TRAFFIC PREDICTION FOR INTELLIGENT TRANSPORTATION SYSTEM

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ABSTRACT

Intelligent Transportation Systems (ITS) are the control and information systems that are used to increase safety, reduce traffic congestion and also to manage incidents effectively. In this project, we are going to recognize the road signs and classify them which will automatically decrease the accidents, increase the safety and reduce the traffic congestion. In this project, we are going to classify around 90 basic signs in this project. This project acts as an assistance for the drivers and guide them according to the road signs. This project will warn the driver about the presence of the road signs such as danger zone, go slow, speed limit, school zone etc., This will automatically alerts the drivers about the sign and decreases the chances of accidents and reduces traffic congestion and also increases road safety. We are going to detect and classify the road signs using the Deep Learning approach Convolutional Neural Network (CNN). In the first step, the object in the road sign is detected from the images that are taken at the region of interest and the feature extraction is performed on the images and then in the second step the object i.e., the road sign that is detected in the first step is classified to different classes such as warning signs, alert signs, speed limit signs etc., based on the shape, color, black and white pixels of the image. This project will safely guide the drivers about the road signs, reduces traffic congestion and increases safety.

Keywords – ***CNN, ITS, Traffic Congestion, Accidents, Road Safety.***

INTRODUCTION

The rapid growing volume of traffic has a critical effect on economic development but causes large amount of traffic accidents. We find the evolution of a driver-assistance system that catches the attention of the driver to avoid vicious traffic situations. Apparently, among the compound and challenging job of these systems is road lanes detection and road signs recognition.

In this project we are going to implement the road sign recognition system that will help in increasing road safety and reduces the traffic congestion and accidents. There are mainly two parts in this project, they are first the road sign is detected from the image that is captured by the camera and then the road sign is classified.

The aim of a pre-programmed road signs recognition system is to detect and classify one or more road signs captured by a camera. It set out to develop an on-board warning system. First, the system gives the driver with real time details from lanes markers and road signs, which consist the most important and challenging tasks. Secondly, generate a warning to the driver in advance of any hazard. The following section represents an outline of previous works in the field of lane detection and road signs recognition.

There are multiple ways in which the features of road signs (RS) could be exploited. Most approaches to the problem of RS detection use either color particulars or shape particulars. Color information is usually utilized by performing color-based segmentation of the image. Such segmentation is complex to perform in RGB space. RGB colors are very sensitive to brightness changes and traffic scenes tend to have varying brightness. Shape is sometimes represented by using corner details of candidate regions.

A technique based on genetic algorithms was used for detection of circular traffic signs. Shape noticing often stops in cases of deficient edge contrast, Feature based approach is used for instance.

Support vector machines also have been reported as a good technique to achieve this main target due to their ability to provide good accuracy as well as being sparse methods, a technique based on genetic algorithms has been proposed to recognize circular road signs by using only the luminosity of an input image, which is obtained in the form of a binary image with the help of smoothing.

OBJECTIVE

One of the major concerns nowadays is traffic, that include traffic congestion, road safety etc. To reduce this traffic congestion and to increase the road safety by reducing the accidents we are implementing the road sign recognition system. The main objective of the road sign recognition system is to understand the properties of the road and traffic signs and there implications for the image processing for the recognition task. Second objective is to identify the Region of Interest and feature extraction for the road signs and to develop an appropriate road sign classification algorithm.

LITERATURE SURVEY

The first research on the road sign recognition was back in 1987 by Akatsuka and Imai. They designed a basic road sign recognition system which is used as an assistance for drivers. This basic road sign recognition system used to tell the drivers about the presence of the sign boards like danger zone ahead, go slow, the maximum speed limit is 60 km/hr etc. There are two basic steps involved in the road sign recognition system, they are detection and classification.

EXISTING SYSTEM

Road Sign Recognition is a field that deals with the detection and classification of the road signs taken by the camera. Existing system is a technique that uses the artificial intelligence for the road signs, pictures taken within the uncontrolled lighting conditions and the images with the similar background with the road sign are very hard to classify. The prevailing road sign recognition system isn't correct because of this disadvantage that it's troublesome to classify the road sign image that's captured in unfavorable conditions and matching backgrounds. There are such completely different issues like color fading, disorientation and variations in size, form and colors that produces it troublesome to differentiate between the pictures and classification of the images.

Disadvantages:

- Existing system has low classification rate.
- Detection of road sign is sophisticated.
- Existing system is very complicated.

PROPOSED SYSTEM

In this proposed system first, we capture the road images, find regions in the image that might contain an object. These regions are called region of interest. Then we extract CNN features from the region of interests. Then we will be Classifying the objects using the extracted features. There are three variants of an R-CNN. The proposal regions are cropped out of the image and resized to 14, then the CNN classifies the cropped and resized regions. Classified sign board and the meaning of the sign board are then transferred to the output screen.

Advantages:

- Proposed system has high classification rate.
- The detection and classification of the objects is increased.
- The total number of initial features are reduced compared to the existing system.
- Proposed system is less complex.

IMPLEMENTATION

The implementation of traffic sign recognition involves two steps – detection and classification.

