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An Improved Traffic Signs Recognition and Tracking Method for Driver Assistance System

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ABSTRACT: Traffic signs (TSs) recognition is a main issue for adriver assistance framework as it has a double part to control the street activity and also cautioning and managing the driver. We present another computer vision based framework for robust traffic sign recognition and tracking. Such a framework exhibits a vital support for driver assistance in anintelligent automotive. Firstly, a color based segmentation strategy is connected to produce traffic sign candidate regions.Secondly, the HoG features are extracted to encode the identified activity signs and afterward creating the component vector. This vector is utilized as a contribution to a SVM classifier to distinguish the movement sign class. Finally, a tracking strategy based onoptical flow is performed to ensure a continuous capture of therecognized traffic sign while accelerating the execution time. Our strategy manages high exactness rates under various testing conditions.

KEYWORDS: Traffic signs detection; traffic signs classification;traffic signs recognition; traffic signs tracking; SVM; HOG.

I. INTRODUCTIONS

Traffic signs recognition is a major issue for a driver assistance system as it has a dual role to control the road traffic as well as warning and guiding the driver. Serious accidents happen when drivers miss signs due to distractions or psychological state of drivers. Therefore, automated recognition of traffic signs is an important topic for navigation systems. Such system has to be fast and efficient to detect traffic signs in real time context and identify them precisely.
Moreover, they have to handle complex problems which are able to detect and do recognition effectiveness. These problems include variations in illumination like light levels, twilight, fog, rain, and shadow, motion blur and signs occlusion. As one misclassified or undetected sign could affect the navigation system the system effectiveness is important aspect. Actually, the existing systems do not provide a guarantee 100% of accuracy. This has motivates many researchers to improve the performance of traffic signs detection, tracking and recognition in complex conditions
Hence, we introduced a new method for fast detection, tracking and classification of traffic signs from a moving vehicle in complex conditions. There are so many traffic rules for reliable life which we break intentionally or unintentionally. Some of them can results to critical incidents.

II. OBJECTIVES

- An automatic traffic sign recognition system would help reducing the number of traffic accidents and it is essential for any autonomous vehicle project.
- Any strategy that allows reducing the list of candidate signs, without taking too much time, helps improving the overall system performance.
- The possible signs are then compared to the database templates and a final recognition result is obtained.

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III. LITERATURE SURVEY

Traffic Sign Recognition is a technology by which a vehicle is able to recognize the traffic signs put on the road e.g. "speed limit" or "children" or "turn ahead". This is part of the features collectively called ADAS. The technology is being developed by many automotive suppliers, including Continental and Delphi.
These first TSR systems which recognize speed limits were developed in cooperation by Mobileye and Continental AG. They first appeared in late 2008 on the redesigned BMW 7-Series, and the following year on the Mercedes-Benz S-Class. Currently these systems only detect the round speed limit signs found all across Europe.
Second generation systems can also detect overtaking restrictions. It was introduced in 2008 in the Opel Insignia, later followed by the Opel Astra and the Saab 9-5. This technology is also available on the 2011 Volkswagen Phaeton and since 2012 in Volvo S80, V70, XC70, XC60, S60, V60 and V40 (model year 2013-), as a technology called Road Sign Information. They are not able to recognise city limit signs, which in most european countries have meaning for speed limits, as they are too equal to direction signs.

When driving on congested roads, it's sometimes difficult to keep your eyes everywhere at once. Checking the road ahead, oncoming traffic, what's behind you, all while trying to maintain your speed can sometimes become quite distracting. Here we have realised this and looking to introduce new technologies, which make things easier. With the introduction of Traffic Sign Recognition systems, the chances of not noticing a change in speed limit, or the warning of a potential hazard ahead have been vastly reduced. In the latest of our technical pieces, we explain how this clever system could benefit a driver at unknown places and navigation system.
Actually, the existing systems do not provide a guarantee 100% of accuracy. This has motivates many researchers toimprove the performance of traffic signs detection, tracking and recognition in complex conditions and so is theobjective of our herein presented method.

In our context of study, we are interested to recognize and track danger and prohibitory traffic signs since theyconstitute the important cause of accident-prone situations.Our proposed method is composed of two steps, one is Traffic signs recognition and second is tracking.

