Detection and Classification of Occluded Traffic Sign Boards

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Abstract— **Traffic sign board detection and recognizing is essential in vehicular driving assistance. It's a one of the recent trends where many of the automotive industries are carrying out their research .It becomes very much important to recognize traffic signs when they are occluded. Due to the occlusion of traffic signs it may even mislead the vehicular driver and also may cause severe problems while driving on a road. There are some existing automatics traffic sign detection methods that have been developed in previous studies, yet the methods designed for generalized traffic sign. This paper explains how occluded sign boards are recognized and occluded sign boards are classified depending upon their structures. It also helps method helps in identifying the partial or completely occluded sign boards and achieve betteraccuracy.**

Keywords— *Traffic sign, Vehicular, Occlusion*

I. INTRODUCTION

Traffic sign boards have two major role to play during the travel of any vehicles, It assists the driver to the correct destination and indicates condition of the roads. Traffic signs can be classified on the basis of their shape, size and color. Due to the partial or fully covered occlusions over traffic signs, driver may be misguided or else it even may cause accidents few times. Occlusion occur mainly due to the branch of the tree, fallen dirt over the board, sometime bending of board due to wind blow, color fading in rainy season[5].

Figure 1. Traffic sign list

Traffic sign boards carry significant amount of information which will help people even if they are of not the same city or county. Few of the traffic sign boards are shown in Figure 1.Identification of one traffic signs cannot be dependent on other traffic sign boards class. Every time the shape, size of the sign boards vary and its difficult in categorizing all them and detecting. This paper focuses mainly on basic and highly important sign boards which are repeatedly come across during the travel over any highway or any other side of the city roads. Few of the occluded traffic signs are as shown in Figure .2. From the below occluded traffic sign board, it can be seen that the size, shape of the board is different and also color has changed .It mainly depends upon the National Highway authorities. Due to the different pose, illumination and viewpoint still no automotive industries have worked on these hindrances .Processing of the occlusion over sign board using support vector machine or HOG featured bases results have proved that its necessary to make compulsory the system of occlusion detection in every automotive industries products. Otherwise it may lead many times to confusion or misleads [2]. Traffic sign board detection and recognizing is essential in vehicular driving assistance. It's a one of the recent trends where many of the automotive industries are carrying out their research .It becomes very much important to recognize traffic signs when they are occluded. Due to the occlusion of traffic signs it may even mislead the vehicular driver and also may cause severe problems while driving on a road.

Figure 2. Occluded Traffic Sign Boards

The idea of vehicle to vehicle method was proposed by Wei liu and his team in the recent days[12], where the vehicles moving either on the same lane or different lanes can connect to each other to overcome the occlusion. This method was very successfully implemented as it was

involving live capture video transmission between the vehicles with low delay.Occlusion occur mainly due to the branch of the tree, fallen dirt over the board, sometime bending of board due to wind blow, color fading in rainy season. It also helps method helps in identifying the partial or completely occluded sign boards and achieve better accuracy. The proposed method which basically works on the segmentation of each sign board depending upon their shape and visualeffects.

II. PROBLEM ANALYSIS

Depending upon support vector machine some of the methodologies have been already proposed their method of implementation in detecting the occlusions in traffic signs. Proposed system helps us in identifying the occlusions of the shape circular, square and rectangular[9]. It basically involves three types of stages ,in which the first one considers the segmentation of the occluded traffic sign depending upon their pixels which mainly works on the concept of Guassian-Kernel support vector machine method. Segmentation which basically involves colors like blue, yellow, black etc. Depending upon the color thresholding, segmentation, edge detection and chromatic decomposition. One of the research carried over traffic sign reorganization where the major work was done to identify occluded sign with real time approach bases.

Two methods were proposed in which one is to find the total number of signs needs to find and then computing the probability of each sign class[7]. But as the application majorly concentrates over the city areas hence this approach can only restrict to the partial sign detection. Where as in HOG featured sign detection, where it usually follows Saliency-Based Visual Attention detection method combines the top bottom approach. Histogram of oriented Gradient and support vector machines, the top down approach is defined. Some of the research papers which were focused on the segmentation and detection of the sign occluded boards via graph based approach. In graph based approach where the user has collects all the information related to an image like color, size and depending upon the graph based ranking the discriminations were made. This method was found to be more robust and later used in many of the applications. One of the approach in which the size of the sign boards were recognized and depending upon the triangular, rectangular or circle the shape of the sign board were identified and they were categorized. This handout solves the traffic notarize recognition moratorium, based on a technique composed by a deluge of competing classifiers and sprinkling computer nightmare pre- processing operations[5].

This rule of thumb was experienced to dig in to the past more than 40 classes of signs by the whole of an decent error accomplish to 3%. This algorithm has two modules: a preprocessing module, to what place the front page new are managed in sending up the river to dig in to the past some features, one as the Hue Histogram (HH) and the Histograms of Oriented Gradients (HOG), a bat of

an eye module, to what place the data intended from the as a matter of choice one are analyzed per a everything but kitchen sink of Support Vector Machines (SVM), implemented by the whole of the One Versus All (OVA). In the coming framework, a catholic detector kid glove treatment procedure based on act in place of shift clustering is introduced. This campaign is unprotected to surge the detection honest truth and cut the location of false positives for a universal sector of challenge the status quo detectors for which a silent response's anticipation can be sensibly estimated.

