INTERNATIONAL JOURNAL OF TECHO-ENGINEERING

ISSN : 2057-5688

A SURVEY ON NEUTRAL NETWORKS-BASED TRAFFIC SIGN DETECTION USING CNN

[1]VUTHURI GOPI (20JJ1D5817), [2]SRI. P. SREENIVASA RAO

1M.tech Scholar, 2Associate Professor , Department Of CSE,

JNTUHU COLLEGE OF ENGINERING, JAGTIAL, T.S., INDIA

Abstract: - Road traffic accidents are one of the primary reasons for deaths that occur in India. These accidents do not just result in serious injuries, but can result in deaths. Imaging recognition technologies are among the most commonly used methods used across a range of research fields including medicine, agriculture automotive, medicine, etc. Today, the most Image recognition methods use an artificial feature extraction, which is not just time-consuming but also very complicated. Thus, many researchers are striving to improve algorithms and to make them efficient and more robust. The basic principle of convolution neural networks was briefly presented. The numerous applications it has within the realm of Image Processing were also discussed. In the final part, the difficulties that Convolution Neural Networks face in terms of precision and time complexity were assessed, and our latest work was presented to solve the efficiency-related problems.

Keywords: - Sign detection, search region, maximally stable region, recognition, temporal fusion.

1 INTRODUCTION

The Traffic Sign Recognition (TSDR) system was developed to decrease safety issues. The TSDR system recognizes and detects traffic signs, both within and outside images captured by cameras and imaging sensors, and informs the user exactly which traffic rules apply for the particular stretch of road. In the event of bad traffic conditions drivers might not see the signs for traffic, due to which accidents can occur. In these instances, the TSDR system is activated. The principal goal of study of TSDR is to increase the effectiveness and speed of operation that can be achieved by the TSDR system. The development of an TSDR system is not an easy task given the constant change in the environmental as well as the lighting. Other issues include as obscured areas, multiple traffic signs that appear simultaneously, blurring and fading of traffic signs from the past, which could also cause issues in the purpose of detection and must be dealt with. In order to use a TSDR systems in a real time settings such as autonomous vehicles the use of a fast algorithm is necessary. Additionally, when dealing with issues, the system for recognition must be able to prevent errors in recognition of signs that aren't there.

Text on road signs conveys many useful information for drivers and navigating. It explains the current traffic conditions and defines right-of-way and warns of potential risks, and allows or blocks access to the roadway. The automatic recognition of road signs can assist to keep drivers conscious of traffic conditions and the surrounding environment by identifying and the signs ahead and/or have or have been. Recognition and detection of road signs an arduous issue, and has a variety of applications that are important which include advanced driver assist system, surveying of roads as well as autonomous vehicle. There is a lot of research regarding the recognition and detection of traffic signs based on symbols. Without the addition of context or temporal data there aren't many details to identify the flow of traffic.

2 RELATED WORKS

Recognition of traffic signals with computer vision methods is an area of study over the last decade. A thorough overview of the principal vision-based concepts of the current state-of-the-art in Intelligent Driver Assistance Systems can be located in the article [8], which contains an overview of the future direction of this field of study is as well. Furthermore, the research in [10] offers an innovative contribution to an automated road signage inventory that is based on image recognition. It is related to the app that we present in this paper, however for traffic signs rather than traffic panels, and employing images from a car instead of images retrieved from Google Street View. Lai et al. [5] have developed an algorithm for sign recognition that is designed at intelligent vehicles and smart phones. Color detection is employed and it is done within the HSV the color space. Shape recognition using templates is achieved by the similarity calculation. OCR is applied to pixels of this shape boarder in order to the exact match with the sign.

The description is entirely algorithmic and is implemented in software. Andrey et al. [2] utilize a similar method of colour segmentation as well as shape analyses. Histograms, however serve as the method of determining the shape after linked regions are marked. The actual recognition of signs is achieved with template matching, which is the weighted direct comparison of the inside portion of each shape against templates.