S. Karungaru et al. [1] propose an automatic stop signDetection strategy to help the drivers and also contribute to futureautomatic driving framework, for example, the Intelligent Traffic System (ITS). Technique proficiently extracts the sign region´scandidate regions, performs template matching utilizing genetic algorithms and verifies the presence of the road sign utilizing neural systems. Despite the fact that, we confront different issues including camera shake and complicated scenes, our method produces an encouraging exactness of around 96%. proposed technique to recognize and identifythe stop sign utilizing image processing. If we can automaticallydetect road signs, it can prevent missed signs at junctionswithout traffic lights and this can be required to lessen auto collisions and petty criminal offenses.
Brendan Morris et al. [2] with the presentation of intelligent driver support frameworks, vehicles have turned out to be more agreeable and more secure. But, these frameworks require new sensors and the data they contain must be proficiently introduced to the driver. The psychological requests for translating these signs may demonstrate to be a diversion with negative effect on driving execution. This work portrays a bound together perception conspire, the Vehicle Notable Surround Observer, equipped for presenting new encompass sensors into a typical show condition which rapidly passes on basic encompass setting with negligible driver elucidation.
Yan Han et al. [3] in this paper, a robust traffic sign recognition framework is presented for driver help applications and/orautonomous cars. The framework fuses two noteworthy operations, movement sign recognition and arrangement. The sign detection isbased on color segmentation and incorporates hue detection,morphological filter and labeling. A closest neighbor classifier is presented for sign grouping. The training features areextracted by SURF algorithm. Three feature extraction methodologies are contrasted with locate an ideal element database for preparing. The proposed framework profits by the SURF calculation, which achieves invariance to the rotated, skewed and occluded signs.Extensive experimental results show detection accuracy reachingup to 97.54%.
Felix Mărius et al. [4] the paper proposes a three steps algorithm thatautomatically detects, classifies and recognizes traffic signs fromimages taken from a car running along European street. Activity signs are distinguished by examining the shading data contained in the pictures utilizing HSV shading space. Distinguished signs are then ordered utilizing

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connection with standard sign shapes. The recognition step uses the minimum distance classification basedon calculating the Euclidean distance between two featurevectors composed using a Gabor filter with different parameters.
YanleiGu et al. [5] Traffic sign recognition frameworks can be connected to help drivers and enhance the activity wellbeing. High resolutionimage of traffic sign can improve the recognition result, particularly for some perplexing movement signs. In this paper, a double central dynamic camera framework is proposed to acquire a high determination picture of movement sign. In the framework a dynamic fax camera is prepared as a right hand of a wide point camera. To make the proposed framework accurately catch a high determination image of traffic sign, the shape, color features and the relationship between continuous frames are used together in the traffic sign detection. The experiment results demonstrate that the proposed strategy makes the double central dynamic camera framework adequately work when the framework is introduced on a car furthermoreprecedes onward the street.
Zumra Malik et al. [6] Automatic detection and recognition of road signs is an essential part of computerized driver help frameworks contributing to the safety of the drivers, pedestrians and vehicles. Despite significant research, the issue of recognizing and recognizing road signs still remains challenging due to varying lighting conditions, complex backgrounds and different viewing angles. We exhibit a powerful and productive technique for detection and recognition of traffic signs from images. Detectionis carried out by performing color based segmentation followedby application of Hough transform to find circles, triangles orrectangles. Recognition is carried out using three state-of-the-artfeature matching techniques, SIFT, SURF and BRISK. Theproposed system evaluated on a custom developed datasetreported promising detection and recognition results. Acomparative analysis of the three descriptors reveal that whileSIFT achieves the best recognition rates, BRISK is the mostefficient of the three descriptors in terms of computation time.

IV. SYSTEM ARCHITECTURE

In the detection step, the image is segmented relying on the visual key of traffic Sign features such as colour and shape. In fact, traffic signs colours represent basic information as the TSs contains bright primary colours that contrast strongly with background environments. Therefore, many methods proceed with a segmentation stage within a specific colour space. Typically, the output of a mounted camera is an RGB image. Whereas, the RGB color space is not suitable for the detection of signs' colours due to its sensitiveness to the illumination variations. Therefore, some researchers used a color ratio between the intensity components of RGB, while others used only one RGB component as a reference to detect the sign colors in the image. To reduce the dependency on illumination variation, the Hue SaturationIntensity (HSI) system and HSV has been frequently used.

