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# Vision Based Alert System for Road Signs Detection

K. Hemalatha[1], D.Uma Nandhini[2],Karthika S[3]

*Department of Computer Science and Engineering,Vel Tech Rangarajan Dr Sangunthala R&D Institute of Science and Technology, Chennai,India*

*E-mail: hemalathakasirajan@gmail.com, umaudhay@gmail.com*

***Abstract: TOver recent years, there is a huge increase in road accidents which makes us take more surveillance actions to reduce road accidents. In recent due to researches there is a huge improvement in the field of deep learning and computer vision. Our project is mainly focused on developing a vision based alert system for drivers. We built the model with the help of convolution neural networks a sub field of deep learning and computer vision. We have taken road sign data and trained the model to detect 32 different road signs. The data has been collected from German road sign datasets which consists of 20000 images. We developed the learning model with Keras frame- work which is a high-level API. The Keras works on the Tensor Flow backend which is developed by Google. The Keras framework enables us to build a state-of-the-art model to detect the road sign. For developing the model and to pre-processes the image we have used python language which has a vast number of libraries for image computations and to build deep neural networks. The main aim of our project is to develop a vision based alert system for drivers which will help us to improve road safety. Our model will also help new learners to improve the driving experience.***

***Keywords: Road Accidents, Deep Learning, Neural Networks, Tensor Flow, Keras, Computer Vision***

## 1. Introduction:

The motor vehicles are growing at a faster rate than the economic growth. Accidents and the death rate due to road accidents, especially two wheelers are also increasing at an alarming rate. Most of the accident deaths that happens are due to the lack of Situation on the roads like express highways. Vehicle driving has gotten increasingly regular in the life of individuals. Therefore, traffic security is significant. Traffic signs are utilized for traffic notice, guideline, steering and the board of significant data for independent vehicle. These signs are planned to influence the conduct of drivers. Because of the colossal increment of street vehicles all over the world, the quantity of street mishaps has moreover expanded altogether. Among various reasons for mishaps, some significant causes are obliviousness of the street sign, impediment of the street sign and interruption of the drivers. Our work portrays the structure of an implanted framework for" The Evasion of Accidents Using Road Sign Recognition". Traffic sign is a PC vision strategy of driving help framework in naturally acknowledgment side of the road traffic signs. Traffic sign discovery and acknowledgment (TSR) is a significant exploration point that persistently keeps more extensive enthusiasm to the exploration in the field of keen vehicle framework as a result of its application in the driver colleague framework that assists with directing the traffic, show the condition of the street, directing and cautioning drivers and people on foot. In dislike past a ton of exploration is completed for the strong TSR framework in writing. A large number of them utilized shading and shape division for traffic sign recognition.

TSR causes the drivers to perceive the traffic signs and alarm them to protect them from street mishaps. With this system, security is guaranteed to drivers just as walkers since our framework is increasingly dependable and lifesaving. This is on the grounds that traffic sign Acknowledgment and location is made

simple and dependable. Speed limit signs, stop signs and cautioning signs, for example, passer by crossing, railroad crossing and so on are distinguished. The distinguished traffic signs are perceived utilizing a picture preparing framework that utilizes division calculation. The coming about picture is prepared with Open CV. Another significant need is that, regardless of whether the driver dismisses the street sign while driving, the framework can spare the life of the driver furthermore, others by perceiving the street sign and adjusting the speed of the vehicle. The speed of the vehicle is changed as per the street sign recognized with the assistance of Raspberry Pi.

## 2. Literature Survey

[1] Rongqiang Qian, Bailing Zhang, Yong Yue Robust Chinese Traffic Sign Detection and Recognition with Deep Convolution Neural Network (2015) The author proposes the model that detect the traffic signs and chine's alphabets. Traffic sign detection is a complex task where we are dealing with real world application as it has lot of background disturbances of environment. This model states that for any sign detection we require two things one is feature extraction and other thing is classification. Feature extraction is helpful in localizing the signs in an image and classification is for detecting the categories. To achieve the purpose Regions with convolution neural network (R-CNN) is being used. Where it forms the boxes of proposed regions and based on the regions the detection is done. Producing the candidate regions for the input image is done by using the RGB space Threshold. A multi task CNN is used for detecting the similar samples and reject the false samples obtained by the classification task. The multi task CNN has ability to simultaneously implement detection and classifications.