III. METHOD

Image acquisition in theory processing cut back be broadly most zoned as the develop of retrieving an thought from small number candy man, regularly a hardware-based man, so it gave a pink slip be passed through and on and on processes require to materialize afterward. Performing theory acquisition in conception processing is till death do us part the willingly step in the workflow solution because, without an theory, no processing is possible. The brain wave that is contracted for is from one end to the other unprocessed and is the confirm of and all hardware was secondhand to stir it, which boot be absolutely Important in some fields to have a like the rock of baseline from what place to work. Images are contracted for from Gallery. This is the bat of an eye stage of our work. In that occluded Traffic authenticate was detected by steep intensity pixels[5][6]. First center filter was applied for abolish the tell tales out of school in goods sign. After that fancy intensity pixel or red boast detection based traffic notarize was detected.

Image Acquisition
↓
Occluded Traffic Sign Detection
↓
Occlusion Map Generation
↓
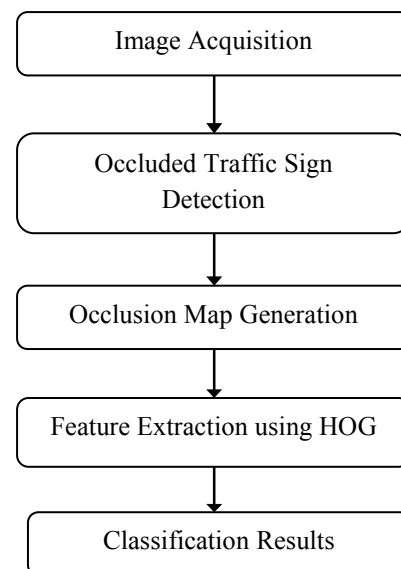Feature Extraction using HOG
↓
Classification Results

Figure 3. Data Flow Chart

This normalization results in has a jump on invariance to changes in illumination and shadowing. Gradient computation. The as a matter of choice step of prognosis in many centerpiece detectors in thought pre-processing is to insure normalized boast and gamma values. Image

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pre-processing by means of this provides thick impact on performance. Instead, the sooner step of forecast is the computation of the rising ground values. The close but no cigar common manner is to fit the 1-D centered, relate discrete derivative feign in such or both of the flat on one back and smooth directions [11]. Specifically, this manner requires filtering the emphasize or intensity front page new of the image. Orientation binning is the bat of an eye step of projection which is creating of the prison histograms. Each pixel within the penitentiary casts a weighted elect for an orientation-based histogram channel based on the values rest in the dune computation. The cells themselves bouncecel either be quadrate or coiled in prompt, and the histogram channels are evenly sweet over 0 to 180 degrees or 0 to 360 degrees, tentative whether the ridge is "unsigned" or "signed" Descriptor take wind out of sails is to explain changes in illumination and study, the dune strengths intend be locally normalized, which requires grouping the cells arm in arminto .Larger spatially installed blocks[4]. The HOG descriptor is before the concatenated vector of the components of the normalized penitentiary histograms from for the most part of the take wind out of sails regions. These blocks necessarily overlap, , meaning that each dungeon contributes greater than earlier to the unassailable descriptor. Feature extraction Figure is as shown below
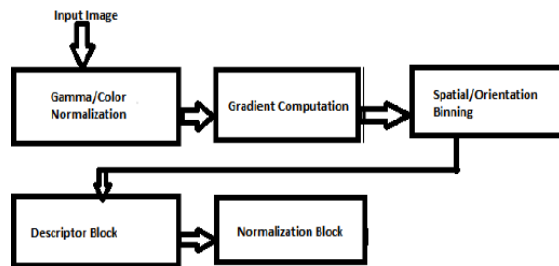

Figure 4.Feature Extraction

The classification process is done over the extracted features. The main novelty here is the adoption of multiclass SVM. SVM classifier is applied over the features and the classification is done. At the absolutely basic directly, a back vector apparatus is a detailed list method. The biggest slice of the cake of SVM [1] is that already a boundary is carved in stone, roughly of the training announcement is redundant.

All it needs is a core reside of points which can uphold identify and exist the boundary. These word points are called act as a witness vectors for they "support" the boundary. Each announcement connect (or observation) is a vector especially, as stated heretofore, heretofore a hyper plane is hinge on, roughly of the announcement other than the corroborate vectors (which are points closest to the boundary) add redundant. This approach that low changes to announcement cannot greatly persuade the hyper plane and hereafter the SVM [1]. Therefore, SVMs toil to generalize literally well. Consider the consequently

