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Identification of Indian Road Signs Using Soft Computing Techniques

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ABSTRACT: The main objective is to identify and recognize a traffic sign boards used in India in various backgrounds and lighting conditions from static digital images. In present the sign will be resized and classified, the data which obtained by neural network training is used to classify the road sign. The feed forward neural networks were widely used in the detection and the recognition of the road signs. We have collected around 280 samples which were used to build the system for training purpose out of which 270 samples we correctly identified and the system showed with accuracy of 96.42% of accuracy in the training state. Later we used the samples which were unknown for our system with the different denomination of 150 samples which haven't being used in the training processes for our surprise the system showed a good performance of 140 images were justified with of 93.33% accuracy.

I.INTRODUCTION

Traffic sign detection and recognition is an important part of intelligent transportation system. Traffic sign informs about the important rules to driver which makes his driving skills effective, hence to become a good driver every driver should be familiar with these signs. Traffic signals are primarily detected based on the color codes followed by the different shapes in which they are represented. Because colors are distinguishing features of traffic signals, they can simplify the process. Globally the color code used to detect a stop sign is red and green is used to indicate the normal flow of traffic. Usually the shapes used are a red and green circle or a red circle and green arrows pointing towards different directions based on which lane is free to carry on. While for a person with normal eyesight is able to recognize the colors and shapes easily, it is a difficult task for people with problems such as those with color blindness and poor visibility. Hence it is important to have a system that is able to recognize the signals and interpret them to the driver to ensure safe driving. Traffic signal recognition is a system based on which a vehicle is able to capture the signals and interpret them to the driver for their understanding. There are two main stages for traffic sign interpretation. The first phase is detection and second is recognition of the signal. In the detection phase the image is acquired and segmented. Followed by recognition phase in which feature vector is calculated using centroid and moments and compared with test images. Color segmentation is used to specify the shapes of signals based on color filtering.

1.1 Steps involved

1. To understand the properties of road and traffic signs and their implications for image processing for the recognition task.
2. To understand colour, colour spaces and colour space conversion.
3. To develop robust colour segmentation algorithms that can be used in a wide range of environmental conditions.
4.To identify the most appropriate approach for feature extraction from road signs.
5. To develop an appropriate road sign classification algorithm.

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6. To evaluate the performance of the aforementioned methods for robustness under different conditions of weather, lighting geometry, and sign.

II. METHODOLOGY

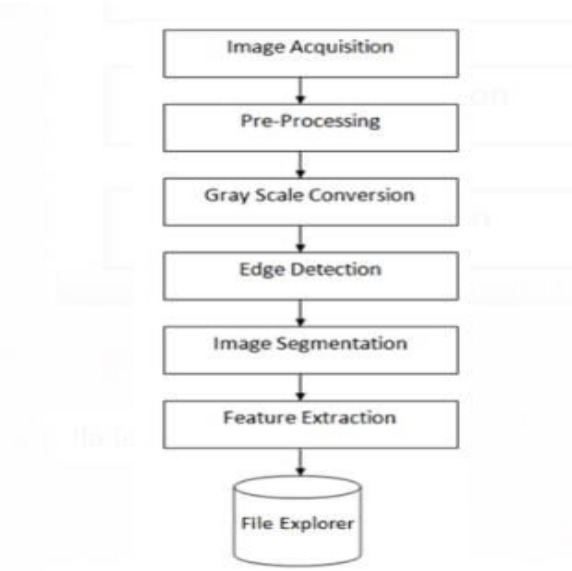

Figure -1: Processes involved in feature Extraction and storing

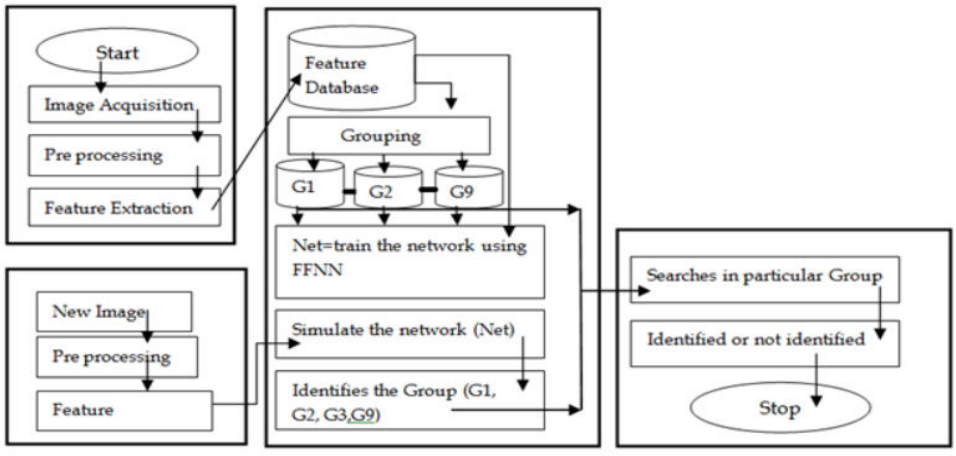

Figure 1-1 The Steps involved in Identification

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Image acquisition:

The first stage of any vision system is the image acquisition stage. After the image has been obtained, various methods of processing can be applied to the image to perform the many different vision tasks required today. However, if the image has not been acquired satisfactorily then the intended tasks may not be achievable, even with the aid of some form of image enhancement.

