iJRASET
International Journal For Research in
Applied Science and Engineering Technology

INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

Volume: 5 **Issue:** IV **Month of publication:** April 2017

DOI: http://doi.org/10.22214/ijraset.2017.4164

www.ijraset.com Volume 5 Issue IV, April 2017
IC Value: 45.98 ISSN: 2321-9653
International Journal for Research in Applied Science & Engineering Technology (IJRASET)

Traffic Sign Detection Via Graph-Based Ranking and Segmentation Algorithm

C. Premsai[1], Prof. A. Kavya[2]
School of Computer Science, School of Computer Science Engineering, Engineering
VIT Chennai, VIT Chennai

Abstract: The majority of the existing traffic sign detection systems to utilize color or shape information, but the methods of remain limited in regard to detecting and segmenting traffic signs from a complex background. In this paper, we propose a novel graph-based traffic sign detection for an approach that consists of a saliency measure stage, a graph-based ranking stage, a multithreshold segmentation stage. Because the graph-based ranking algorithm with their specified color and saliency combines the information of color, saliency, spatial, and contextual relationship of the nodes, and more discriminative and robust than the other systems in terms of their handling various illumination conditions, and shape rotations, and scale changes from traffic sign images.
Index Terms: Classification, detection, road sign, support vector machine (SVMs).

I. INTRODUCTION

Currently, more and more intelligent transportation systems are developed for assisting drivers. Traffic sign recognition (TSR) is extremely important for safe and careful driving, as not only can this system inform the driver of the conditions of the road, but can also support the driver during the tedious task of remembering each of the many types of traffic signs. Some of the traffic sign information may sometimes be extracted from the GPS navigation data, but it is always neither complete nor up-to-date. Moreover, temporary speed limits for road works, as well as variable speed limits, are by registration not included in predefined digital cartographic data. Therefore, a visual real time TSR system is a mandatory complement to GPS systems for designing advanced driving assistance systems. Traffic signs are designed using specific shapes and colors, which are highly salient and visible from the background against which they are set, enhancing their visibility to drivers. In-depth study of traffic sign datasets allows us to observe some common characteristics of traffic signs.

Traffic signs are designed using specific shapes and colors, are highly salient and visible from the background which they are set, enhancing their visibility to drivers.

In-depth study of traffic sign datasets allows us to observe Some common characteristics of traffic signs.

Traffic signs are designed with specified colors (i.e., red, Blue, yellow, or white).

Traffic signs are highly salient.

The image intensities in traffic sign regions present appearance coherence.

In this paper, we propose a novel graph-based ranking and segmentation approach to detect salient regions, with specified colors, as traffic sign candidate regions. The proposed approach combines information pertaining to the color, saliency, spatial, and contextual relationship of nodes for traffic sign detection, making it more discriminative and robust than other methods in addressing various illumination conditions, shape rotations, and scale changes of traffic sign images.

A. Scope of The Project

In this paper, we propose a novel graph-based ranking and segmentation approach to detect salient regions, with specified colors, as traffic sign candidate regions. The proposed approach combines information pertaining to the color, saliency, spatial, and contextual relationship of nodes for traffic sign detection, making it more discriminative and robust than other methods in addressing various illumination conditions, shape rotations, and scale changes of traffic sign images. These can be indicating to the driver for the presence of a sign in advance, so that some incorrect human decisions are could be avoided.

B. Problem Statement

The existing system have several problems: The performance of color-based traffic sign detection approach is often reduced in setting with adverse weather conditions, such as strong illumination or poor lighting.When the traffic signs have been rotated or

International Journal for Research in Applied Science & Engineering Technology (IJRASET)

