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A MOTIVATED METHOD FOR DETECTION OF DISTORTED TRAFFIC SIGN BOARD IMAGES

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ABSTRACT :In human general activities the movement from one place to another place is an important aspect. The use of vehicles is a main resource for the movement of the humans from one place to other place. It requires the person who is driving must be capable of handling the vehicle and also should have the knowledge regarding road driving rules. In accordance with this , traffic sign boards are displayed across the road side to avoid the collision on the roads. Detection of these sign board meaning is an important aspect in the maintenance of the road collision. If the user who is driving understands the sign , than the collision can be reduced significantly. Hence a traffic sign recognition system is introduced for the user who doesn't know the meaning of sign exactly. The system detects the sign board based on the features like shape and colour and later classifies the sign based on the Multilayer perception (MLP) classifier to give the result to user after interpretation.

Index Terms - MLP, HSV, DWT, HSV, DE noising, image acquisition, image processing.

I INTRODUCTION

Traffic sign recognition system is an important part of intelligence transportation systems, which can take images by the cameras installed on the front side of the motor vehicle and transfer images to the image processing module of the system. It plays an important role in drivers and pedestrian safety.The natural scene of the traffic board recognition exists in complex scenes: climate interference, illumination changes, dirt or blocked traffic sign board and skew distortions due to anthropogenic factors or disrepair. Therefore, the recognition of traffic sign board is of great significance in natural scenes.

Every country has its own sign boards in terms of signs, colors and designs in it etc. These standards are considered to be static or uniform in any part of the country. The Government has set the rules and regulations regarding these color and shape of the sign boards, colors like red, Green, blue , yellow, and the shapes such as diamond, triangular, square, circle and etc are to be used. Depending on these signs driver need to follow the instructions. These sign boards have been evolved to reduce the amount of accidents happening on the road. These signs have specific information regarding speed limit, terms ahead, school ahead, Hospital ahead and do not park etc. Proposed road sign recognition system uses the computer vision technology by grabbing the images from the frames, from the videos, and giving input to system for recognition of the sign boards. It is performed based on the assumptions of uniqueness of color and shape. There are many methods which have been developed for road sign recognition over many years. But a challenge of recognition of these sign boards in case of bad weather conditions has been challenging to the drivers due to blurriness of the board and even over speed can also cause collision of vehicles .

To overcome these problems many of the techniques have been proposed but still it is a expensive process as well as time consuming. A real time traffic sign recognition has been performed in following stages:

1. Acquisition of Image
2. Preprocessing of Image.

It consist of following steps:

a. Color module Conversion

b. Noise Filtering
c. Connect component labelling
d. Size filters.

3. Sign recognition or feature recognition.

4. Traffic sign Tracking.

The flow of the road types are as follows.

a. Warning

b. Prohibition

c. Obligation

d. Informative.

a. Warning: This type of sign boards are used to be generally in red color. It indicates a not to do a information to the users.

b. Prohibition: Sign boards generally circle in shape, white or blue in color generally located in area which public works.

c. Obligation: Generally Obligations are circle in shape in blue background. Which indicates no parking indications.

d. Informative: The sign board which indicates some informations like hospitals, schools etc.

II RELATED WORK

S. Maldonado-Bascón, et al.[1] has addressed the task of recognising the traffic sign by using a video input in the two components independently. In the initial stage the team, takes video input from the source and perform the same frame conversion from the video. H. Gomez-Moreno and team have performed Traffic Sign Recognition by using transformation of the features and support of classifier. Based on the reality of the images, every images are initially classified based on three classifications like distance, angle, environment etc. In [3] ,A. Ruta, F. Porikli et al. tried to achieve a real time classification of road signs by using a live camera which is embedded on the moving vehicles. They have emphasized a neural network for the classification stage to avoid the conflicts for the candidate selection. T. Michalke, et al. [4] have used a approach to recognise the traffic signs based on the patterns associated with each image like shapes, colors etc. The classifier SVM is used for classification of recognised sign boards. Images are acquired through the camera and it is invariable to size once it is scaled.L.-F. Liu, et al .[5] had concentrated mainly on shape of a sign boards to be classified based on the distance measure by using SVM classifier. They have given lot of interest in providing a safe and accurate measurement of the sign for the user to avoid the accidents. In[6],H. Chen, has used histogram based features like HOG and classifier like SVM for recognition and classification of road signs. This system recognises those candidates in the image which are stable in nature and gives good results under various lightning conditions. It also operate for high speed vehicles and bad weather performance. P. E. Hart, et al.[7] have used sensor based technology for the recognition of sign on a moving vehicle .They used the infrastructure based vehicle communication method with a vision sensor applied in it and used GPS based sensor to track the vehicle location and providing higher level of communication ,the experiment has been performed in day and night situation on number of vehicles provided with accuracy for detection 95%, and recognition 93% and consume time about 35milisecond per test. G. Loy et al .[8] have applied color based segmentation with adaboost classifier an HOG transformation method to perform the sign recognition easily and efficiently.

