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Traffic Sign Recognition System

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Abstract- The proposed system is about the detection of road traffic signs from images or real time video, classification and recognition. Road traffic signs are detected by analyzing color information, mainly red and blue, contained on the images or video. Following are main modules of a system: Module 1:Preprocessing, Module 2: RGB to HSV conversion, Module 3:Detection, Module 4:Template Matching. Finally the proposed system produces the detection of traffic sign with its Corresponding classification as Danger, Mandatory or Informatory signs, and recognizes that particular sign.

Index Terms- Real-time video,classification,Recognition,RGB,HSV.

1. INTRODUCTION

Our intelligent Traffic Sign Recognition System for road traffic control System offers the ability to acquire real-time traffic sign information. System provides real time information of traffic sign captured through video camera. Traffic management measures are aimed at improving the safety and flow of traffic utilizing traffic capacity more effectively. The automatic Traffic sign recognition system would help reducing the number of traffic accidents and it is essential for any autonomous vehicle project. Traffic signs were designed to contrast easily With the background, so they can be detected by the drivers. Most of the signs have blue or red tint with highly saturated properties and also reflective attributes, since they must be detected in varied conditions.

2. MOTIVATION

Traffic sign recognition system would help in reducing of traffic accidents. It can use as an essential for any autonomous vehicle. Traffic sign recognition system can be used in automatic car for guiding them about the traffic signs. Traffic signs were designed to contrast easily with the background, so they can be detected by the drivers. Traffic signs have blue or red boundaries with highly saturated properties and also reflective attributes, since they must be detected in varied weather conditions.

3. LITERATURE SURVEY

Many algorithms and methodologies have been proposed for Traffic sign recognition system. Tam T. Le has proposed the Support Vector Machine method to retrieve region of traffic signs in real-time video processing in which a block of pixels is given as an input vector. Another method had been proposed by Hassan Shojania based on thresholding, convolution masks and geometric constraint. Another method is proposed by Auranuch Lorsakul with Neural Network technique with canny edge detection technique, in this test sign images including distortion images are

Fig. 1. Traffic Signs.

provided into the program in order to identify the network generalization. Because of the complex background and high number of potential areas it is tough for the system to detect the circle and ellipse in the test image candidates.

4. EXISTING SYSTEM

Many systems has been developed and various techniques had been used in those systems. Support vector machine model which uses candidate regions of the traffic sign. It consists of training model and training sets used for classification of traffic signs. Another model is based on Neural network which uses multilevel perceptron.Another model consists of GPS which can download the maps but it is not reliable as many vehicles not do not have GPS and do not allow the download of maps.

5. SYSTEM ARCHITECTURE

In the proposed system we use detection identification and classification of various traffic signs. The whole

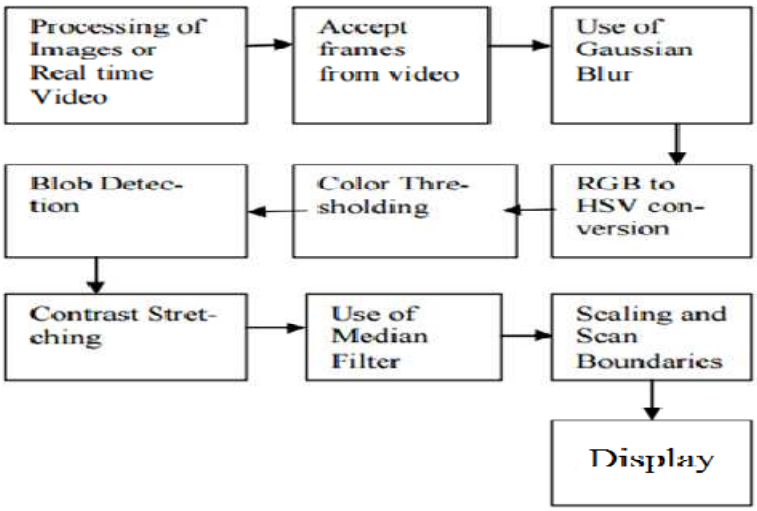

Fig. 2.System Architecture

system architecture is divided into five modules and each module have great importance for the system.

5.1. *Module 1:Pre-Processing of a Video*

(1)Proposed system detect the traffic sign from the image and videos.