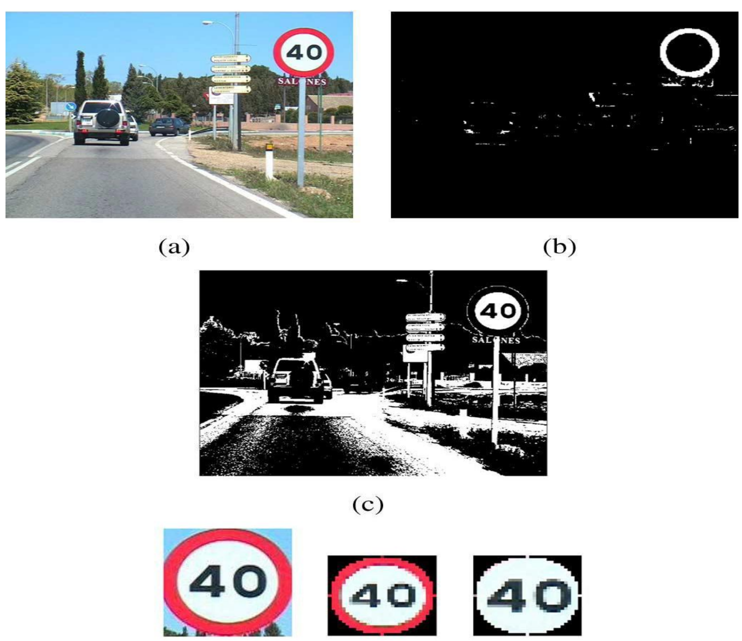
occluded, or have undergone affine transformations, the performance of shape-based traffic sign detection method is often reduced.Local features and the sliding window paradigm-based traffic sign detection and recognition method score a large number of windows in a test image using a classifier. Thus, computational complexity and the number of false alarms increase.

C. Existing System

This paper can a presents an automatic road-sign detection for a recognition system based on their support vector machines (SVMs). In automatic traffic-sign they maintenance a visual driver through a assistance system, and road-sign detection and an recognition for two of the most important functions. Our system is capable to detect and recognize a circular, rectangular, triangular, and octagonal signs, and then hence covers all the existing Spanish traffic-sign shapes. The road signs are provide drivers for important information and help them to drive for more safely and more easily by guiding to warning them and regulating their actions. Then proposed recognition system is based on their generalization properties of support vector machine. Then system consists of three stages: 1) Segmentation according to their colour of pixel; 2) Traffic-sign detection may be shape classification using linear SVM; 3) Content recognition is based on Gaussian-kernel SVs. Because of their used segmentation stage by red, blue, yellow, white, or combinations of these colours, and all traffic signs can be detected through, and some of them can be detected by their colours. Results are show a high success rate for an very low amount of false positives and final recognition stage. These results, we can conclude that the proposed algorithm is an invariant to their translation, rotation, scale, and, many situations, even in partial occlusions.

Nevertheless, there are some works where thresholding is not applied directly using a specific color space. The thresholding by looking for chromatic and achromatic colors is applied by a simple vector filter (SVF). The SVF has characteristics that can extract the specific color and eliminate all the outlines at the same time. Normalized error between the luminance component and RGB components is obtained, computing an energy function in order to identify the inner area of the sign. We learned the sign similarity function from the pairs of images cropped from the individual frames of real-life video sequences. These sequences were captured from a moving vehicle in cluttered Japanese street scenes. The quality of the input images varied from very good (short distance**)** from the camera, good illumination, bright colors, and good contrast) to very poor (adverse illumination, pale colors, and motion blur).

D. Over All Diagrams



(a) (b)

(c)

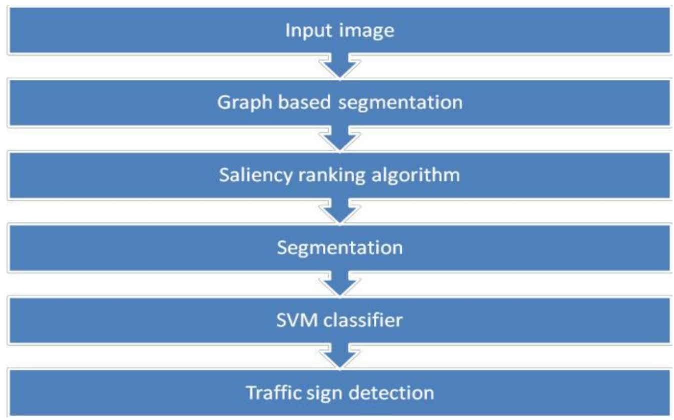
(d) (e) (f)