However [1] offers an approach to recognize the text on traffic panels using footage. First, regions with identical color are separated by using a k-means algorithm, and the candidates for traffic panels are identified by searching for flat areas perpendicular to the camera's axis. The orientation of candidate planes is calculated using at least three points within two consecutive frames, which means this technique requires a precise tracking technique to identify parallel points in subsequent frames. Furthermore, a multiscale detection algorithm is applied to each of the traffic panel areas that are candidates.

Traffic signals can be classified into various k-sets, based on different image classification methods. To simplify the driver's job, and prevent a variety of accidents that happen throughout the country, a traffic sign recognition is used. Image recognition is done with a variety of techniques developed by various researchers.

Convolution Neural Network

CNN is an image recognition in many different applications for recognition of road traffic signs. applications. The system [3] has three major stages. The traffic sign region of Interest the refinement of ROIs and classification, and lastly post-processing. The modified Convolution Neural Networks are employed in the paper to aid in image recognition. The system's speed also must be improved to be suitable for this kind of application. Image Segmentation Image segmentation technique is employed to determine the form of the traffic signal by comparison with the data set. Image segmentation for recognition of road traffic signs produces poor output due to blurred images that are captured in movement of the vehicle. The study [4], RGB color segmentation technique is employed in conjunction with a rule-based method. The morphological analysis of images is carried out to identify the form of a traffic signs. The results are a lot in false positives.

3 CURRENT TRENDS AND CHALLENGES

Variable lighting conditions the variable lighting condition is among the most important problems when developing the TSDR system. One of the primary aspects of the traffic sign is its distinctive color that makes it stand out from its surroundings. The color of the sign is extremely sensitive to changing lighting conditions. The impact of light changes in response to different days of the week and also the weather [11].

Blurring and blurring effects In the case of illumination caused by rain and sun is a important issue for the TSDR system. The blurring and fading of traffic signals due to the sunlight and rain can lead to false detection that can result in the inefficiency of the TSDR systems. A method for adaptive thresholding is a great option for this reason. Recently, researchers have used Hough transformation, which is dependable to different conditions of lighting and lighting conditions.

Multiple appearances of signs Traffic signs that appear multiple times at the same time, and having a similar shape of man-made objects can create overlapping signs that results in an inaccurate detection. The detection process could be affected by translation, rotation or scaling as well as partial Occlusion. Li et al. ([13]) employed HSI transform, and Fuzzy shape recognition, which is strong and unaffected by these issues and its precision rate for different conditions of weather is sunny 94.66 percent cloudy 92.05 percent, and rainy 90.72 percent.

Signs that are damaged and partially obscured Signs that are damaged or partially obscured traffic signs are creating problems for recognition and detection, especially in the event that the system has an image recognizer. It can

ISSN : 2057-5688

increase the likelihood of false detection and lowers the effectiveness of the system. 3D reconstruction technology developed by Soheilian and colleagues [15] is able to identify damaged signs in real-time environments.

The above factors could affect the performance of a TSDR system in a significant way. If a system is real-time the above factors are likely to be in play. With all of the factors considered one approach isn't able to address all issues. Researchers have already devised a variety of ways to reduce the impact of lighting variations motion blurring, damage to signs blurring, and fading. Employing Eigen-gradients-based in oriented gradient maps and the Karhunen-Loeve transformation [10] is the most recent method for minimizing the effects of changing lighting. Apart from that, Hough transformation, Adaptive thresholding, Adaptive Shape Analysis Self-Organizing Map also designed to minimize the effects of lighting changes.

Comparative Analysis

The problems mentioned in the previous paragraphs are the primary aspects that influence the development of an efficient TSDR system. The combination of various methods will increase the effectiveness that the system can achieve.

