Traffic Sign Board Recognition And Voice Alert System

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Abstract: -Millions of people are injured annually in vehicle accidents. Most of the traffic accidents are the result of carelessness, ignorance of the rules and neglecting traffic signboards, both at the individual level by the drivers and the society at large. The magnitude of road accidents in India is alarming. This is evident from the fact that every hour there are about 56 accidents taking place similarly, every hour more than 14 deaths occur due to road accidents. When someone neglects to obey traffic signs, they are putting themselves at risk as well as other drivers, their passengers and pedestrians. All the signs and signals help keep order in traffic and they also are designed to reduce the number and severity of traffic accidents. Some drivers believe that some traffic signs are simply not necessary.

INTRODUCTION:

In recent years, with the outbreak of Artificial Intelligence (AI), the vehicle-aided driving system has updated previous driving mode. By acquiring real-time road condition information, the system promptly reminds drivers to make accurate operations, thereby prevent car accidents due to driver fatigue. In addition to the auxiliary driving systems, development of autonomous vehicles also requires rapid and accurate detection of traffic signs from digital images.

Traffic Sign Recognition (TSR) is to detect the location of traffic signs from digital images or video frames, given a specific classification. The TSR methods basically make use of visual information such as shape and color of traffic signs. However, the conventional TSR algorithms are facing drawbacks in real-time tests, such as being easily restricted by driving conditions, including lighting, camera angle, obstruction, driving speed, and so on. It's also very difficult to achieve multitarget detection, easy to miss visual objects because of slow recognition.

With continuous improvement of computer hardware, the limitation of artificial neural networks has been well alleviated, which has brought machine learning into a golden time of development. Deep learning is a type of machine learning methods. A deep neural network model simulates the neural structure of our human brain while processing information. Using this neural network model to extract the effective features from the road image is much better than the conventional TSR algorithms, which has the potential to improve the robustness and generalization of the algorithms.

The research outcomes in TSR not only avoid traffic accidents and protect drivers, but also help inspect traffic signs on roads efficiently and accurately, which reduce unnecessary manpower and resources. In addition, it also provides technical support for unmanned and auxiliary driving. Therefore, the research

work based on deep learning has tremendous significance and is invaluable to our daily life.

which contains 2,182 images with eight classes. Secondly, regarding the latest version of YOLOv5, we implement our experiments and evaluate TSR performance based on our dataset. The key metrics and parameters provide a few essential references for further explorations and exploitations. Finally, we conduct a detailed comparison of TSR performance between YOLOv5 and SSD. We also analyses and justify the advantages and disadvantages of these two deep learning models.

LITERATURE SURVEY:

TSR has always been a hot research topic in recent years. For this purpose, TSR is investigated to detect traffic sign region and non-traffic sign area in complex scene of images, TSR is to extract the specific features represented through traffic sign patterns. The existing TSR methods are basically grouped into two categories: One is based on traditional methods, the other is related to deep learning methods.

The main steps of TSR methods based on color and shape of a given image are to extract the visual information contained in the candidate area, capture and segment the traffic signs in the image, and correctly label the signs through patter classification. Although TSR requires color and shape information which is employed to improve the recognition accuracy. The problems of illumination changes or color fading of traffic signs, as well as the deformation and the occlusion of traffic signs, are still unresolved problem. Conventional machine learning methods usually selected specified visual features and take use of the features to classify the classes of traffic signs. The specific features include Haar-like features, HOG features, SIFT features, and so on.

Conventional TSR methods are based on template matching, which needs to extract and utilize the invariant and similar visual features of traffic signs, the matching algorithms are run for pattern classification. The feature representation of these methods needs to be specified well, which is a tough problem to describe the visual features precisely, because of the variations of traffic signs.

The neural networks, Bayesian classifier, random forest, and Support Vector Machine (SVM) are employed as classifiers. However, the performance of conventional machine learning methods depends on the specified features, they are prone to missing the key features. Furthermore, for different classifiers, corresponding feature description information is required. Hence, traditional machine learning methods have limitations, their real-time performance is not comparative relatively.

Deep learning utilizes a multilayer neural network to automatically extract and learn the features of visual objects, which has merits for image processing. CNN models are one of the most popular deep learning approaches for TSR. TSR algorithms are based on region proposals, also known as two-stage detection algorithm, the core idea is selective search, its advantages are the great performance of detection and positioning, but the cost is a large amount of computations and high-performance hardware for computing.

The CNN models encapsulate R-CNN, Fast R-CNN, and Faster R-CNN. Faster R-CNN combines the regression of bounding boxes and object classification, takes use of end-to-end methods to detect visual objects, which not only improve the accuracy of object detection, but also uplift the speed of object recognition. The road signs usually were detected from the driver's point of view, in this paper, we view the signs from the viewpoint of satellite images. In guided image filtering was employed for the input image to remove image artefacts such as foggy and haze. The processed image is imported into the proposed networks for model training.