III METHODOLOGY

In the proposed work the requirement of digital image processing is the main criteria about the process. We use image process technologies which will allow the user to capture process recognised and classify the given input image of technologies available. The image processing technologies such as image acquisition, image transformation, Image classification has to be performed in order to get accurate and efficient results.

The Road sign boards has to be captured first by the use of digital camera later it is sent to the system by the help of image acquisition process. The input image is then processed based on the requirement of the user which is generally used to classify the road sign.

The processed image is then taken into consideration for the final classification of the system, later the result is interpreted to the user, then it can be processed for the later uses.

SYSTEM ARCHITECTURE

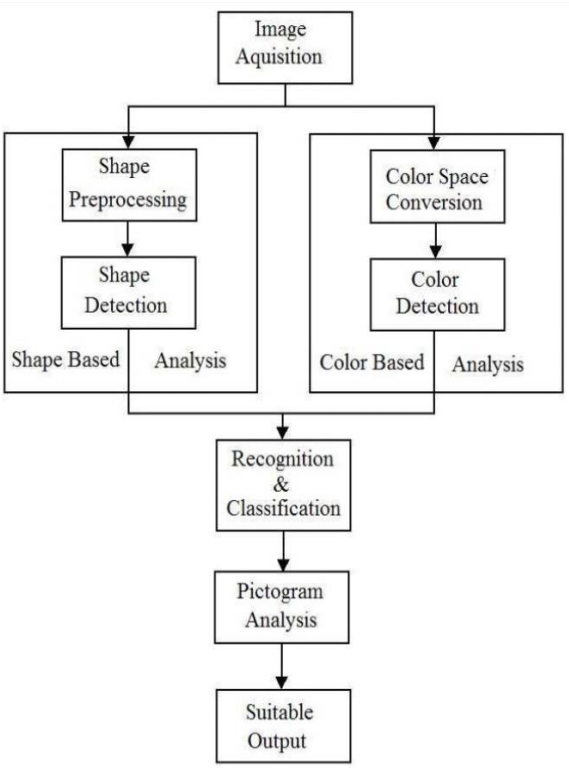

Fig 1 : System Architecture

Algorithm used for image denoising:

```
Begin
send true image;
Division process
Set Condition: pixel similarity
    If(pixel similarity = = TRUE)
        Return: "Compared to region"
    End
    If(pixel similarity = = FALSE)
        Return: "sub-areas of interest in turn"
    End
    For(i =begins of images, split cut)
SplitImage
    If(Splitting = = 0)
        Brake
Else split
End
    For (i = splitrregion ; split areas)
        Merge process
    Compare adjacent regions
    Merge of necessary
    End
End
Terminate;
```

Algorithm used for Interpretation:

```
Initially
    Read the image 'I'
        I = Imread(image)
    Convert Image to Binary
        B = im2Bw (I)
    For each pixel in image B
            If pixel in image is Red
                Current pixel to white
            End
    End
Create pixel to blue
    Perform Binary Image labelling
    Perform criteria selection
Extract clustersize 'C'
    For each cluster C in B
        If(Cluster > 100 & Cluster <3000)
            Then mark as Road sign
        End
      For each user.c

        If(Cluster is too small or high)
            Neglect objects;
        End
      End

      Merge pixel clusters 'C' and same or signImage.
```

Filtering of the image is carried out as follows :

A noise is a unwanted pixel present in the image which is caused due to many of the electronic issues, such as storage, transmission, recording etc.Hence filtering removes such noise present in the image, A kind of filter called split and merge is used in the proposed work.This filter removes the noise without blurring the image and does not remove the inter information of given input image.This filter may reduce block of pixels based on its nature and attempts to divide the image into the uniform regions and later merging them based on the neighborhood pixel values.