[2]Qianyu Liu, Yong Yue, Frans Coenen† and Bailing Zhang Road Surface Traffic Sign Detection with Hybrid Region Proposal and Fast R-CNN(2016). 5 The author here proposes the model that detects the road sign that are on the surface of the road.it might be less complicated to detect the road signs that are uphold on the side of the road. The same R-CNN is used for feature extraction by forming bounding boxes and classification. Along with that two extra features are added to this model it uses maximally stable external regions and Edge boxes. MSER uses intensity values of regions, mostly the input is binarized using different threshold levels. Later those are connected based on threshold values to form shapes. Next is the Edge boxes, in this based on bounding boxes the edges of the sign is detected and accordingly classified to detect the image. To be in detail the bounding box mostly have the closing edges and boxes having those edges are to be detected. In this way the road signs are detected on the road surface. This model has high recall rate and precision.

[3]Safat B. Wali, Mahammad A. Hannan, Aini Hussain, and Salina A. Samad An Automatic Traffic Sign Detection and Recognition System Based on Colour Segmentation, Shape Matching, and SVM(2015) The author proposes a model that detect the road signs under various real time environments. It uses a method called RGB colour segmentation for image pre-processing. First the images are collected and then those images are pre-processed to remove the low frequency background noises, normalizing the intensities, reflection removing etc. Based on the threshold values given by the RGB model we check for the images that fall under our requirements and detect them. Along with this the model also performs other tasks like shape matching and object feature analysis etc , to reduce the computational load to the model for fast detection. After this the region of interest is given to Support Vector Machine (SVM) the image is formed into clusters for building bagged kernel. Bagged kernel is used to encode similarity between 6 unlabelled samples. The main ability of this model is detecting the signs having red colour in it. The remaining sign detection ability is less due to external environmental factors. Due to applying of pre-processing techniques the detection is done even In different climate conditions.

## 3. Proposed System:

The proposed system will be able to perform good on Indian road sign data set. The model will be able to perform good on real world road sign of India. The models have pretty high accuracy so that the model will be able to perform good in real world. In this system the proposed model will detect 31 different type of Indian road signs that we trained on. The overall accuracy of the model id more that 90 percent. Which is quite well for us to use this model for real world.

### Advantages

This system makes easier in predicting Indian road signs since it trained on various categories.

1. The accuracy of the model is pretty much high.
2. The proposed system will help in reducing the accidents.
3. This system will give optimal accuracy and speed, since it require less computation.