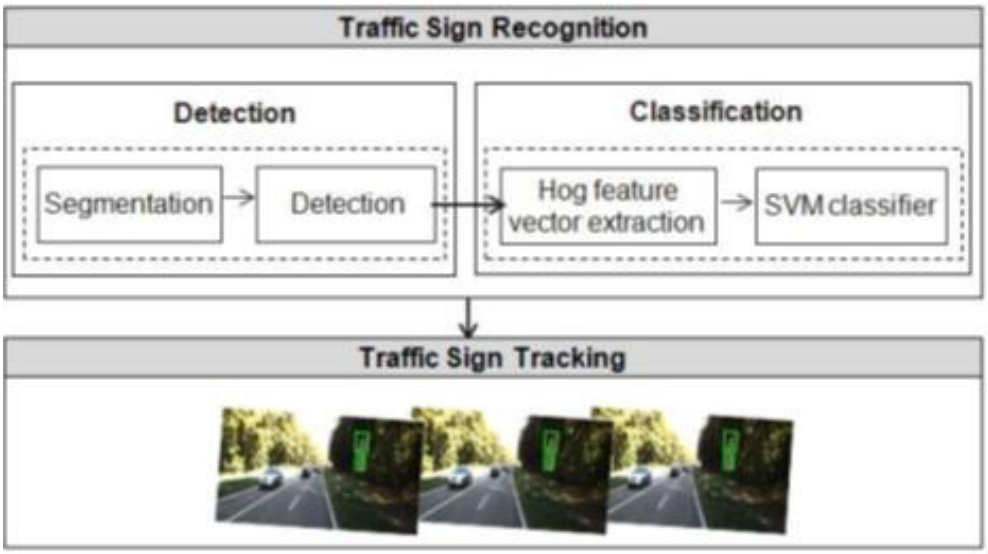

Figure 1: The proposed traffic sign recognition and tracking process

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In contrast, there are methods based on the TS shape which totally ignore color information and focus on shape information from gray scale images. For instance, the technique of local radial symmetry was implemented to detect the points of interest in the TS image. This technique is applied on the gradient of a gray scale image and used a center point votes for circular signs and a line votes for regular polygons. Authors in used the Hough transforms techniques to detect the rectangles, triangle and circles shapes of traffic signs.

Flowchart

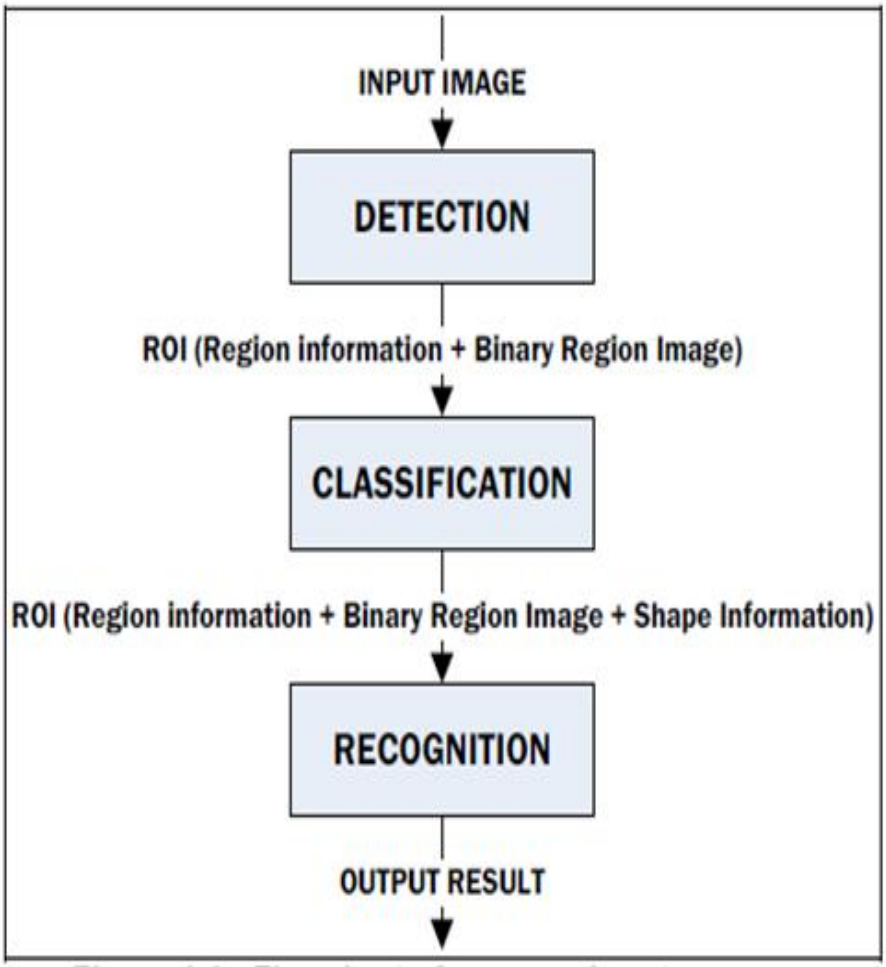

Figure 2: Block Diagram Of Flowchart

It has been said that the procedure adopted in the Thesis consists in three different stages. Detailed information of detection, classification and recognition stages are described here. We provide detection, classification and recognition to LCD displays. This project includes contributions to make detection robust, e.g., avoiding to discard signals that appear as several disconnected areas. Also, a fast and reliable circle, triangle and square shape classification is presented. An initial publication of the traffic sign detection and classification is presented. Here, a new method to extract recognize traffic signs, based on pictogram contours is described.

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V. CONCLUSION

Here, we introduced a new method for recognition and tracking of traffic signs dedicated for an automatic traffic assistance system. Potential traffic signs regions are detected, then classified using HOG features and a linear SVM classifier. Afterwards, we keep tracking traffic sign so as to have a continuous capture of the traffic sign while accelerating the execution time. Also we displayed the alerts on LCD for driver assistance. Our proposed system has good recognition rate under complex challenging lighting and weather conditions. As future work, we aim to experiment other feature descriptors and classifiers as well as comparing the performance of our method with the most recent methods.

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