A variety of algorithms for machine learning are employed by various researchers and are help solve various problems with regards to the system like; Probabilistic Neural Network is utilized by Escalera et al. [12 as well as Sheng et al. [16] that are be capable of recognizing and detecting traffic signs that are somewhat blurred blur, noisy background, as well as in varying lighting conditions. To apply to the TSDR system in a real-time environment, a quick algorithm is required. The paper [11] provides a comprehensive analysis of SVM, MLP, HOG-based decision trees and classifiers is discussed. The results of the experiment showed that the accuracy of Decision trees is around 94.2 percent which is the most accurate among them, while MLP's accuracy is 87.8%, while MLP is 87.8%, while that of the SVM is 87.8 percent, and the accuracy for MLP is 89.2 percent. In terms of the time, it takes to compute for single classifications the SVM requires 115.87

milliseconds. MLP is 1.45 milliseconds and a Decision tree requires 0.15 milliseconds, which is the shortest. To detect the Speed limit indication, SVM or Decision tree is superior to Hough transform or Neural Network. In order to add new classes, the entire data set has to be altered to Neural Network which takes more processing time than SVM.

Table 1: Comparison of Methods used

Methods	Variable lighting	Blurring and fading	Multiple appearance of sign	Damaged sign	Partial obscured sign	Fast algorithm for Real-time	Motion Blur effect	Rotation, translation, scaling	Noisy background	Viewing angle
MSER based HOG + Decision tree	√	√	√			√				
Gradient Orientation + Karhunen-Loeve transform	√	√	√						√	√
Genetic Algorithm + Probabilistic NN	√	√				√			√	
adaptive shape analysis+ Probabilistic NN	√					√			√	
YCbCr + Image Normalization+NN	√	√				√			√	
SVM	√	√				√		√		√
Haar like features + SVM			√		√		√			√
Hough based SVM	√				√	√		√	√	√
CIE XYZ transform in LCH spacing + FOSTS Model	√	√	√						√	
HSI Transform + Fuzzy shape recognizer			√		√			√		√
Gabor Filter + Joint Transform Correlation			√		√			√		√
SIFT matching + SVM	√								√	
AdaBoost + CHT	√	√	√			√				
3D re-construction method				√	√	√				

4 CONCLUSION AND SUGGESTIONS

The primary goal of this article is to examine the main direction for the field of automated traffic sign recognition and detection. This paper provides an overview of research conducted in the area of Automatic TSDR system is provided along with some of the actual issues and issues as well as the responses of researchers are also provided. After studying a vast number of papers, the progress in the area of Automatic TSDR system has been classified into four main stages, namely, the early stages, intermediate saturation

ISSN : 2057-5688

stage and the modern age. We have discussed the four stages in the next sections and in-depth comparisons of the current methods are also discussed. At the moment does not have any human-machine interaction detected, and this could be part of the future research since it is essential to build a reliable ADAS system. Another major issue is the accessibility of a public database, which is also a need to be addressed. There are some databases that are publically available but still not widely used and only covered the Vienna Convention-Complaint. In the future, a combinational method could be used to reduce the particular reliability issue and other concerns in real-time applications. Furthermore, traffic signals can be represented with GPS of RFID to provide exact recognition. Additionally, to improve the safety of drivers, communication between vehicles can be made via RFID or Sonar is used when driving on streets. The summary of the research along with the comparative research and the problems that are discussed in the area of automatic TSDR in this article along with one or two future suggestions will hopefully help to create a strong and effective TSDR system due to its wide range of applications.

5 REFERENCES

[1] Larsson F., Felsberg M., Using Fourier Descriptors and Spatial Models for Traffic Sign Recognition, Image Analysis Lecture Notes in Computer Science, 6688 (2011) 238–49.

[2] Ren F.X., Huang J.S., Jiang R.Y., Klette R., General Traffic Sign Recognition by Feature Matching, (2009).

[3] Ohgushi K., Hamada N., Traffic Sign Recognition by Bags of Features, IEEE Region 10 Conference, 1-4, (2009), 1352–7.

