Traffic Sign Detection Using Sobel Edge Detector and Morphological Operations

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Abstract: The **aim of this project is to identify and recognize a traffic sign in bad weather conditions and at night time traffic signs are harder to recognize correctly. Traffic is the major trouble which every country faces because of the Enlarge in quantity of motor vehicle during the world. A variety of image processing techniques are used to threshold, filter, detect edges, and further process the image.**

Index Terms **– Traffic sign detection, feature extraction, edge detection, morphology ROI, and classification**

1. INTRODUCTION

Identification of traffic signs correctly at the right time and at the right place is very important for car drivers to insure themselves and their passenger's safe journey. The Advanced driver assistance systems (ADA) are the one of the fastest growing field in automotive electronics. Traffic signs are installed to guide, warn, and regulate the traffic, they supply information to help drivers. In real world, drivers may not always notice road sign, at night or in bad weather, traffic signs are harder to recognize correctly. These situations leads to traffic accidents and serious injuries. A vision Based road sign detection system is thus desirable to catch the attention of a driver to avoid traffic hazards. The information provided by the traffic signs is encoded in their visual property like color, shape etc. therefore the detection and recognition modules are based on color and shape of the traffic sign. The detection and recognition system based on two modules. Detection module receive image from the camera and find out all the region in the image they contain traffic sign. The classification module determine the category traffic sign in each region.

2. LITERATURE SURVEY

[1]. ElMargae Samira, used a Discrete Cosine Transform (DCT) to extract a global feature of a traffic sign. The mathematical equations of the DCT uses with image compression, helps to separate the image into parts. The JPEG process is a widely used form of lossy image compression that centers on the Discrete Cosine Transform. Local Binary Pattern (LBP)**,** It is used to obtain local descriptors and Very efficient texture operator. Support vector machine (SVM), Classification of the features is done by the support vector machine and SVM is a global classification model that generates non overlapping partitions. [2]. Ce Li applied automatic segmentation into the homogenous region for merging based on similarities and then used morphological operators and boundary detection algorithm to extract the traffic sign board. They have used markers for the object and the background to obtain the traffic sign board. Morphological operation**,** it's applied to remove unwanted pixels and highlight the required operations of the image and isolate the sign boards. Every image has a background information as well as region of interest these morphological operations are used to extract the required region. [3]. Harini S used background subtraction, object labeling and morphological operation for the detection of the red object for pre-processing and component extraction. [4]. Loy and Barnes presented an algorithm that identifies polygon shaped signs (e.g., square, triangle, octagon) using radial symmetry detector. The accuracy of these shape based methods depends a lot on the edge operators being used by them, and these edges are vulnerable to noisy pixels. [5]. Bharathi Sharma et al has proposed automated vehicle detection based on average filter to reduce the noise effect, also discussed differential morphological closing profile for vehicle segmentation and shape detection. Thresholding value is applied to remove the unwanted objects other than the vehicle. Finally to extract the target vehicle shape index Thresholding has discussed. [6]. Pratishtha Gupta et al discussed a model to count the traffic load by some parameters such as edge detection, histogram equalization, labeling and removing the noise with the help of median filter. To get smooth image and sharp boundaries Pratishtha Gupta proposed median filter.

