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Traffic sign analysis and detection

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Abstract : *This paper helps in detecting and analyzing traffic signs. Since the signs are present in robust environment, these are paid less attention. Therefore to avoid any hazardous situation these signs are needed to be detected. The methods used are colorautocorrelogram , color moments, HOG feature, text to speech conversion . The process includes reading video, extraction of features based on color and shape. The images are added to the database by manually selecting the frame. The user is asked for either adding the image to the database or to compare the image with the added entries. The distance between the extracted features is calculated using Euclidean distance. The one having minimum distance is regarded as the best match and informed in the form of voice signal.*

***Key Words*: colorautocorrelogram, color moments, HOG feature.**

1. INTRODUCTION

Traffic signs can be generally divided into three categories that are informatory, warning and mandatory signs. Various information on direction, destination, roadside facilities, etc. are provided by informatory signs to the road user, some of these are shown in Figure 1. These signs are generally facilitators to the driver. These signs are normally blue in color.

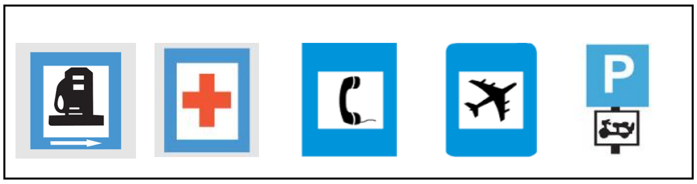

Figure 1: Informatory signs

Mandatory signs are obligatory on the traffic which uses a specific area of road. These signs are the indication of what must one do, rather than must not do. The shape of such signs are generally round. 'Stop' and 'Give Way' are octagon and triangular, respectively, in shape some of which are shown in figure. These are generally in red color but some are in blue color.Violation of these signs attracts heavy fines and punishments. Importantly, violation of these could lead to major accidents also.

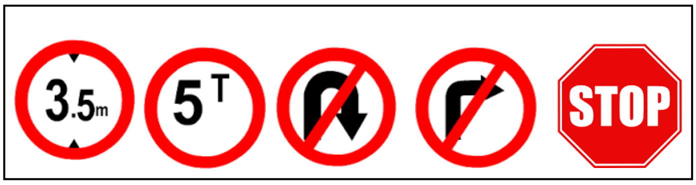

Figure 2: Mandatory signs

Warning or cautionary signs warn the driver about the hazards/situation lying ahead on the road. These signs are meant for the safety, although violation of these road signs may not cause any legal action, there are possibilities of occurrences of major accidents. Cautionary signs are triangular in shape with red border. Figure 3 shows some examples.

Figure 3: Warning / Cautionary signs

2. Proposed approach

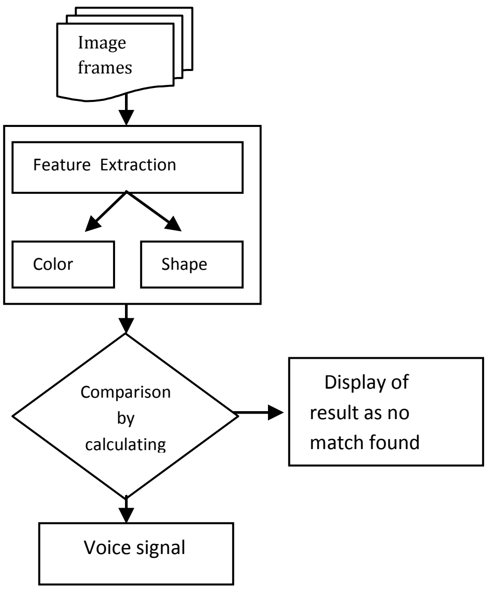

Fig-4: Step by step process

2.1. Color Moments

Color moments are considered to be one of the effective means of bifurcating images based on color. Once calculated, these moments helps in finding color similarity between images. These values of similarity can be used for comparison to the values of images indexed in a database for tasks like image retrieval. Color moments are measures that characterise color distribution in an image in the same way that central moments uniquely describe a probability distribution. Color moments are mainly used for color indexing purposes as features in image retrieval applications in order to compare how similar two images are based on color. In order to find and retrieve a similar image, one image is compared to a database consisting of digital images with pre–computed features. Each comparison between images results in a similarity score, and the lower this score is the more identical the two images are supposed to be. Two color moments mean and standard deviation are used. The i^{th} color channel at the j^{th} image pixel is represented as p_{ij} . Mean is represented as :