[4] Gu Y.L., Yendo T., Tehrani M.P., Fujii T., Tanimoto M., Ieee., A New Vision System for Traffic Sign Recognition, 2010 IEEE Intelligent Vehicles Symposium (Iv), (2010) 7–12.

[5] Paclik P., Novovicova J., Road Sign Classification without Color Information, Proceedings of the 6th Conference of Advanced School of Imaging and Computing, (2000).

[6] Stallkamp J., Schlipsing M., Salmen J., Igel C., The German Traffic Sign Recognition Benchmark: A multi-class classification competition, The 2011

International Joint Conference on Neural Networks, (2011)1453–60.

[7] Stallkamp J., Schlipsing M., Salmen J., Igel C., Man vs. computer: benchmarking machine learning algorithms for traffic sign recognition, Neural Networks: The Official Journal of the International Neural Network Society, 32 (2012) 323–32.

[8] Timofte R., Zimmermann K., Gool L. Van., Multi-view traffic sign detection, recognition, and 3D localisation, 2009 Workshop on Applications of Computer Vision WACV, (2009) 1–8.

[9] Grigorescu C., Petkov N., Distance sets for shape filters and shape recognition, IEEE Transactions on Image Processing : A Publication of the IEEE Signal Processing Society, 12 (2003) 1274–86.

[10] Belaroussi R., Foucher P., Tarel J.-P., Soheilian B., Charbonnier P., Paparoditis N., Road Sign Detection in Images: A Case Study. 20th International Conference on Pattern Recognition (ICPR), (2010), 484–8.

[11] Wali, Safat, Mohammad A Hannan, Shahrum abdullah, Aini Hussain S.A.S., Shape Matching and Color Segmentation Based Traffic Sign Detection System, PrzeglD Elektrotechniczny, 1 (2015) 38–42.

[12] Hussain A., Hannan M.A., Mohamed A., Sanusi H., Ariffin A.K., Vehicle crash analysis for airbag deployment decision, International Journal of Automotive Technology, 7 (2006) 179– 85.

[13] Hannan M.A., Hussain A., Mohamed A., Samad S.A., Development of an embedded vehicle safety system for frontal crash detection. International Journal of Crashworthiness, 13 (2008) 579–87.

[14] Safat B.W., Ridwanur R., Ahsan Z., J. Ahmed M., A Neural network Based System Architecture of An Automatic Traffic Sign Detection and Recognition System, Australian Journal of Basic and Applied Sciences, 8 (2013) 102–5.

[15] Mohammad A Hannan, Safat Bin Wali, Tan J. Pin, Aini Hussain S.A.S., Traffic Sign Classification based on Neural Network for Advance Driver Assistance System, PrzeglD Elektrotechniczny, 1 (2014) 169–72.

[16] Sheng Y.H., Zhang K., Ye C., Liang C., Li J., Automatic detection and recognition of traffic signs in stereo images based on features and probabilistic neural networks. In:

ISSN : 2057-5688

Schelkens P, Ebrahimi T, Cristobal G, Truchetet F, editors. Optical and Digital Image Processing, vol. 7000, Bellingham: Spie-Int Soc Optical Engineering (2008).

[17] S.K. Saha, D. Chakraborty M.A.A.B., Neural Network Based Traffic Sign Recognition, International Journal of Comput App, 50 (2012) 35–41.

[18] Cireşan D., Meier U., Masci J., Schmidhuber J., Multi-column deep neural network for traffic sign classification, Neural Networks: The Official Journal of the International Neural Network Society, 32 (2012) 333–8.

[19] Li Y., Pankanti S., Guan W., Real-Time Traffic Sign Detection: An Evaluation Study. 2010 20th International Conference on Pattern Recognition, (2010), 3033–6.

[20] Chen L., Li Q., Li M., Zhang L., Mao Q., Design of a multisensor cooperation travel environment perception system for autonomous vehicle, Sensors, (Basel, Switzerland) 12 (2012) 12386–404.