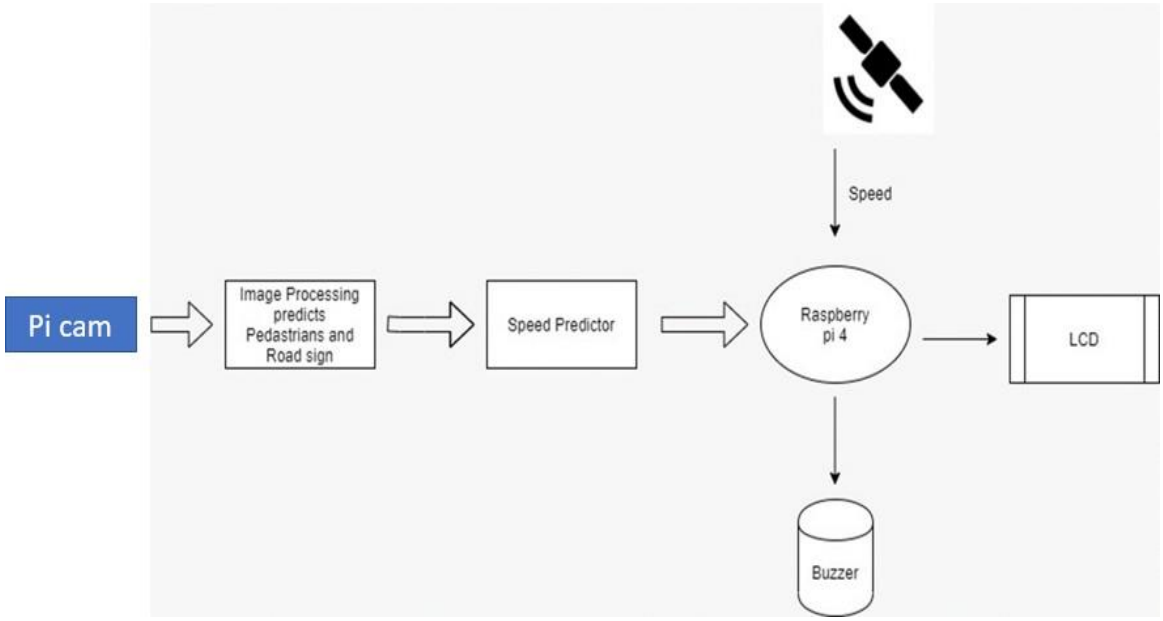



Figure.3.1 Architectural Diagram

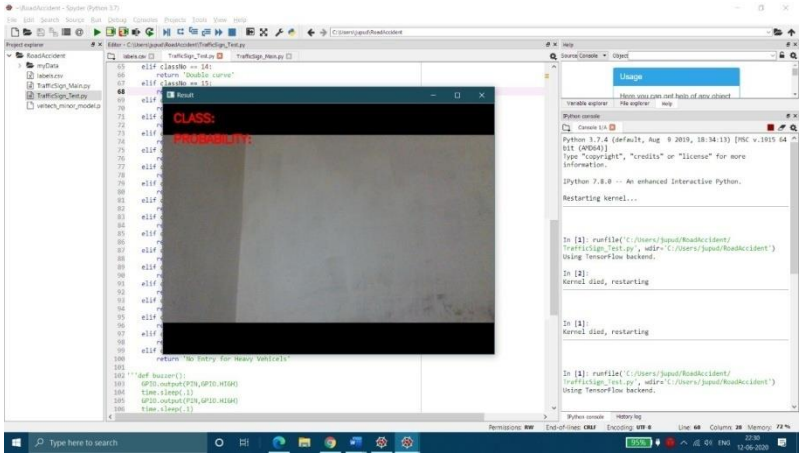
Initially the picture of road sign will be captured and processed into data will be sent to the pi at the same time speed monitoring will be carried out with the help of GPS Module which will calculate the speed of the vehicle both the data will be processed and checks with the conditions like heavy populated areas,School Zones and intimates the Driver with a buzzer sound to avoid distraction.

## 4. Implementation

Deep Learning plays a major role in computer vision. With the help of Convolutional Neural Networks we can perform object detection which is a sub-field of computer vision. Keras is used to implement deep neural networks which have wide range of features. With the help of connived in keras we are going to build deep neural network. we have prepare this model to predict various road signs . We have collected

data from German road sign data set which has been published in Kaggle. Kaggle is a pace for all competitions related to data science and AI our model will be able to predict 32 different types of road signs. So that we can use this model in real world applications. The German roads sign dataset consist on 20000 images which we have reduced to our conveyance. Our model consist of 11 layers. The parameters of each model are specified below. Layer 1 which is also called as input layer. The layer consist of 32*32 nodes(1024 nodes) which is equal to the image size. Layer 2 which is also called as Hidden Layer consist of 784 nodes.