$$E_{ij}=\sum_{N}^{j=1} p_{ij} \;/\; N$$

Standard deviation is represented as :

$$\sigma_{ij}=\sqrt{(\sum_{N}^{j=1}(p_{ij}-E_{ij})^2/N)}$$

2.2. Color correlogram

A color correlogram expresses how the spatial correlation of pairs of colors changes with distance . A color histogram (henceforth histogram) captures only the color distribution in an image and does not include any spatial correlation information. Some characteristics are : (i) it includes the spatial correlation of colors, (ii) it can be used to describe the global distribution of local spatial correlation of colors; (iii) it is easy to compute, and (iv) the size of the feature is fairly small. Several schemes for using spatial information about colors to improve upon the histogram method have been proposed recently. One common approach is to divide images into subregions and impose positional constraints on the image comparison (*image partitioning*). Another approach is to augment histograms with local spatial properties (*histogram refinement*).

The correlogram is effectively used for checking randomness in a data set. This randomness is ascertained by computing autocorrelations for data values at varying time lags. If the values are random, such autocorrelations should be near zero for any and all time-lag separations. If they are non-random, then one or more of the autocorrelations will be considered as non-zero.

2.3. Histogram Of oriented gradients

The histogram of oriented gradients (HOG) is a feature descriptor having wide scope in computer vision and image processing which is helpful in object detection. The occurrences of gradient orientation in localized portions of an image is counted. This method is similar to that of edge orientation histograms, scale-invariant feature transform descriptors, and shape contexts, but differs in that it is computed on a dense grid of uniformly spaced cells and uses overlapping local contrast normalization in order to improve accuracy. The method evaluates well-normalized local histograms of image gradient orientations in a dense grid. The aim is to obtain local object appearance. The distribution of local intensity gradients or edge directions is used to characterize shape, even without having prior and precise knowledge of the corresponding gradient or edge positions. The implementation is carried out by dividing the image window into small spatial regions generally called *cells*, a local 1-D histogram of gradient directions or edge orientations is accumulated over the pixels of the cell for each cell. The representation is thus formed by the combined histogram. In order to achieve better invariance to illumination, shadowing, it is also useful to contrast-normalize the local responses before using them. The next step is carried out by accumulating a measure of local histogram energy over comparatively larger spatial regions called *blocks* and the results are then used in normalization of all cells in the block. The normalized descriptor blocks are known as *Histogram of Oriented Gradient (HOG)* descriptors. The HOG descriptor acts as the concatenated vector of the components of the normalized cell histograms from all of the block regions. These blocks typically overlap, meaning that each cell contributes more than once to the final descriptor. Two main block geometries existing are: rectangular R-HOG blocks and circular C-HOG blocks. R-HOG blocks are generally square grids. There are three parameters to represent these blocks. First is the number of cells per block, second is the number of pixels per cell, and lastly the number of channels per cell histogram. Circular HOG blocks (C-HOG) are generally found in two variants: those with a single, central cell and those with an angularly divided central cell.

Let v be the unnormalized descriptor vector v_k be its k norm, k = 1,2 and ϵ be a small constant , then the two schemes L1 and L2 are given below.