International Journal for Research in Applied Science & Engineering Technology (IJRASET)

E. Proposed System

The majority of an existing traffic sign detection systems can utilize a color or shape information, but we have methods remain limited in a regard to detecting and to segmenting a traffic signs from a complex background. In this paper, we have proposed a novel graph-based traffic sign detection approach through consists of a saliency measure stage, then graph-based ranking stage, and multithreshold segmentation stage. The different color spaces have been used to segment the traffic signs in outdoor images. The difficulties that we encounter in this image segmentation are related to illumination changes and possible deterioration of the signs. We have to believe that the saturation components are HIS space are sufficient to their isolate traffic signs in a scene working with fixed thresholds.

The graph-based ranking algorithm with a specified color and saliency for combines the information of color and saliency, spatial and contextual relationship of their nodes; it is more discriminative and the robust of other systems in terms of their handling various illumination weather conditions, shape rotations, then scale changes from traffic sign images.



can only provide a result of either 0 or 1 for each pixel to describe whether or not it is in the traffic sign region. In this paper, we aim at solving the problems of the color-based traffic sign detection method, and propose an algorithm to combine the information of the color, saliency, spatial, and contextual

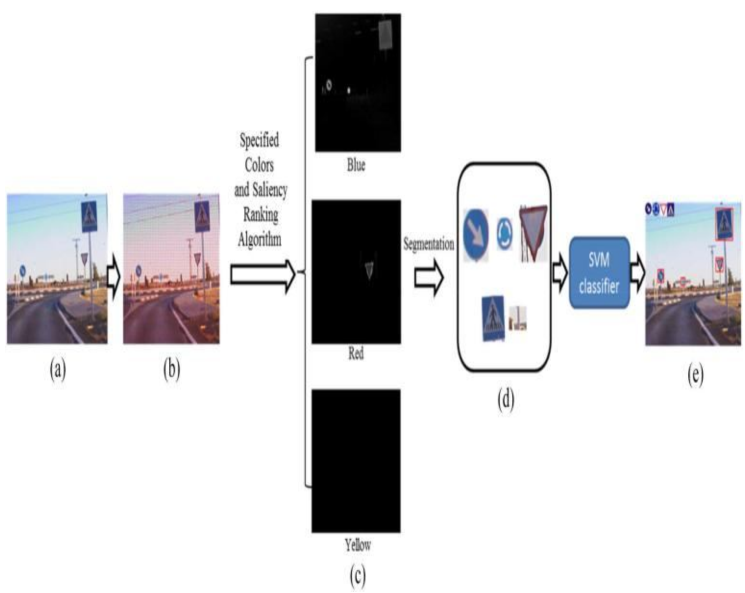


Fig.2. Flow of proposed traffic sign detection system. (a)Input image.
(b) Graph design. (c) Ranking results with specified colors. (d) Segmentation results. (e) Final results of traffic sign detection system.

www.ijraset.com Volume 5 Issue IV, April 2017
IC Value: 45.98 ISSN: 2321-9653
International Journal for Research in Applied Science & Engineering Technology (IJRASET)

F. Limitations of the related traffic sign

1) Detection some limitations of the related studies are presented as follow.

a) The performance of color-based traffic sign detection approach is often reduced in weather conditions.

b) When the traffic signs have been rotated or occluded, or have undergone affine transformations, the performance of shape-based traffic sign detection method is often reduced.

c) Local features and the sliding window paradigm-based traffic sign detection and recognition method score a large number of windows in a test image using a classifier. Thus, computational complexity and the number of false alarms increase.

II. CONTRIBUTION

In the detection stage, the majority of the systems utilize color information as a method for segmenting images. However, fixing thresholds for a traffic sign detection system in outdoor environments is the problem of the color thresholding method. As shown in Fig. 1, if the range of thresholds is large, the number of false alarms increase, otherwise, the number of misses increase. Furthermore, the color thresholding method

relationship of nodes for traffic sign detection. Even if we set a wide range of thresholds, false alarms can also be reduced by combining the information of saliency, spatial, or contextual information. Furthermore, a score between 0 and 1can be given for each node to describe how likely it is to be a part of a traffic sign. In this paper, graph-based ranking and segmentation algorithms are proposed, which consist of a saliency measure stage, a graph-based ranking stage, and a multithreshold segmentation stage. First, we design a graph to represent an image. We then propose a ranking algorithm to exploit the intrinsic manifold structure of the nodes of the graph, and give each node a ranking score according to its saliency, coherence, and similarity with the specified colors. Finally, we propose a multithreshold segmentation approach to segment traffic sign candidate regions. The key contributions of our algorithm areas follow.