Meanwhile, TSR algorithms based on regression, also known as single-stage detection algorithm. This kind of TSR algorithms eliminate the idea of Region Proposal Network (RPN), and directly perform regression and classification in a network. You Only Look Once (YOLO) and Single Shot MultiBox Detector (SSD) belong to the single-stage category.

Visual object detection consists of two tasks, which are classification and positioning. Before the emerging of YOLOs, these two tasks are different in visual object detection. In the YOLO models, the object detection is simply converted into a regression problem. Furthermore, YOLOs follow an end-to-end structure of neural networks for visual object detection that obtains the coordinates of the predicted bounding boxes, the confidence of the target, and the probability of the class that the target belongs to simultaneously through one image input.

Existing System: -

In existing system, sign board recognition is done and is highlighted to the user. This was performed using OpenCV and K-Means algorithms. In this the sign board is detected and is shown on the screen visually. But there isn't any description on that sign board. The person who is good enough to understand the board doesn't need this setup and if needs this setup doesn't work for him.

PROBLEM STATEMENTS:

- Low accuracy
- Low feature consideration
- Limited ability to explore

PROPOSED SYSTEM:

The system provides the driver with real time information from road signs, which consist the most important and challenging tasks. It generates an acoustic warning to the driver in advance of any danger. This warning allows the driver to take appropriate actions in order to avoid the accident. Image processing technology is mostly used for the identification of the signboards. The alertness to the driver is given as an audio output. To achieve this we use CNN model for detection of signs and Google's gtt library for reading out the description of the sign.

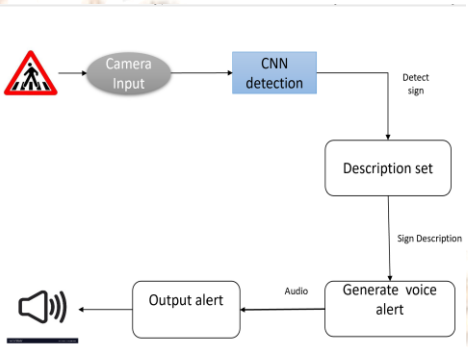

Fig: Flow Diagram

Implementation:

The CNN model is applied in first part where the input is an image. After image being processed, one class out of the remaining classes is obtained as the output. In a certain image is not containing a traffic sign, then the user gets a prompt of "No Sign is Being Detected". This is done by analysing the output of the "model-predicted" function in python. The "model-predicted" function returns in an array value representing how closely the image falls under each of the remaining classes and finally predict the class based on the highest value.

The sign which are in the vicinity of the user are found by using google text to speech (gTT's). A voice alert is sent, the user will keep in mind that he is going to approach certain signs hence the driver follows the rules. Along with this, there is a particular section for the user to learn about the traffic signs and also for helpline too. The driver will be verified initially before using our system.

Results:

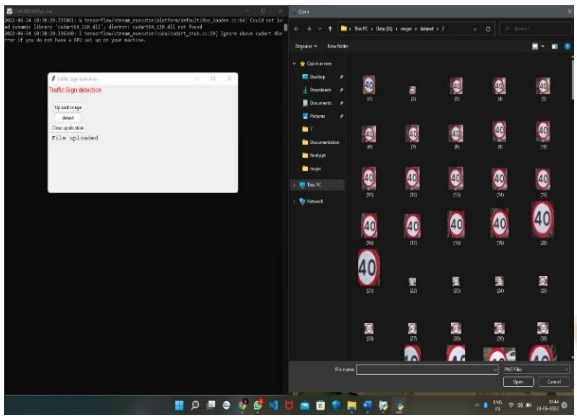

Fig: input screen(uploading image)

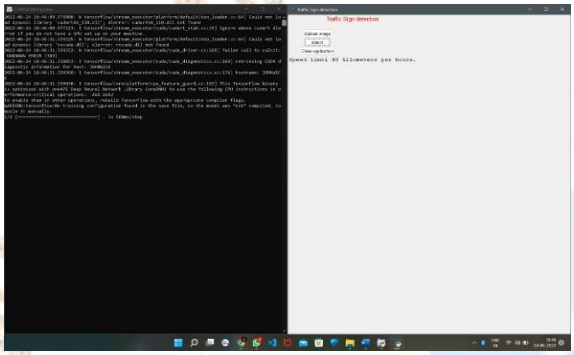

Fig: output screen

CONCLUSION:

Here is our project that address problems with existing system and solves them effectively. In the end, we have achieved a process that segments the image efficiently and in less time.

FUTURE ENHANCEMENTS:

Updates are best to continue the legacy of any applications. For this we propose to integrate micro businesses into the research and try to make the accuracy maximum.

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