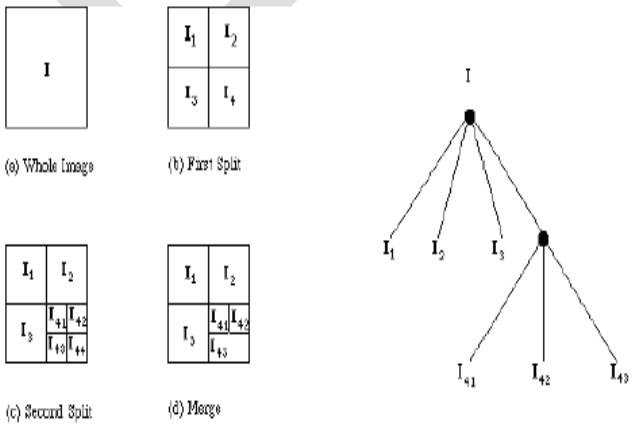

Fig 2 : Split and merge filter process

HSV color model :

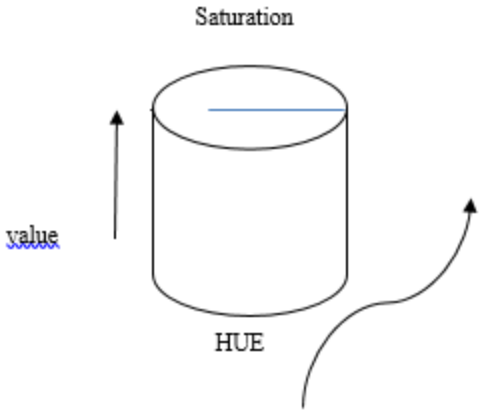

Fig 3 : HSV color model

The HSV color model is implemented in the proposed work, which is used to calculate the brightness, intensity of the image which is given from the dataset **.** The Hue (H) and saturation (S) , these two parameters are concerned with the wavelength of color model, used in the image and the value(V) ,is used to indicate the amount of brightness present in the light which ranges from 0 to 100 %.

For ex: In HSV the range are as follows.
For Red color.

- Here HUE is less than of 0.05 or also is greater than of 0.95.
- Saturation greater than of 0.5.
- Value also greater than of 0.01

The pixel ranges which above and below range of a threshold are eliminated and assign the value of 0 in the pixel values which are within the range of values are assigned value of 1.

IV GRAPHICAL ANALYSIS AND EXPERIMENTAL RESULT

Experimental Results

After analyzing the colors from different videos to the usual color ,HSV values are set in the table below:

Table 1

color	HSV values		
	HUE	Saturation	value
Red	0-58	0-90	0-90
Blue	0-60	0-107	98-255
Yellow	100-140	80-90	0-65
Black	150-160	110-150	0-120

Table 2

Table for Mismatched traffic sign

Sign color		Results		
	Inputs	Detected	Different Patterns	Mismatch percent

Red	74	40	34	0%
Blue	90	78	12	0%

Table 3

Table showing percentage of correct noise detection for the given input images

Sign code		Results	
	Inputs	Correct detection	Correct percentage
Red	40	39	97.35%
Blue	50	47	95%

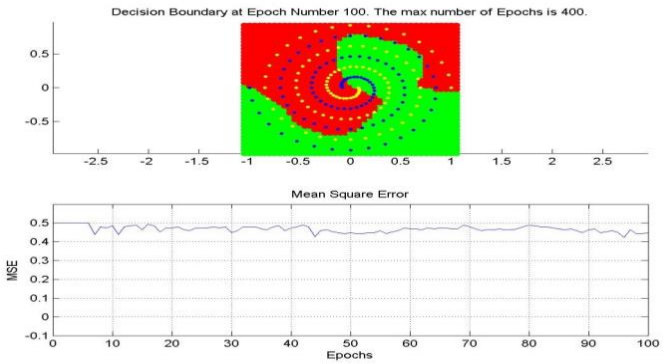

Fig 4 : Graphical analysis of image labeling

Fig 5 : Occluded Samples

V RESULT AND DISCUSSION

The Algorithm which are used for interpretation and image DE noising are implemented in step wise in order to recognize the traffic sign image efficiently. The De noising algorithm use the concept of split image and merge concept necessarily and interpretation algorithm uses Binary image labeling concept and gives the following efficient results.

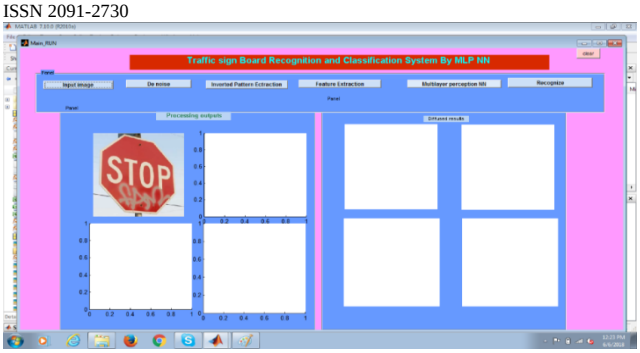

Fig 6: Input Image

The figure represents the Traffic Sign which is given as an input image to the system from the data set.