3. METHODOLOGY

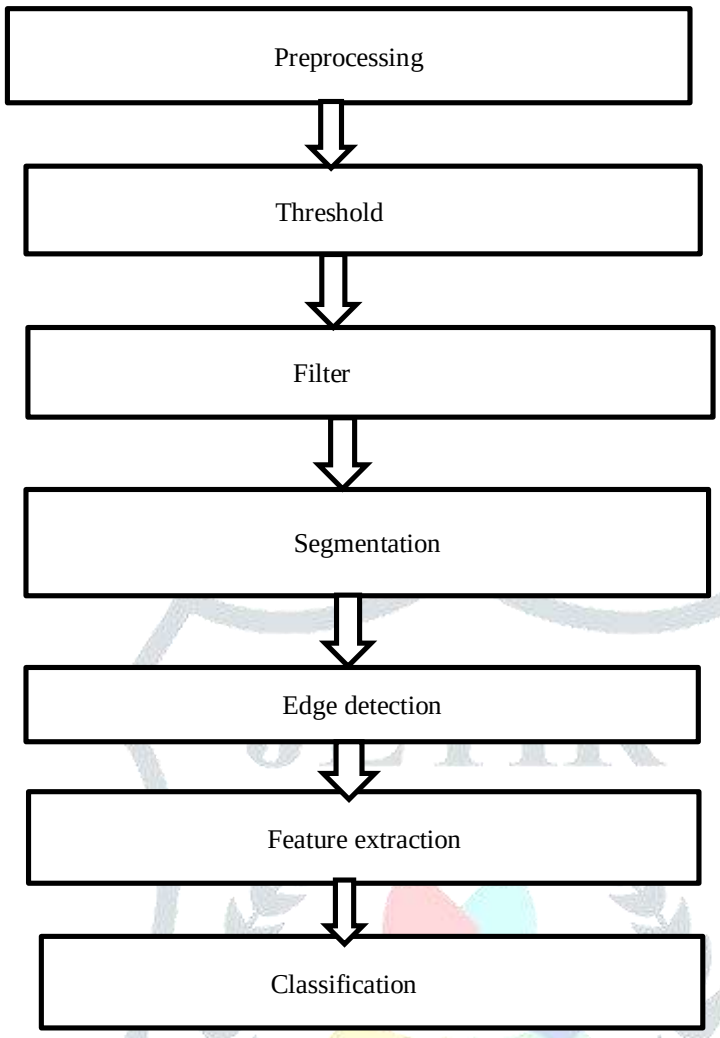


Figure1: Block diagram of proposed method

3.1 preprocessing

Preprocessing is carried out on the image to improve the quality of the image so that the main processing on the image becomes easier. It is a common name for operations with images at the lowest level of abstraction. The aim of preprocessing is an improvement of the image data that suppresses unwanted distortions or enhances some image features important for further processing. This step involves image converting to resize, normalized, threshold, noise removing and extracting connected component.

Threshold: Partitioning an image into a foreground and background. The most intuitive color space is the RGB system. The color of every pixel is defined by three components: red, green, and blue. Because of this, the color threshold has the following expression.
RB=(NR>X)&(NR<X1)
GB=(NG>Y)&(NG<Y1)
BB=(NB>Z)&(NB<Z1)
Thresh image = RB&GB&BB.
Where RB,GB,BB is red binary, green binary, blue binary respectively and NR,NG,NB is normalized red, normalized green, normalized blue and (X,X1), (Y,Y1), (Z,Z1) are threshold values.

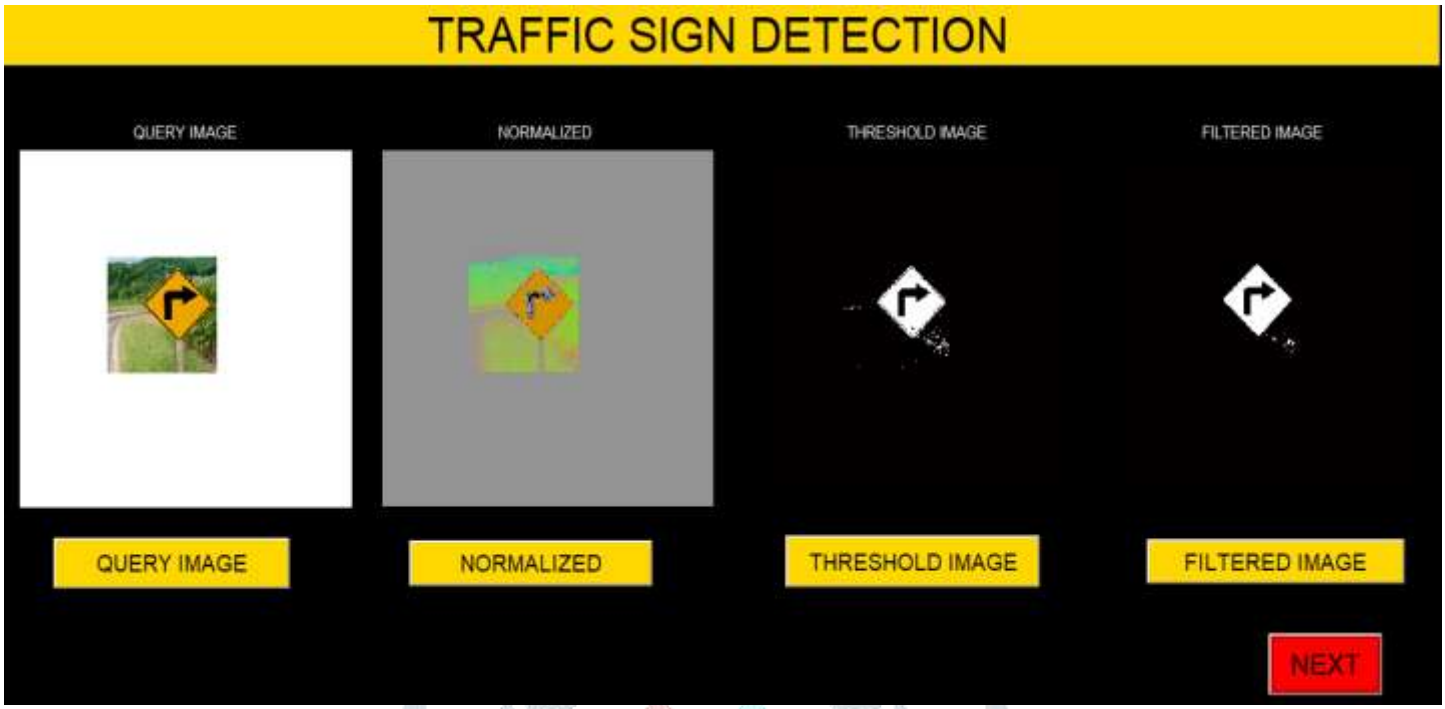
Median filter: In signal processing it is necessary to perform some kind of noise reduction on an image or signal. The median filter is a nonlinear digital filtering technique, Used to remove noise from an image also used to remove the noise signboard outlines or edges. Median filter is better able to remove the outliers without reducing the sharpness of the image.

