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REAL TIME TRAFFIC SIGN RECOGNITION BASED ON SMARTPHONE PLATFORM

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ABSTRACT:- *As society has developed, the number of vehicles has increased and road conditions have become complicated increasing the risk of crashes. Therefore, a service that provides safe vehicle control and various types of information to the driver is urgently needed. In addition we designed and implemented a model to estimate congestion by analyzing traffic information. Traffic sign recognition can help the driver to make a right decision at the right time for safe driving. The realization traffic sign recognition system usually divided into two stages: Detection and Classification. This paper presented an algorithm for detection of traffic sign using convert region of interest (ROI) polygon to region mask method. The algorithm detects the traffic sign from the images captured from different environment and different position angle. The proposed method extracted the detected sign in black and white pixels and further classified into groups. In this paper introduces the main difficulties in road sign recognition with further discussion on the potential trend of road sign recognition.*

Keywords: *Traffic sign recognition, detection, binarization, classification, region of interest (ROI)*

1. INTRODUCTION

Traffic Sign Recognition System for road traffic control system offers the ability to acquire real time traffic sign information. System provides real time information of traffic sign captured through video camera. Traffic management measures are aimed at improving the safety and flow of the traffic utilizing traffic capacity more effectively. The automatic traffic sign recognition system would help reducing the number of traffic accidents and it is essential for any autonomous vehicle project. Traffic signs were designed to contrast easily with the background, so they can be detected by the drivers. Most of the signs have blue or red tint with highly saturated properties and also reflective attributes, since they must be detected in varied conditions for any autonomous vehicle. Traffic sign recognition system can be used in automatic car for guiding them about the traffic signs, Traffic signs were designed to contrast easily with the background, so they can be detected by the drivers. A driver assistance system is designed to help the driver to help better control the vehicle in difficult circumstances. To help increase safety and the safety of other drivers, pedestrians etc. Involved in the traffic on the roads. Computer vision is a promising approach for addressing these problems. Automatic control of the breaking system automatic speed control, generation of alerts and notifications, corresponding to the various events encountered on the road etc, are some examples among many installations of driver assistance that could be developed based on this approach. Autonomous Vehicle Driving System (AVDS) recognize potential dangers, threads, driving limitations and possibilities. One of the key factors for a successful AVDS development is to identify appropriate traffic rules valid on a certain road sector or in a junction.

2. RELATED WORK

There are many researches in the literature deal with Road Sign Recognition (RSR) problem.

Fast gray scale road sign model matching and recognition: Mobile mapping is a standard technique for compiling cartographic information from a mobile vehicle. In a mobile mapping process that consists in fitting a model to recover the sign distortion and applying recognition techniques on weak classifiers cascade results. High variance of sign appearance has made detection and recognition of road signs a computer vision problem over which many studies have lately been performed.

Detection by Adaboost: The Adaboost algorithm presents a general frame work to combine classifiers in order to solve the supervised pattern recognition problem. This approach consists of choosing a classifier, modifying example weights in order to give priority to examples where the previous classifiers fail and combining classifiers in a multiple classifiers. The input images of our recognition procedure are provided by the weak classifiers cascade detection process.

Road traffic sign detection and classification: Road vehicles can have three main roles road detection, obstacle detection and sign recognition. Road detection and obstacle detection have been gives good results, but traffic sign recognition is a less studied field. Traffic signs provide drivers with very valuable information about the road, in order to make driving safer and easier.

Traffic sign detection: There are four types of traffic signs: warning, prohibition, obligation and informative. Depending on the format of the color, the warning signs are equilateral triangles with one vertex upwards. They have a white

background and are surrounded by a red border. Prohibition signs are circles with a white or blue background and a red border. Both warning signs and prohibition signs have a yellow background if they are located in an area where there are public works. To indicate obligation and informative, the signs are circles with a blue background.

Color thresholding: The most intuitive color space is the RGB system. Color of every pixel is defined by three components: red, green and blue.

4. METHODOLOGY

Existing Method: Many systems have been developed and various techniques had been used in those systems .Support vector machine model which uses candidates regions of the traffic sign. It consists of training model and training sets used for classification of traffic signs. Another model is based on Neural network which uses multilevel perception. Another model consists of GPS which can download the maps but it is not reliable as many vehicles not do not have GPS and do not allow the download of maps.