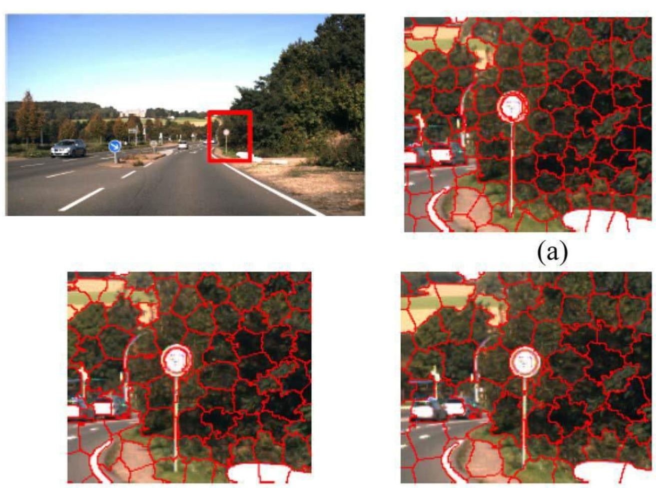
A novel graph-based saliency measure algorithm for traffic sign detection is proposed.

We provide a novel framework that combines the information of the color, saliency, spatial, and contextual relationship of their nodes. It is more and more discriminative and a robust color for other systems in terms of handling various illumination conditions, shape rotations, and scale changes from traffic sign images.

The multithreshold segmentation algorithm focuses on all the nodes with a nonzero ranking score, which can effectively solve problems such as complex background, occlusion, various illumination conditions, and so on. There are some works where thresholding is not applied directly using a specific color space. Thresholding by looking for chromatic and achromatic colors is applied by a simple vector filter (SVF). The SVF has characteristics that can extract the specific color and eliminate all the outlines at the same time. Normalized error between the luminance component and RGB components is obtained.

A. Graph-Based Ranking and Segmentation Algorithm for Traffic Sign Detection

Super pixels are generated by the simple linear iterative clustering (SLIC) algorithm, which clusters pixels in the combined five-dimensional color and image plane space to efficiently generate compact, nearly uniform super pixels. The flow of our proposed traffic sign detection system is illustrated



(a) (b) (c)

www.ijraset.com Volume 5 Issue IV, April 2017
IC Value: 45.98 ISSN: 2321-9653

International Journal for Research in Applied Science & Engineering Technology (IJRASET)

Fig. 3. Examples of super pixels generated with different numbers. Example of (a) 4000, (b) 3000, and(c) 2000 super pixels.
Fig. 3, where Fig. 3(a)–(c) is the examples of 4000, 3000, and 2000 super pixels generated, respectively. Indicated that a traffic sign is the sum of a color border, a color or achromatic background, and an inner component. To detect small traffic signs, the system must guarantee that the color border of the traffic signs is segmented into independent super pixels. Therefore, in this paper we select 4000 super pixels.

B. Traffic Sign Candidate Regions Segmentation

Based on the ranking algorithm, the system gives a ranking score for each node, which indicates how likely it is to be a part of a traffic sign. To segment the traffic sign regions from the results of the ranking algorithm, we propose a multithreshold segmentation algorithm. Each image of ranking result is binarized at a number of different threshold levels, and the connected components at each level are found. Fig. 8 shows the different threshold levels for an example image with the connected components colored. Each connected component

