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A Survey on Road sign Detection and Classification

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Abstract—*Traffic sign recognition plays very important role in driver assistant system to disburden driver as well as in intelligent autonomous vehicles. This framework includes two parts: traffic sign detection and classification of detected traffic signs. This paper recommends different methods for detection and recognition of traffic signs. Different methods are used for traffic sign detection and recognition like color segmentation, RGB to HSI model. Recognition includes HOG feature, shape context etc.*

Keywords— RGB model, HSI model, Hough circle transform, shape context, HOG features..

1. INTRODUCTION

Traffic sign recognition has high industrial potential in intelligent autonomous vehicle and driver assistance system.improvement in traffic quality and safety cannot be achieved without correctly applying and maintaining road traffic signs, traffic signals and road markings. The traffic indication sign recognition is essential to the ITS (Intelligent Transport System). Every year 1.3 million people worldwide are killed on roads, and between 20 and 40 million are injured. A good solution to this problem would be to develop system, which take into account the environment. That is why today, driving safety is becoming a popular topic in many fields, from small projects to large car factories. However this topic also raises many questions and problems. It is required to define the width of the edges of the road, recognize road signs, traffic lights, pedestrians, and other objects which contribute the driving safely.

There are many methods for solving these tasks. Road sign detection is a technique due to which vehicle is able to recognize the different signs put on the road. Traffic signs are used to regulate traffic. Traffic signs are used to provide guidance to driver. Automatic traffic sign recognition is essential task of traffic regulation and guiding and warning driver.

Generally traffic sign provide the driver very essential information for safe and efficient navigation.

2. REVIEW OF LITERATURE

2.1 J. Stallkamp, M. Schlipsing, J. Salmen, and C. Igel, "The German traffic sign recognition benchmark: a multi-class classification competition," in *Proc. IEEE IJCNN*, 2011, pp. 1453–1460.

This paper proposes the design and analysis of the "German Traffic Sign Recognition Benchmark" dataset and competition. The results of the competition show that state-of-the-art machine learning algorithms perform very good in the challenging task of traffic sign recognition. The participants achieved a very high performance of up to 98.98% correct recognition rate which is similar to human performance on this dataset.

2.2 S. Houben, J. Stallkamp, J. Salmen,M. Schlipsing, and C. Igel, "Detection of traffic signs in real-world images: The German traffic sign detection benchmark," in *Proc. IEEE IJCNN*, 2013, pp. 1–8.

This paper proposes a real-world benchmark data set for traffic sign detection together with carefully chosen evaluation metrics, baseline results, and a web-interface for comparing approaches. In their evaluation, they separate sign detection from classification, also measured the performance on relevant categories of signs to allow for benchmarking specialized solutions. The considered baseline algorithms represent some of the most well liked detection approaches such as the Viola-Jones detector based on Haar features and a linear classifier relying on HOG descriptors. Further, a recently proposed problem-specific algorithm utilizing shape and color in a model-based Hough like voting scheme is evaluated.

2.3Towards Real-Time Traffic Sign Detection and Classification by Yi Yang, Hengliang Luo, Huarong Xu and Fuchao Wu,2014, IEEE.

This paper points to deal with real-time traffic sign recognition, i.e. localizing what type of traffic sign appears in which area of an input image at a fast processing time. To achieve this objective, a two-module framework (detection module and classification module) is proposed. In detection module, the input color image is transformed to probability maps by using color probability model. Then the road sign proposals are extracted by finding maximally stable extremal regions on these maps. Lastly , an SVM classifier which prepare with color HOG features is used to further filter out the false positives and classify the present proposals to their super classes. In classification module, they used CNN to classify the detected traffic signs to their sub-classes within each super class. Demonstration on the GTSDB benchmark shows that their method achieved comparable performance to the state-of-the-art methods with outstanding improved computational efficiency, which is 20 times faster than the existing best method.

2.4"Traffic indication symbols recognition with shape context" by Kai Li, Weiyao Lan, Department of Automation Xiamen University, China, 2011, IEEE

In this paper to detect the traffic sign, HIS color model followed by circle detection is used. The regions detected by color detection cannot be determined to the exact sign region. In this method the edge of interested regions is traced to get their contours after morphologic operations. Then to find the target region, Hough circle transform is applied. The object have been detected and extracted after the previous two steps. We next recognize the symbol in the destination area. The image is preprocessed to remove noise. To obtain a clear silhouette boundary of the traffic indication symbol Edge detection and segmentation are used specifically to the image. Shape context is based on the contour of the object.

2.5 "Real-Time Detection and Recognition of Road Traffic Signs" by Jack Greenhalgh and Majid Mirmehdi, *Senior Member,* 2012, *IEEE*

This paper aims to deal with novel system for the automatic detection and recognition of traffic signs. Candidate regions are detected as maximally stable extremal regions (MSERs), which offers ruggedness to variations in lighting Conditions. Recognition is based on a cascade of support vector machine (SVM) classifiers that were trained using histogram of oriented gradient (HOG) features. This system is accurate at high vehicle speeds, operates under a range of weather conditions, runs at an average speed of 20 frames per second.

3.CONCLUSION

Papers discussed above provide various methods for detection and classification of traffic sign. Detection module

includes color and shape analysis. Classification module include SVM classifier, edge detection which provides improved results.it is necessary to have best methods to provide best result which will significantly improve driving safety comfort.

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