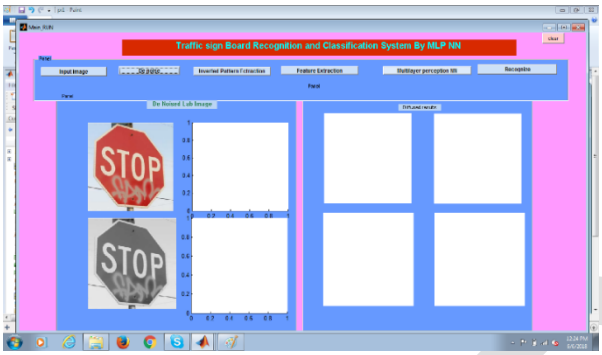

Fig 7: Input image from the traning data set.

The figure shows input image, which is preselected from the image database. The image which is given as input is STOP signal image which contains noise in it

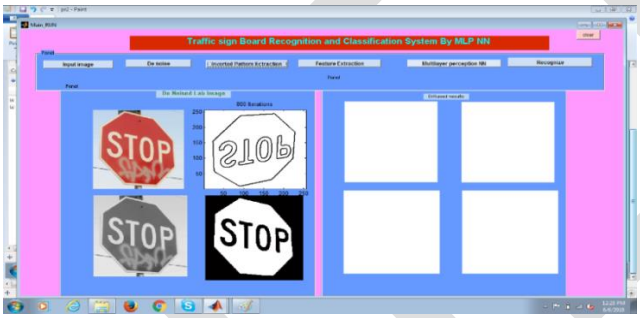

Fig 8 : Image preprocessing

Figure Perform the basic image processing operation from the given input image based on Training data set.

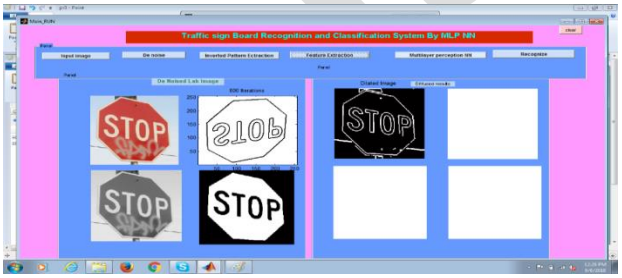

Fig 9 :Region based Feature Extraction

Figure shows, input image process the region based feature extraction and detects the boundaries of a given input image

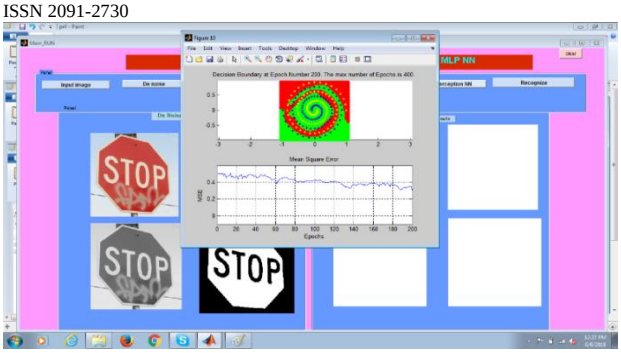

Fig 10: Image Color Band Labelling

Figure shows that preselected image pass the processed image set to the system and Image Labelling. Through this we get a least mean square error difference.

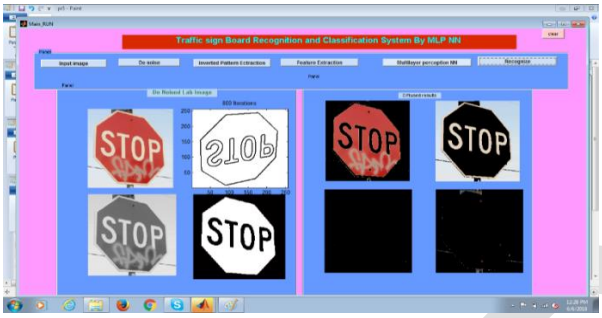

Fig 11: multilayer perception.

Figure shows that color and shape based feature extractions classify images by multilayer perception and recognition.

Fig 12 : Recognizing the type of the sign

CONCLUSION

The proposed system of multilayer perception for the Indian Road side Recognition and Classification has given the satisfactory results to the user. By using this system with the help of HSV color transformation the user can detect and classify the road sign images more accurately. This system which uses processing of road images has given accurate results, but the images have to be in the prescribed format ,with the help of processing method the system is capable of performing DE noising, reshaping, resizing type of basic image processing options.The feature extraction phase includes extraction of color and shape which can be used in the classification method .Future enhancement of the system is automatic video rendering and classification on road.Also need to include higher level of images and datasets in the system.

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