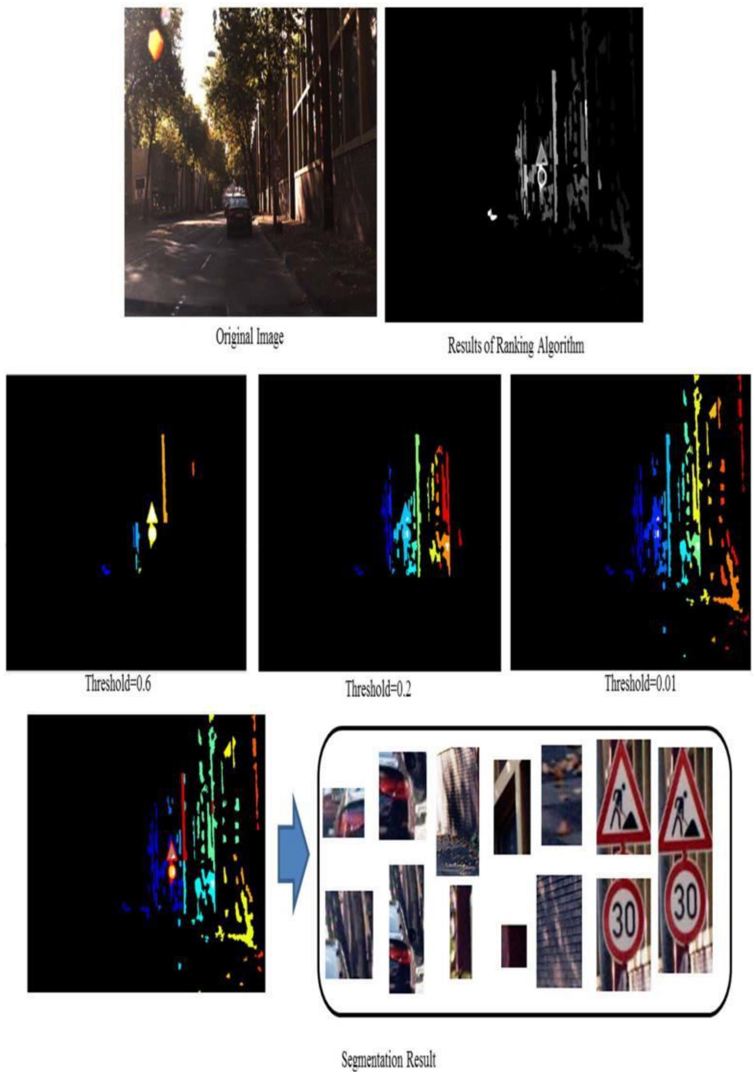


Fig.4. Process of multithreshold segmentation algorithm

can be described as *Lzi* , which is the *i*th connected component at level *z*. Here, $i \in [1, 2, \ldots, Nz]$ and $t \in [1, 2, \ldots, Z]$.To increase the speed, we threshold only at an appropriate range of values rather than at every possible value, the thresholds are set to 0.6, 0.4, 0.2, and 0.01. Furthermore, we remove the segments with areas that are either too large or small, and cut some segments whose heights are twice as longer as the width.

Volume 5 Issue IV, April 2017
ISSN: 2321-9653

International Journal for Research in Applied Science & Engineering Technology (IJRASET)

C. Traffic Sign Classification Based On SVMS

SVM and the library LibLinear in our system. The classification stage input is a vector of the HOG descriptor, which Dalal and Triggs proposed for pedestrian detection. On the basis of the gradients of the images, we calculate the different weighted and normalized histograms, overlapping cells with the size of 16×16 pixels, a block size of 4 × 4 cells, and an orientation resolution of 8. To classify the decision region, all feature vectors of a specific class are grouped together against all vectors corresponding to the remainder of the classes (including noisy objects), according to the one-versus-all classification algorithm. SVM multiclass classification constructs SVM models.

The *i*th SVM is trained with an all the examples of *i*th class with a positive labels, and all the other examples of negative labels. In this paper, the cost of a regularization parameter in *C* is set of 1.2 by the producing through highest cross-correlation accuracy.

III. EXPERIMENTAL RESULTS

A. Graph Design

Each node is a super pixel generated by the simple linear iterative clustering (SLIC) algorithm. To exploit the spatial relationship, we adopted a k-regular graph, which is a graph with vertices of degree k. By extending the scope of node connection with the same degree of k, we effectively utilize the local smoothness cue. Each node is not only connected to its neighbouring nodes, but also connected to the nodes sharing common boundaries with these neighbouring nodes.