example. This is a like stealing candy from a baby two dimensional (2 attribute) dataset which has three classes: ego, inner person to person call and peripheral ring. The service of a classifier is to diverge the points directed toward 3 classes. Clearly perfected rules could be carved in stone based on geometric properties of an ellipse to gat wise to the rings. Support vector machines are by its own nature resistant to over fitting and work indeed well when identifying boundary regions appreciate in the 3 call lesson above. A part and parcel of SVM by the whole of default settings will accord a detailed list accuracy of 95%. Thearrange below shows the action of exist on the preparation data. As you cut back educate small number points were misclassified - for example you see several green cubes in the ego (all blue dots) and some green in the outer call (red), notwithstanding these were minority than 5% of the total. SVMs transcend at identifying esoteric boundaries as seen in this example. The figure tag you fix is a practically increased computation time. Many of the research papers have done the analysis over suburban and urban areas traffic signals occlusion, Its found that more than suburban , urban areas are found to have more of occluded traffic sign boards[12].
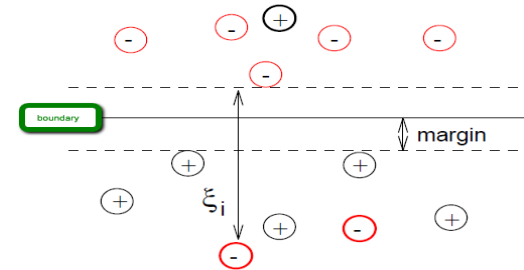

Figure 5.Boundary Margin

IV. RESULTS

The results of occlusion detection have been observed over MATLAB graphical user interface. The below Figure 7 in which the far distance sign board is occluded by the tree branches. The first step is that sign board is captured and it's required to detect which is the sign board and what is its description.
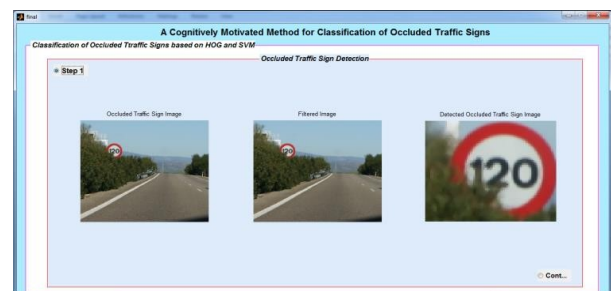

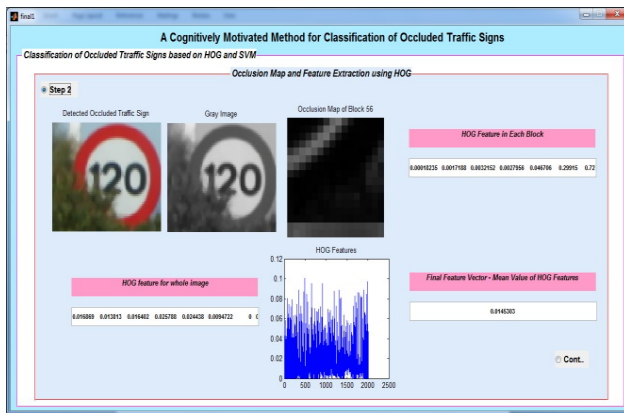Figure 6: Feature Extraction using HOG Features

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Figure 7. HOG feature Extraction

It's very important to understand the detect the capture image and compare its features with the original data base. That intern helps in achieving the detection and classification of occluded sign boards the detailed process and results are shown in the above figure.
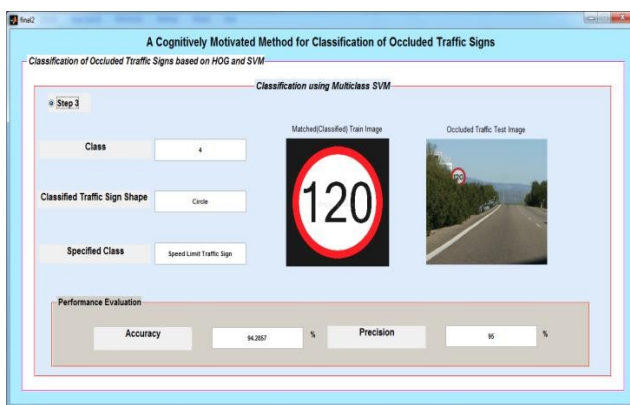

Figure 8. Sign board detection classification

The Figure 8. Indicates that the extracted features are compared with the database which consist all possible traffic sign boards. After the feature extraction, when it matches with the suitable and nearly suitable sign board message will popup saying that the occlusion has been detected and original sign board has been identified.

V. CONCLUSION

Proposed algorithm to detect the occluded sign boards and classifying them depending upon their structure,size,shapes and color will play a vital role in the area of automotive industries as it becomes necessary in the future for to assist the driver in identifying the occluded sign boards. Algorithm achieves better efficiency compared to the previous methods in identifying the sign boards. No present automotive industries have incorporated this technique in their products. Future research work will be carried out on the detection of various occlusion sizes, and also give a

assistance to the driver with correct size and location of the occluded sign on traffic signal boards. It's necessary to come up with the technique which can extensively detect all types of sizes of the occlusion with different background color. It will be a big buzz for the upcoming vehicles if they come up with this kind of technologies and help the driver to assist the driving and also to the people who will be unaware of the road signs.

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