Pre-processing:

Image pre-processing is the name for operations on images at the lowest level of abstraction whose aim is an improvement of the image data that suppress undesired distortions or enhances some image features important for further processing. It does not increase image information content. Pre-processing is carried out on the image to improve the quality of the image so that the main Processing on the image becomes easier.

Gray scale conversion:

The road sign location in this paper are based on gray image, so the main function of the pretreatment algorithm is to convert color images to gray scale images for the latter operation. A color bitmap is composed of R, G and B 3components. If it is a 24-bit true color image, every point is made up of three bytes which respectively represent R, G and B. Grayscale is a range of monochromatic shades from black to white. Therefore, a grayscale image contains only shades of gray and no color. While digital images can be saved as grayscale (or black and white) images, even color images contain grayscale information. This is because each pixel has a luminance value, regardless of its color. Luminance can also be described as brightness or intensity, which can be measured on a scale from black to white.

Edge detection:

Edge detection is a type of image segmentation techniques which determines the presence of an edge or line in an image and outlines them in an appropriate way. The main purpose of edge detection is to simplify the image data in order to minimize the amount of data to be processed. Generally, an edge is defined as the boundary pixels that connect two separate regions with changing image amplitude attributes such as different constant luminance and tristimulus values in an image and. There are different approaches and algorithm to find out the edge in image processing that, in the meantime, canny operator due to high accuracy and low processing volume has a more favorable performance compared to other methods for our database.

Image segmentation:

Image segmentation is the process of partitioning a digital image into multiple segments. The goal of segmentation is to simplify and/or change the representation of an image into something that is more meaningful and easier to analyse. Image segmentation is typically used to locate objects and boundaries (lines, curves, etc.) in images. More precisely, image segmentation is the process of assigning a label to every pixel in an image such that pixels with the same label share certain characteristics. The result of image segmentation is a set of segments that collectively cover the entire image, or a set of contours extracted from the image.

Feature extraction:

Feature extraction is a part of the dimensionality reduction process, in which, an initial set of the raw data is divided and reduced to more manageable groups. So when you want to process it will be easier. The most important characteristic of these large data sets is that they have a large number of variables. These variables require a lot of computing resources to process them. So Feature extraction helps to get the best feature from those big data sets by select and combine variables into features, thus, effectively reducing the amount of data. These features are easy to process, but still able to describe the actual data set with the accuracy and originality.

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File explorer:

Once all of the required computations have been completed, the sign are matched with the Database images, and the operational task compares the features of the newly identified sign to the database features.

III. SAMPLE DATASET IMAGES:

A database comprising of 280 images is created for evaluation of the proposed algorithm. The dataset consists of all variety of traffic signs like additional sign, animal sign, warning sign, prohibitory sign, and information sign, cross buck, road. marking, mandatory sign and yield sign

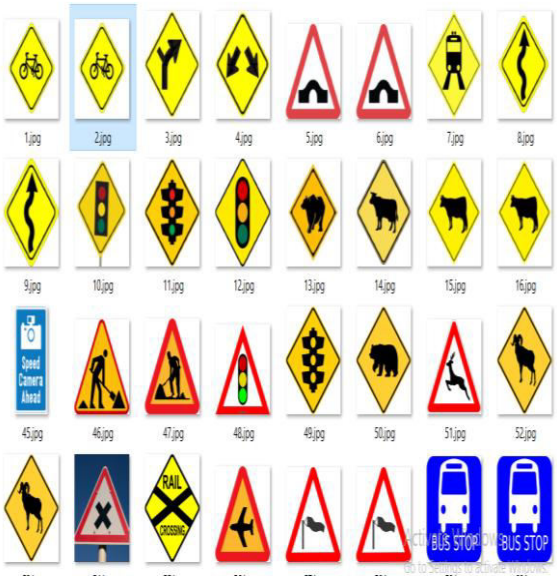

Figure -2: Collection of Dataset Set of Images

Prohibitory signs: They are used to prohibit certain types of manoeuvres orsome types of traffic. The no entry, no parking, and speed limit signs belong to this category. Normally, they are designed in a circular shape with a thick red rim and a yellow interior. There are few exceptions; the STOP sign is an octagon with a red background and white rim, the NO PARKING and NO STANDING signs have a blue background instead of yellow. The end of restriction signs are marked with black bars.

Mandatory signs: They are characterised by a complete blue circle and a white arrow or pictogram. They control the actions of drivers and road users. Signs ending obligation have a diagonal red slash.