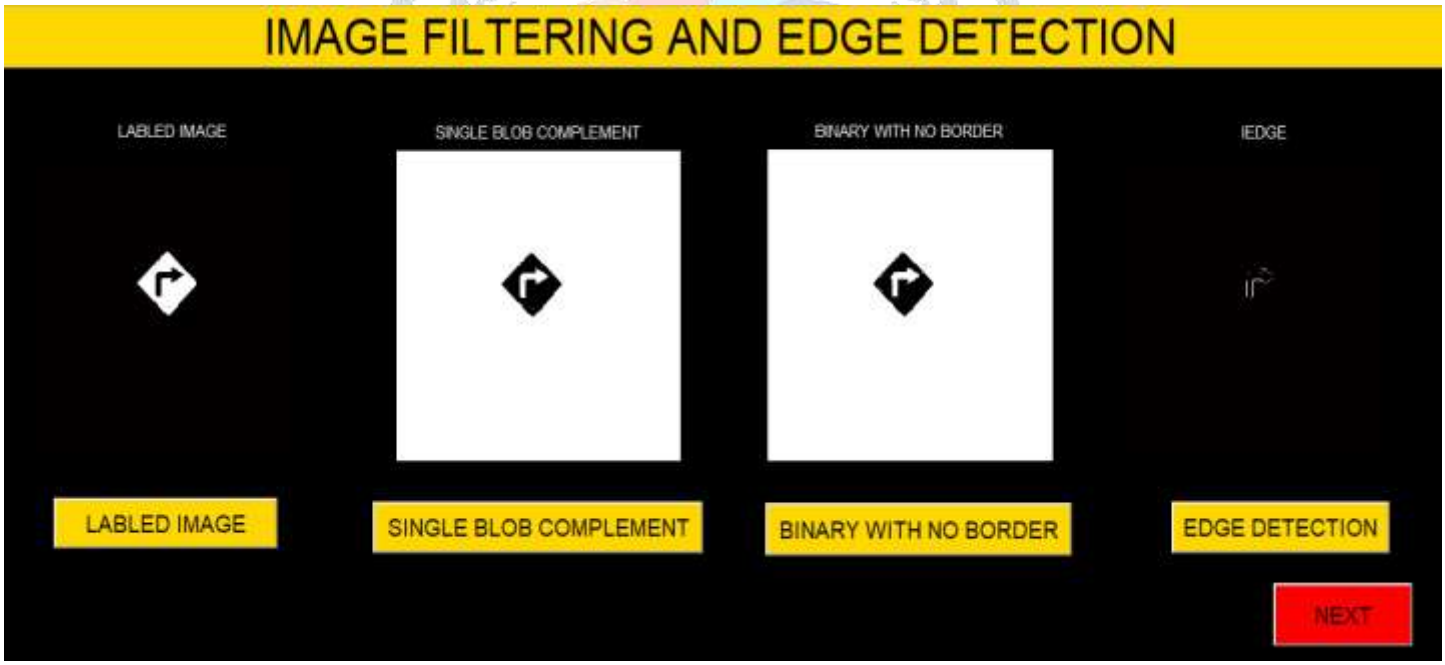
3.2 segmentation: the process of dividing image into multiple part this is typically identify object and other relevant information with in an image.
Sobel edge detector: Edge detection is a type of image segmentation technique which determines the presence of an edge or line in an image. Sobel edge detector Reduce the amount of pixels to process and maintain the structural aspects of image.