Fig. Examples of super pixels belongings to traffic sign

The nodes on the image boundary as background seeds, then constructed its neighboring nodes, but also connected to the nodes sharing common boundaries with these neighboring nodes.

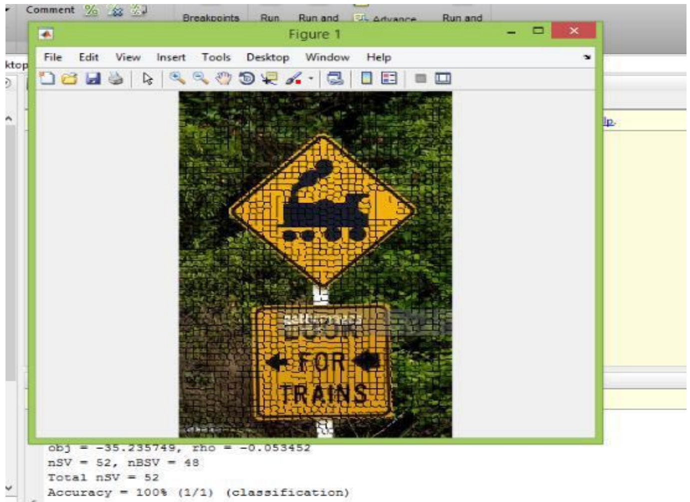
B. Saliency

Our goal is to learn a ranking function, which defines the relevance between the nodes of the graph and ranges of the traffic sign colors. The core idea of manifold ranking is to rank the nodes with respect to the intrinsic structure collectively. By taking the relevance between the nodes of the graph and ranges of the traffic sign colors, manifold ranking assigns each node a relative ranking score, instead of an absolute pair wise similarity as traditional ways.

C. Segmentation

Based on the ranking algorithm, the system gives a ranking score for each node, which indicates how likely it is to be a part of a traffic sign. To segment the traffic sign regions from the results of the ranking algorithm, we propose a multithreshold segmentation algorithm. Each image of ranking result is binarized at a number of different threshold levels, and the connected components at each level are found.

International Journal for Research in Applied Science & Engineering Technology (IJRASET)