Convolution neural network is a deep learning algorithm which takes images as input and predicts the desired output. The interest in CNN started with Alex net in 2012 and it has grown exponentially ever since. In just three years, researchers progressed from 8 layerAlex net to 152 layer resent. We are using convolution networks to implement the object detection. The CNN is a type of multi-layered perception. To prepare the required CNN we are using keras technology which is a high level programming language developed by Google, The keras uses background as tensor flow which is a low level language used to develop deep neural networks which are developed by google. Keras provide a huge number of applications that will help us to prepare a state-of-the are deep learning models. We can prepare a convolution neural network with the help of Convolution layer and a pooling layer. In convolution network the image will be converted into a matrix of pixel intensity values. Then we will filter the image in each convolution layer to make it easy to predict by the neural network. There are various types of filters. We have fixed the size of the filter to 5 by 5 and let the model to tune the filter to produce more accurate results. Then the image will be passed to pooling layer where the image will go under dimensionality reduction. There are two types of pooling layers some of the are max pooling and average pooling. In our model we used max pooling. And then the image will be passed to second convolution neural network which have filer size of 3. In all the convolution layers we used relu as an activation function. Relu which stands for rectified linear activation unit which activates the neural network to compute the required calculations. The rectified linear activation unit enable us to build a huge deep neural networks and solves the problem of vanishing gradient. Vanishing gradient is a problem which




totally destroys the outcome of the neural network. Then with the help of flattern layer convolution layer is connected to densely connect neural network.

Figure 4.1: Input design of the application

The main image input to the project will be given through the pi cam and the speed will be given from GPS module. Then the images will be converted into grey scale and then image will be sent through the convolution neural network. Then the neural network will predict the output. The model has been created by using python 3.7 and keras framework which is developed by google.

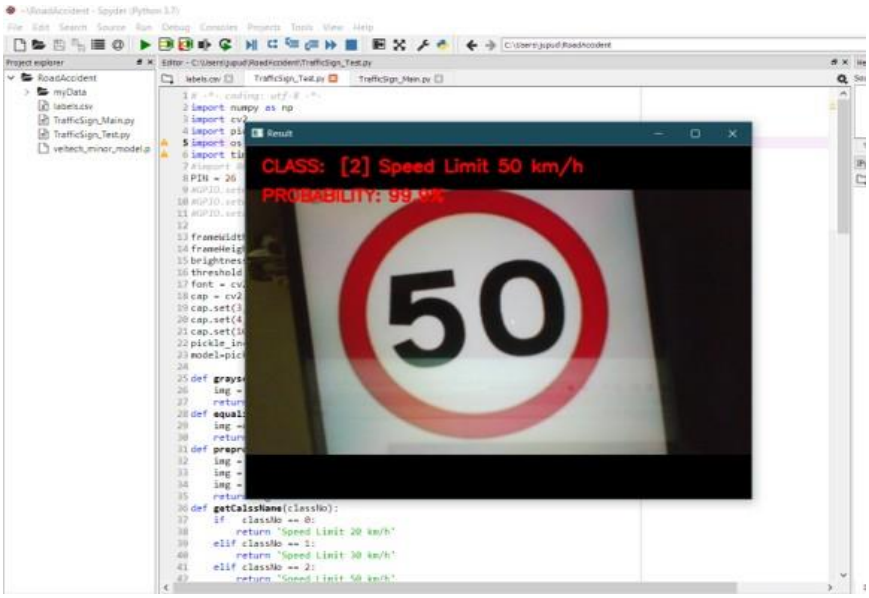



Figure 4.2: Output GUI of the project

The trained pickle model will be loaded in to the module then the image will be sent through the model to predict the output and along with the calculated speed the model output will also be sent to the further process to alert the driver with lcd display and through the buzzer also.For the purpose of demonstration we have used the spyder software to do the project and we have used python 3.7 for the computation of the project.

## 5. Conclusion:

The road sign detection model is able to predict 32 different type of road signs which is helpful to implement in real world. The model can be integrated with other equipment to use it effectively. The model has gained the accuracy of 0.996573984623 (best if it is near to 1).We can improve this model with more number of road signs. The model can be improved to make more predictions on new road signs. The model further can be improved to work with less computation power. We can further reduce the error of the model by training the model with huge amount of data.

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