Warning signs: A traffic warning sign, Figure 2.1, is a type of traffic sign which indicates a hazard ahead on the road. It is characterised by an equilateral triangle with a thick red rim and a yellow interior. A pictogram is used to specify different warnings. The red-yellow combination is easily seen in snowy weather conditions. Other signs such as the YIELD sign and the distance to level crossing signs and track level crossing also belong to this class.

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IV. WALK THROUGH SOFTWARE PROCESS

1. Load image:

In this module, user must selected images from the folder. After image is loaded it display image is loaded.

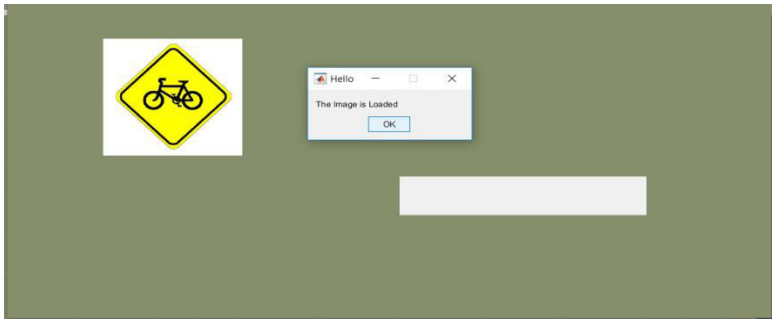

Figure-3: Load Image

2.Feature extraction:

In this module, after loading image feature extraction is extracted from the image. After it will display feature extracted from the image.

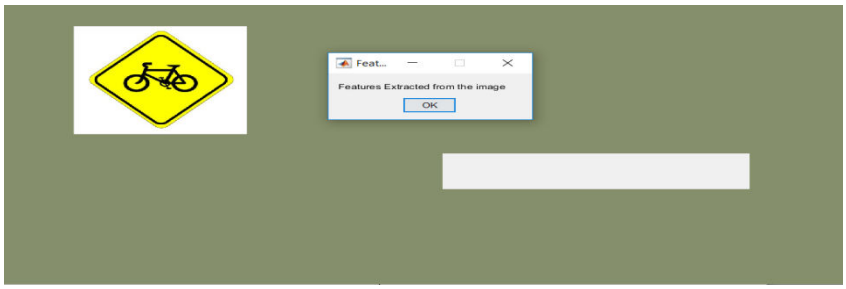

Figure-4: Feature Extraction

3. Recognize

After feature extraction, identification group will be displayed based on the image extracted from the feature extraction.

Figure -5: Identify

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4. Result

After identification group displayed, display the image belongs to identification group.

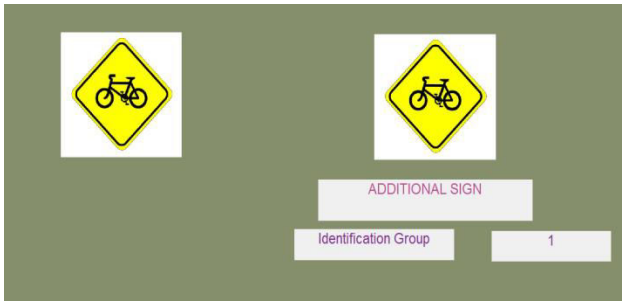

Figure-6: Display Result

5. Identification Rate

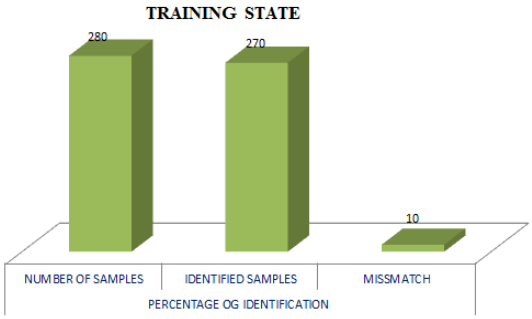

Figure-7: Identification Rate

We have used around 280 samples for training purpose out of 270 samples we correctly identified and we have achieved of 96.42% of accuracy in the training state. The figure 8 shows the validation of the network built, the system showed about 93.33%.

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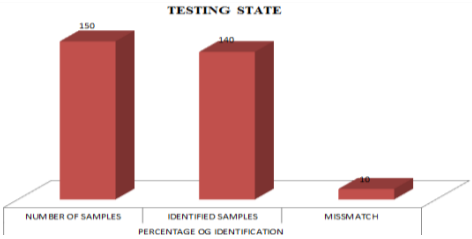

Figure 8: Testing the system

V. CONCLUSION

The attributes of Gray level Co-occurrence showed the best result being arrived, using artificial neural network, we arrived with the 96.42% of accuracy from the known dataset that are being used for identification of the Indian Road Sign and Later we use the stabilized network to test the network to perform for our surprise the system performed with 93.33 % accuracy from an unknown dataset in the system, so this shows with the good accuracy.

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