Fig;-Graph design

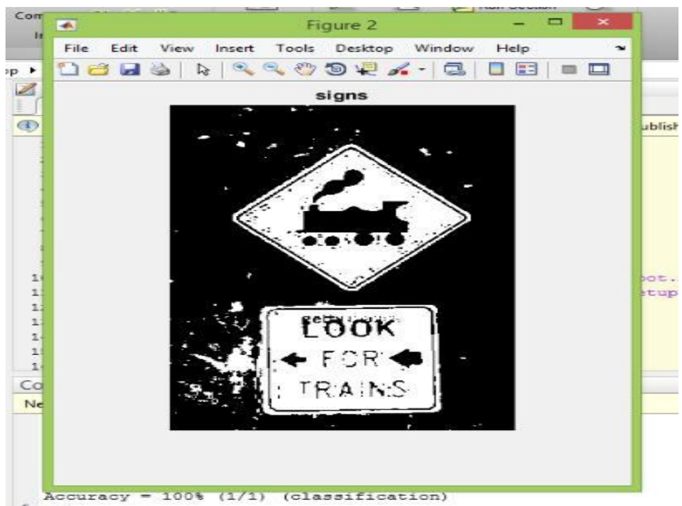


Fig:-Signs

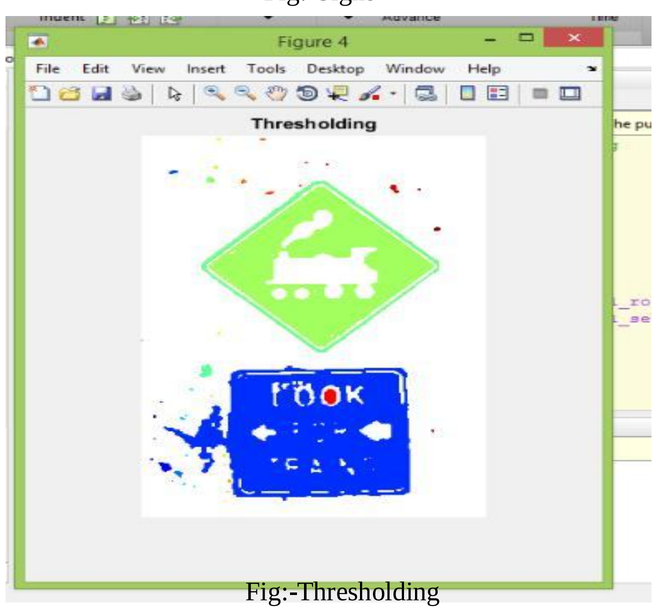


Fig:-Thresholding

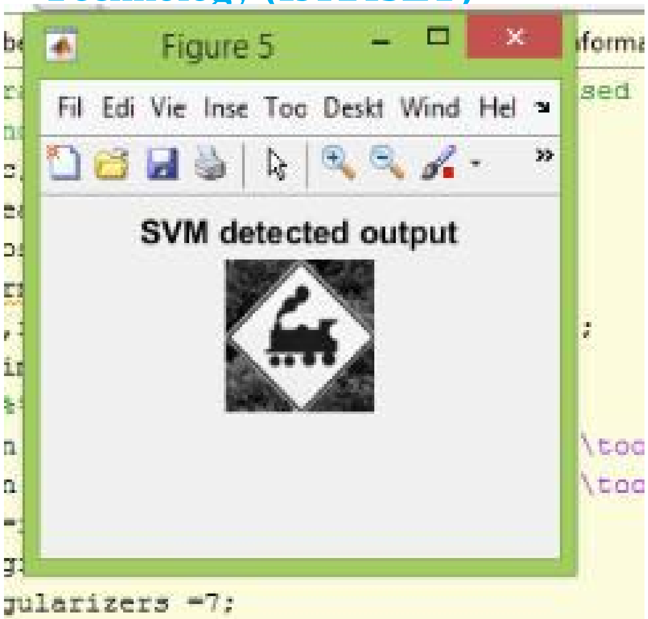


Fig:-support vector machine detected output

IV. CONCLUSION

In this paper, we described a novel graph-based traffic sign detection approach, which consisted of a saliency measure stage, a graph-based ranking stage, and a multithreshold segmentation stage. We presented a graph with superpixels as nodes for an image, and gave the nodes ranking scores, according to their spatial structures, saliency, contextual relationship of nodes and similarities with the specified colours. We could then segment traffic sign candidate regions with the specified colours from a complex background, on the basis of the multithreshold segmentation algorithm.

REFERENCES

[1] X. W. Gao, L. Podladchikova, D. Shaposhnikov, K. Hong, andN. Shevtsov, "Recognition of traffic signs based on their colour andshape features extracted using human vision models," J. Vis. Commun.Image Represent., vol. 17, no. 4, pp. 675–685, 2006.