Detection:

As traffic signs are present at certain areas of the road and not everywhere.

First, we need to locate the regions of interest (ROI) in which there is a possibility to find a traffic sign. This method of (ROI) involves capturing of the main sign by removing the extra spaces. As the ROI should only capture the signs and not misinterpret it with other objects on the road for example, trees, poles etc. shape, color and dimensions of the sign help for the recognition.

After capturing the image with sign, it contains the background which is not necessary and should be cropped away. Recognition of signs can be easy because they have a particular color and shape so that they can be differentiated from other characteristics in the background. However, the images captured by the camera on vehicle may not always succeed to convey the information regarding the shape and color of the sign accurately.

Classification:

The next step after detection is classification. Classification is done based upon the attributes like shape and color of the sign. Histogram of oriented gradients (HOG) decomposes the image into minute boxes. Computation is done for each box of the image. UNet is another way for classification involving encoding and decoding architecture. Another way for classification is Convolutional Neural Network (CNN). CNN is a type of multi-layer neural network which is broadly used for classification purposes. We use CNN for recognition and detection of traffic signs and it has not failed us. It has given high accuracy with end-to-end classification. After the input is captured, the CNN computes its features and classifies the images based upon the pixels. The sign images contain colored pixels however, the CNN coverts those colored pixels into black and white pixels and the images are classified based upon the same.

Traffic Sign Classification: There are two sets - training set and testing set. Training set has database consisting of traffic signs for training purpose and in testing the system recognizes the traffic sign which are not familiar. In the training mode, the sign image is taken as input and stored in database which is classified and taken by the system for training. Now this image is processed through color segmentation process so that all the objects and unwanted data in the background are removed. A Prioritized to-do listing which lists the entirety that the person wants to do, with the maximum essential responsibilities at the pinnacle of the list, and the least crucial responsibilities at the lowest. And through prioritizing obligations the user can know what tasks want their immediate attention and what you could leave until later.

Priorities are labeled as low, medium, and excessive. The color adjustments according to the priority decided on. It will clear out the duties and prioritizes them. Web Application names precedence-based to-do listing. It consists of UI where user can create a brand-new to-do listing and assign a priority. Additionally, it will additionallylist the full variety of available lists. It has an option to filter out duties based on priorities. An extra characteristic that shows the weekly document of our responsibilities.

ARCHITECTURE

An architecture diagram is used to show the flow of process. It explains the relationship between the components of the system. The diagram represents the interaction between the software and hardware of the system. Although the process can be written in theory, a block diagram has a greater impact for understanding what is actually happening in the system. It explains the process step by step as show in the below diagram.

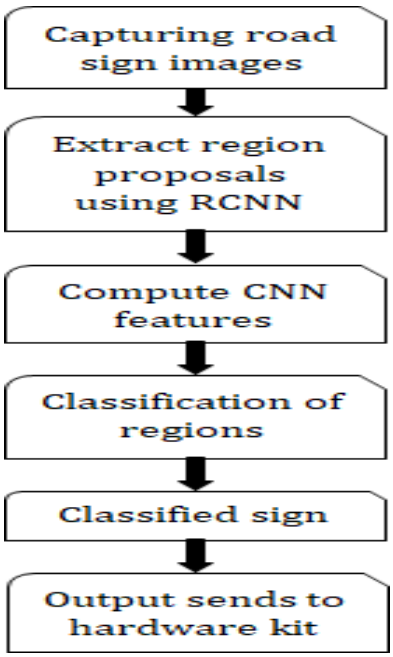

Fig 1: System Architecture

RESULTS

The captured images are inserted into the screen, the feature extraction, sign detection and classification is performed internally and then we are going to display the road sign with the description on the output screen as shown in the below images.

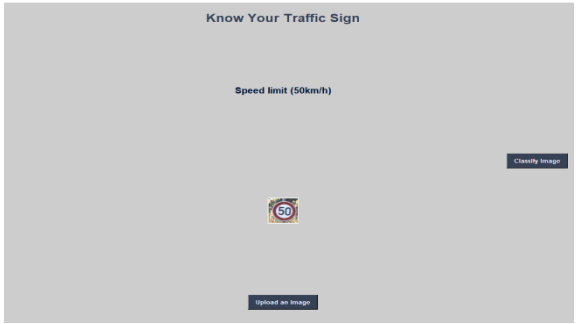

Fig 2: Speed Limit (50km/hr)

Fig 3: General Caution

Fig 4: Stop

CONCLUSION

Road signs are specially designed to avoid any incidents and provide safety and to guide the drivers. In this project we have tried to recognize the road signs to reduce the traffic congestion, accidents and to increase the road safety. So far we have used around 90 basic road signs in this project. we have taken many images as the test cases to classify the images. The first step is to capture the image, and next step is to recognize the region of interest to recognize the object in the image and next we perform the feature extraction from the image using the CNN algorithm and applied the classification algorithm to classify the images into different classes such as warning signs, danger signs, speed limits etc. This project will act as an assistance for the drivers by warning or guiding them about the presence of the road signs on their way.

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