(2)Frame Extraction
Frames from the video is extracted from the video for detecting the traffic sign.

(3)Gaussian Blur
Gaussian blur is also known as Gaussian smoothing is the result of blurring an image by a Gaussian function.It is widely used in computer graphics Software,to reduce the noise in an image. The effect of this blur provide a resemblance of that of looking through a translucent screen . Gaussian function is widely used in computer graphics to enhance the image structure.It is an algorithm used in image pre processing Gaussian blur reduces the high frequency components from the image.

$$G(x) = \frac{1}{\sqrt{2\pi\sigma^2}} e^{-\frac{x^2}{2\sigma^2}}$$

. The Gaussian blur is a type of image filtering function that transforms each pixel present in the image. The equation of a Gaussian function in one dimension is in two dimensions, it is the product of two such Gaussians, one in each dimension where x is the distance from the origin in the horizontal axis, y is the distance from the origin in the vertical axis, and is the standard deviation of the Gaussian distribution. When applied in two dimensions, this formula produces a surface whose contours are concentric circles with a Gaussian distribution from the center point. Values from this distribution are used to build a convolution matrix which is applied to the original image.

$$G(x,y) = \frac{1}{2\pi\sigma^2} e^{-\frac{x^2+y^2}{2\sigma^2}}$$

Each pixel's new value is set to a weighted average of that pixel's neighborhood. The original pixel's value receives the heaviest weight (having the highest Gaussian value) and neighboring pixels receive smaller weights as their distance to the original pixel

increases. This results in a blur that preserves boundaries and edges better than other, more uniform blurring filters; see also scale space implementation.

5.2. *RGV to HSV Conversion*

RGB color model consists 3 primary colors Red,Green and Blue.These primary colors are are supported by most computer devices.HSV color model consists of three components : hue, saturation and value.HSV color model are more naturally perceived by human.With the combination of saturation and intensity information the sign can be easily identified for all the pixels containing Red Blue and Green color. Hue is expressed as a number from 0 to 360 degrees representing hues of red (starts at 0), yellow (starts at 60), green (starts at 120), cyan (starts at 180), blue (starts at 240), and magenta (starts at 300).
Saturation is the amount of gray (0 % to 100%) in the color.Value (or Brightness) works in conjunction with saturation and describes the brightness or intensity of the color from 0% to 100%.

5.3. *Detection of Traffic Signs*

(1)Color Thresholding
Image segmentation can be done by a simplest technique called Thresholding.The simplest thresholding methods replace each pixel in an image with a black pixel if the image intensity I is less than some fixed constant T ,or a white pixel if the image intensity is greater than that constant. In the example image on the right, this results in the dark tree becoming completely black, and the white snow becoming complete white.Color images can also be threshold. One approach is to designate a separate threshold for each of the RGB components of the image and then combine them with an AND operation. This reflects the way the camera works and how the data is stored in the computer, but it does not correspond to the way that people recognize color.

(2)Blob Detection
It is a method for detecting the regions whose properties differ from the surrounding regions.The blob analysis takes an image is represented as a matrix with a certain number of pixels on a certain number of lines. When the image is grayscale, every one of those pixels has a value which indicates the brightness of the image at that point. When this grayscale image is converted to a black and white image, where every pixel above a certain threshold is white and under that threshold is black, then generated a black and white image with the white area's being the blobs.

Following sequence of actions are involved.

a) Check the first line of the image and find groups of one or more white pixels. These are the blobs on a certain line, called line blobs. Number each of these groups.
b) Repeat this sequence on the next line. While collecting the line blobs, check the line blobs on the line which are checked before this current line and see if these blobs overlap each other.
c) If so merge these line blobs as one blob i.e. Give the current line blob the same number or id as the line blob(s) on the other line.
d) Repeat this for every line and have a collection of blobs.