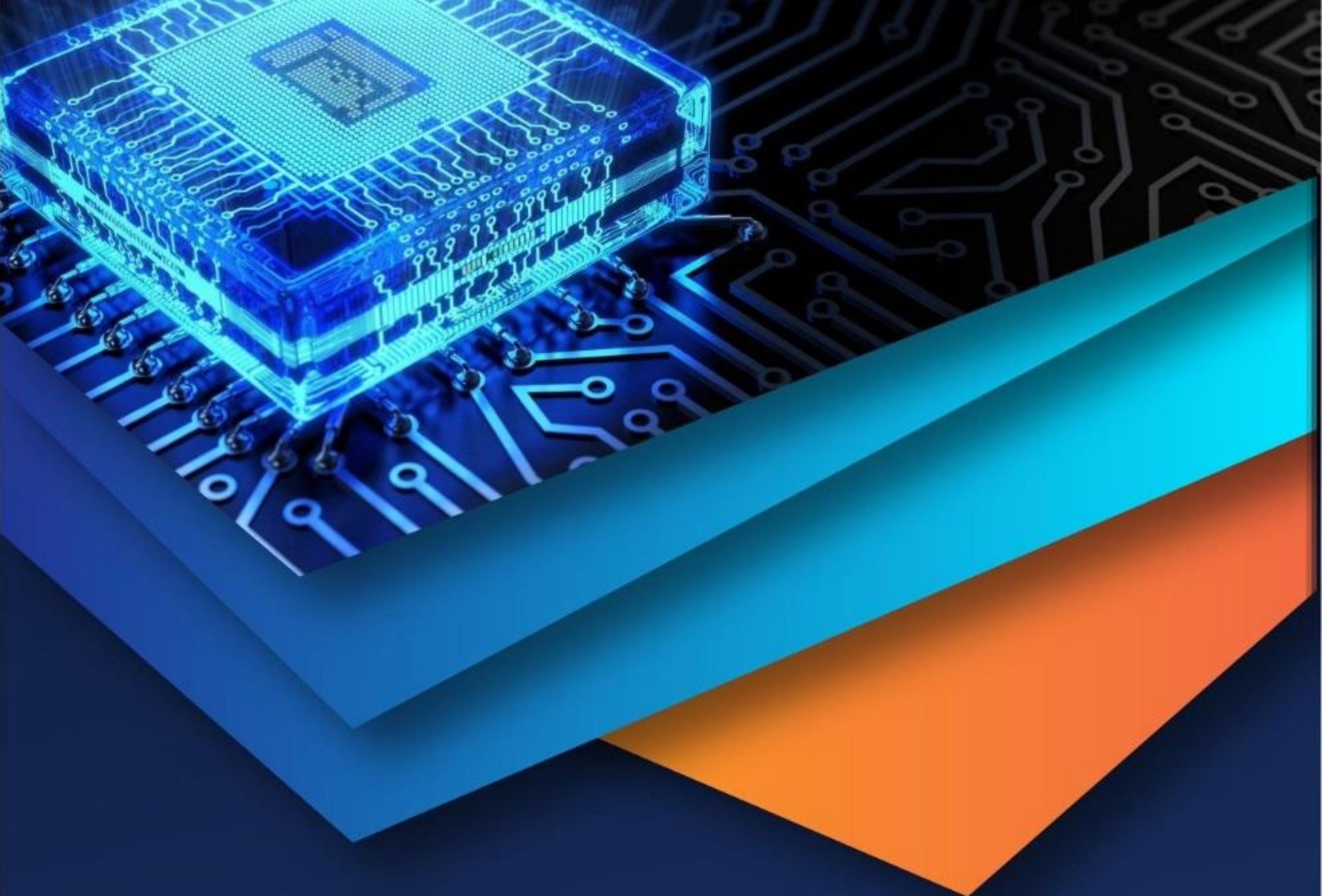
[2] S. Maldonado-Bascón, S. Lafuente-Arroyo, P. Gil-Jiménez,H. Gómez-Moreno, and F. López-Ferreras, "Road-sign detectionand recognition based on the SVMs," IEEE Trans Intell Transp. Syst., vol. 8 no. 2, pp. 264–278, Jun. 2007

[3] S. Maldonado-Bascón, J. Acevedo-Rodríguez, S. Lafuente-Arroyo,A. Fernndez-Caballero, and F. López-Ferreras, "An optimization on pictogramidentification for the

[4] road-sign recognition task using SVMs,"Comput. Vis. Image Understand., vol. 114, no. 3, pp. 373–383, 2010.M. S. Prieto and A. R. Allen, "Using self-organising maps in the detectionand recognition of road signs," Image Vis. Comput., vol. 27, no. 6,pp. 673–683, 2009

[5] G. Loy, "Fast shape-based on the road sign detection for a driver assistance system," in Proc. IEEE. Conf Robots Syst., vol. 1. Sendai, Japan, 2004, pp. 70–75

[6] S. Houben, "A single target voting scheme for traffic sign detection," in Proc. IEEE Intell. Veh. Symp. (IV), Baden-Baden, Germany, 2011, pp. 124–129.



10.22214/IJRASET

45.98

IMPACT FACTOR: 7.129

IMPACT FACTOR: 7.429

INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY