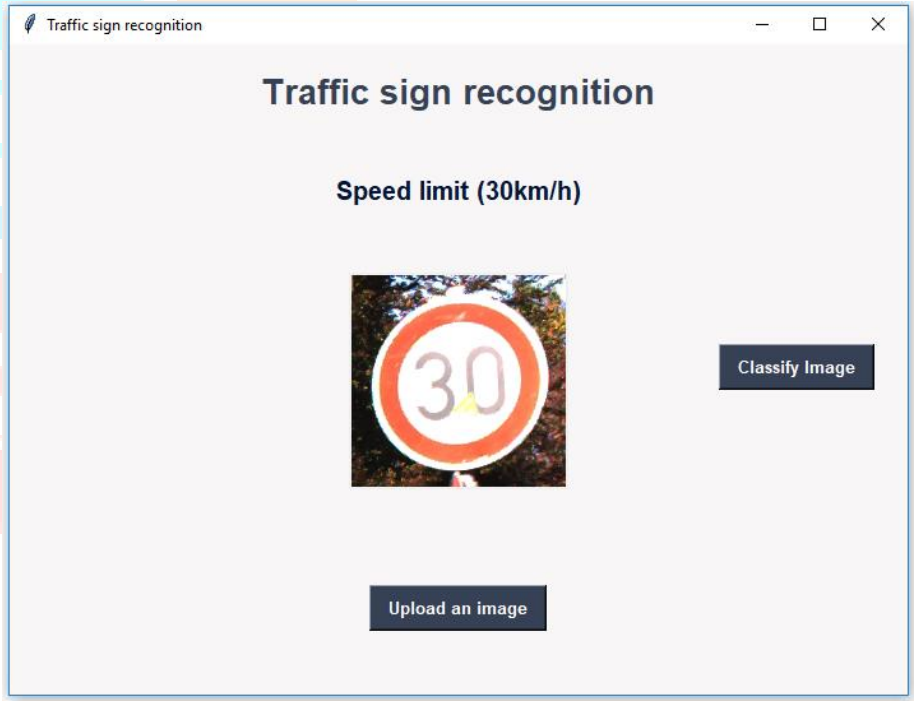
7. EXPERIMETAL REPORTS

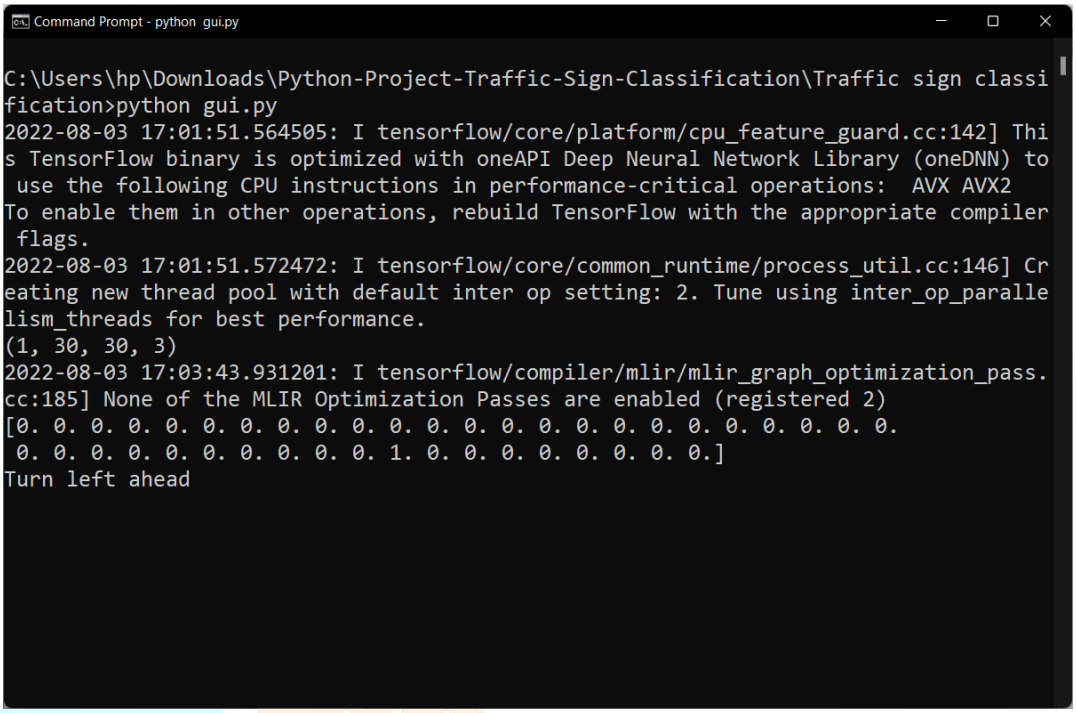
In this proposed application, we try to use google collab as working platform and try to show the performance of our proposed application.

1) MAIN WINDOW FOR UPLOADING THE INPUT

2) AFTER CLASSIFICATION

3) TEST INPUT





From the above window we can clearly identify the speed limit of that image is restricted upto 30 Kmph.

8. CONCLUSION

Convolutional Neural Network is used to implement the Traffic Sign Board Detection and Voice Alert System. Several CNN models were investigated, and the one with the highest accuracy on the GTSRB dataset was implemented. The addition of different classifications for each traffic sign has aided in the model's accuracy. After recognising the sign, a voice message is issued to alert the driver. A map is displayed on which the signs in the driver's surroundings are displayed, assisting him or her in making proper judgements. This technology represents a huge improvement in the realm of driving because it would make the driver's work easier without sacrificing safety. Furthermore, this approach is simple to implement.

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