(3)Contrast Stretching
Contrast stretching (also called Normalization) attempts to improve an image by stretching the range of intensity values it contains to make full use of possible values. Unlike histogram equalization, contrast stretching is restricted to a linear mapping of input to output values. The first step is to determine the limits over which image intensity values will be extended. These lower and upper limits will be called a and b, respectively (for standard 8-bit grayscale pictures, these limits are usually 0 and 255). Next, the histogram of the original image is examined to determine the value limits (lower = c, upper = d) in the unmodified picture. If the original range covers the full possible set of values, straightforward contrast stretching will achieve nothing, but even then sometimes most of the image data is contained within a restricted range; this restricted range can be stretched linearly, with original values which lie outside the range being set to the appropriate limit of the extended output range. Then for each pixel, the original value r is mapped to output value s using the function:

$$I_N = (I - \text{Min})\frac{\text{newMax} - \text{newMin}}{\text{Max} - \text{Min}} + \text{newMin}$$

(4)Median Filter
In signal processing, it is often desirable to be able to perform noise reduction on an image or frame extracted from videos. The median filter is a nonlinear digital filtering technique used to remove noise. Such noise reduction is a typical pre-processing step to improve the results of later processing .The property of median filter is that is removes the noise and preseves the edges.the median filter is to run through the signal entry by entry, replacing each entry with the median of neighboring entries. The pattern of neighbors is called the "window", which slides, entry by entry, over the entire signal. For 1D signals, the most obvious window is just the first few preceding and following entries.In 2D or higher-dimensional

signals such as images, more complex window patterns like sphere box, are possible.

(5) Scaling
Image scaling is the process of resizing a digital image. Scaling is a non-trivial process that involves a trade-off between efficiency,
Smoothness and sharpness. As the size of an image is increased, so the pixels which comprise the image become increasingly visible, making the image appears "soft". Conversely, reducing an image will tend to enhance its smoothness and apparent sharpness. To locate the particular sign exactly, boundary scanning is done with the help of colors. This scan includes right to left, left to right, top to bottom, and bottom to top of an image.

5.4. *Output Generation*

The image obtained after all
the processing is compared with the image present in the database.If the corresponding image is found then the image detected will be displayed on the screen.

6. CHALLENGES

(1)The proposed system is unable to work if the traffic sign is not visible due to trres or any other objects.
2) In the absence of proper light the system may not Identify the traffic signs.
3) Bad weather like dense fog, heavy rain can lead to the non recognition of the traffic signs.
4) If the speed of the vehicle is more than the ideal Speed.

7. CONCLUSION

This paper describes the traffic sign recognition system,capable of classifying in real-time about triangular shaped Indian Traffic Signs and challenges offered by different light and weather conditions. The system will be tested in real environment on a test-vehicle.This paper provides approach
for detecting road traffic signs with quality output.Correct traffic sign detection is essential for accurate classification because if particular sign is not detected properly it cannot produce proper result. The methods were divided into color based, shape-based and learning-based.In the first time the Traffic sign Module has processed the input images using
image processing techniques, such as, threshold technique, Gaussian filter, .Using the provided training data set, different traffic sign is being recognized.The main reason to select this
method is to reduce the computational cost in order to facilitate the real time implementation. Still research is going on more results will be presented in the next paper.

REFERENCES

[1] Real Time Road Signs Classification Paolo Medici, Claudio Caraffi,,Elena Cardarelli, Pier Paolo Porta,2008
[2] DETECTION, CLASSIFICATION AND RECOGNITION OF ROAD TRAFFIC SIGNS USING COLOR AND SHAPE FEATURES Gauri
A. Tagunde,IJATER,2012.
[3] en.wikipedia.org/wiki/Gaussian blur.
[4] Tam T. Le1, Son T. Tran2, Seichii Mita2, and Thuc D. Nguyen1, Real Time Traffic Sign Detection Using Color and Shape-Based Features, Part
II, LNCS 5991, pp. 268278, March 2011.
[5] A. SALHI, B. MINAOUI, and M. FAKIR, Robust Automatic Traffic Signs Recognition Using Fast Polygonal Approximation of Digital Curves and
Neural Network. IJACSA, 2012.
[6] P. D. Nagarkar and D. H. R. Kher, Algorithm for Road Sign Detection for Driver Assistance from Complex Background. IJERT, 2015.
[7] A. S. et al., Fast and Robust Traffic Sign Detection. IEEE, 2005.
[8] D. S. Solanki and D. G. Dixit, Traffic Sign Detection Using Feature Based Method. Bhopal,India: IJARCSSE, 2015
[9]en.wikipedia.org/wiki/Normalization