L1 norm : $v \rightarrow v/(v_1 + \epsilon)$

L2 norm : $v \rightarrow v/\sqrt{(v_2^2 + \epsilon^2)}$

3. Experimental Results

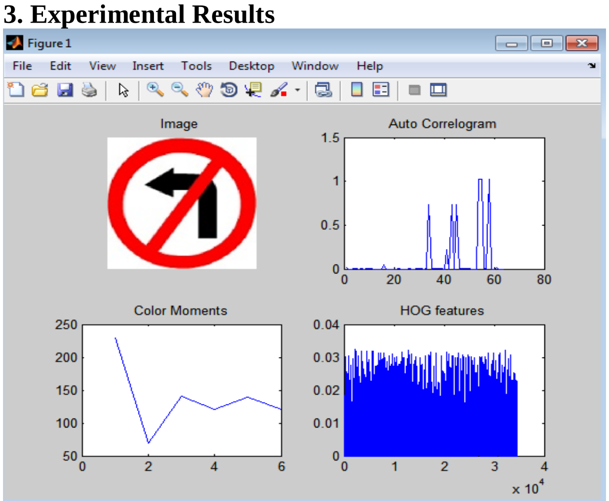

Fig -5: Feature extraction of the image

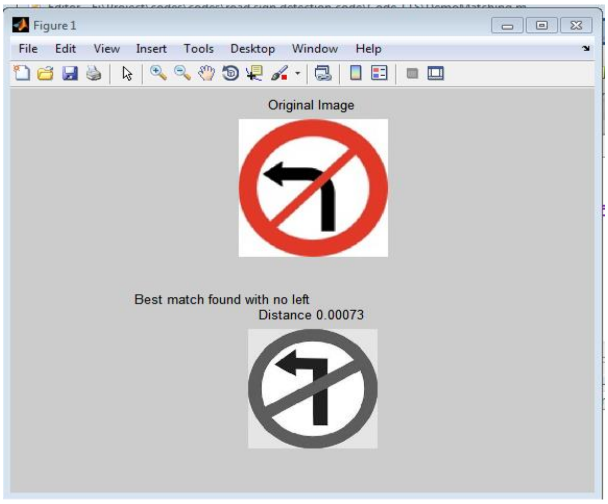

Fig -6: Display of result

4. Analysis

	BR	FR	TI	SL	NL	NE	Y.I.	T.R.	C.L.	C.R.
BR	1			1						
FR		1		1						
TI			2							
SL				2						
NL					2					
NE						2				
YI							2			
TR	1		1							
CL									2	
CR							1	1		

Table-1 : Confusion matrix for three images per training signs.

The above matrix represents the classification of the images. Columns represent the traffic signs provided during training (3 images per sign).The rows represent the signs provided during testing(2 images per sign).The abbreviations BR,FR,TI,SL,NL,NE,YI,TR,CL,CR are short for Bicycle Route, Falling Rocks, T Intersection, Speed Limit, No Left, No Entry, Y Intersection Turn Right, Compulsory Left, Cross Road respectively.

	BR	FR	TI	SL	NL	NE	Y.I.	T.R.	C.L.	C.R.
BR	2									
FR		2								
TI			2							
SL				2						
NL					2					
NE						2				
YI							2			
TR				1			1			
CL									2	
CR			1					1		

Table 2 : Confusion matrix for four images per training signs

5.Conclusion

Color moments have proven to be a successful technique for indexing images based on color. An accurate and consistent method is provided that outperforms classic color indexing techniques such as color indexing and cumulative color histograms. Image indexing is easy due to use of correlogram. The HOG features help to describe the image on the basis of shape more efficiently. Accuracy achieved is 75%.

REFERENCES

[1]Bolc Leonard, “Computer Vision and Graphics”,2012 IEEE International Conference, Warsaw, Poland, 2012.

[2] L. Chen, Q. Li, M. Li, Q. Mao, Traffic Sign Detection and Recognition for Intelligent Vehicle, in, 2011 IEEE Intelligent Vehicles Symposium (IV), Baden-Baden, Germany, 2011.

[3] P. Sermanet, Y. LeCun, Traffic sign recognition with multi-scale Convolutional Networks in, The 2011 International Joint Conference on Neural Networks (IJCNN), , IEEE, San Jose, CA , USA, 2011.

[4]Y. Jiang, S. Zhou, J. Gong, G. Xiong, H.Chen, Traffic sign sign recognition using Ridge Regression and OTSU method in IEEE Intelligent Vehicles Symposium (IV) Baden-Baden, Germany, 2011.

[5]. G. Yanlei, T. Yendo, M. Tehrani, T. Fujii, M. Tanimoto, Traffic sign detection in dual-focal active camera system in,2011 IEEE intelligent Vehicles Symposium (IV) Baden-Baden, Germany, 2011.