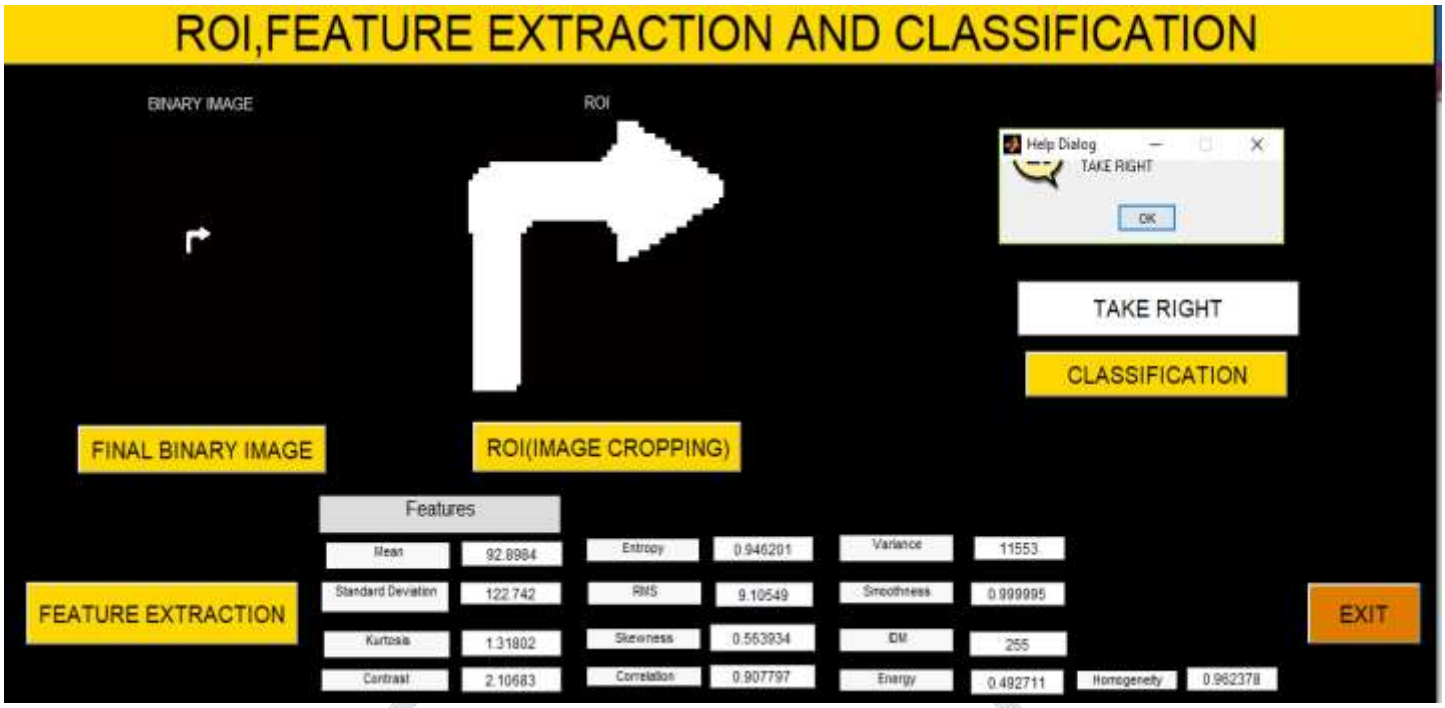
3.3 Morphological operation: morphological operation capture the essence of the feature such as shape in an image. These operation remove unwanted pixel and highlight the required operation of the image. The Dilation and Erosion are used to add or removed from the object an image depends on size and shape of structuring element used process the image.

3.4 classification: The main task of the detection module is to process the input image and extract out the areas that contain road sign pattern. The detection module then forwards this ROI to the classification module for recognition. The main task of the classification module is to classify the extracted regions of interest presented to its input into the road sign category they belong to different techniques in image classification like SVM and multi SVM.

RESULTS:







The traffic sign detection and classified.

CONCLUSION

The proposed system can be used to provide the safety information for the driving assistance system. The database has been trained with traffic sign images in different classes. Multi SVM classifier is designed to classify the objects in different classes based on the features.

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