Proposed Method: The proposed method detects the location of the sign in the image, based on its geometrical characteristics and recognizes it using color information. Partial occlusion is dealt by the use of the Hough Transform and suggestions are made for future improvements so that the robustness of the algorithm in light condition changes can be increased. The objective of this project is the development of an algorithm for the automatic recognition of traffic signs in digital images. The program An Si was created (from the Greek words Anagorisi Simaton which means Sign Recognition). Up to know, many algorithms for the traffic signs detection and classification have been introduced.

BLOCK DIAGRAM

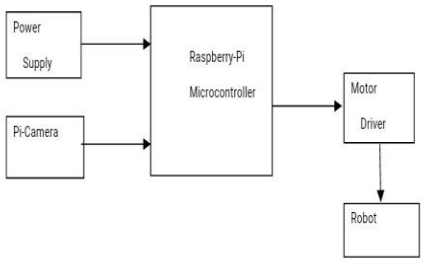

Figure1. Block Diagram of Traffic Sign Recognition

The main objective is to develop a system that can be used for traffic sign inventory. The system can assist local or national authorities in the task of maintaining and updating their road and traffic signs by automatically detecting and classifying one or more traffic signs from a complex scene when captured by a camera from a vehicle. This system consists of Power supply, Pi Camera, Raspberry Pi Microcontroller, Motor Driver and a Robot. In this, Pi Camera Module which is connected to the Raspberry Pi installed in a moving vehicle to real time capture scenes in the front of this vehicle. This can be considered as input images of the traffic sign recognition scheme. The major recognition scheme can be performed on in-vehicle computing device. In this paper, the proposed scheme can be divided into five stages: frame capturing, preprocessing, traffic sign detection, character/icon extraction and recognition. The first stage is to capture the front view of a vehicle as the dynamic video, and then sampling frames are extracted from the video in certain frame rate. These extracted frames are further are processes, and then recognized through the following stages. In this paper, all above works can be performed in Raspberry Pi 3. The preprocessing stage contains some image processing procedures to improve and normalize the image quality and format. The traffic sign detection is to detect the region of each traffic sign, and the last two stages are used to further recognize each detected traffic sign.

Preprocessing

The videos are real-time captured by the Pi Camera Module which is connected to the Raspberry Pi installed in a moving vehicle. Hence, the brightness, contrast, clarity and noises of scenes may have large difference when the weather or other conditions are changed by time and locations. However, these variables could increase recognition difficulty and affect the recognition results. In order to increase the robustness of the proposed scheme, some preprocesses are used to reduce the influence of variable conditions.

RGB color space is a very general color space for monitor displaying and image processing. However, when the brightness is changed, all color channels also would be changed. At the sign detection stage, all signs are detected when their colors are satisfied with a specific color condition. However, the specific color condition should be changed in different brightness conditions. In order to detect traffic signs by a fixed color condition, the RGB color space is transformed into other color spaces, such as, HSI and HSV in the preprocessing. Both HSI and HSV only record the brightness of images in I and V channels, respectively. Hence, other channels only are stored the color information. HSV and HSI values are calculated using the standard formulas.

Traffic Sign Detection and Extraction

Generally speaking, the mandatory and cautionary signs are most important for drivers and their contents must contain a red circle or triangle frame. Hence, color extraction is a very effective and efficient solution for selecting candidate sign regions in each image. However, each color of the human vision has a fuzzy range in computer color spaces. For example, the proposed scheme wants to extract all regions which are "red" as the frame of a sign from an image. In order to extract all "red" regions, some color conditions are needed to select red pixels by computers. In this paper, the color selection is performed in the HSV color space. This color space can be obtained from the RGB color space at the preprocessing stage itself. The color selection is a suitable and simplest solution for detecting traffic sign candidate regions. However, the image may contain other red-likeness objects, such as, commercial signboards, vehicles, flowers or any object with red color. Hence, this color selection method only can be used to obtain all candidates of prohibitory and warning signs. This paper presents a simple traffic sign object filter which can be performed to remove most objects which are not traffic signs.

The traffic sign detection and extraction scheme can be used to obtain the traffic sign sub-images from each video frame. Besides, the shape recognition can provide the preliminary category information of each traffic sign object to help the following stages further recognize traffic sign more efficiently. In order to gain more performance this stage can be applied in the images with lower resolution. When any satisfied traffic sign cannot be detected in certain frame, this frame would be not processed in the following stages. The following stages focus on traffic sign content recognition.

FLOWCHART

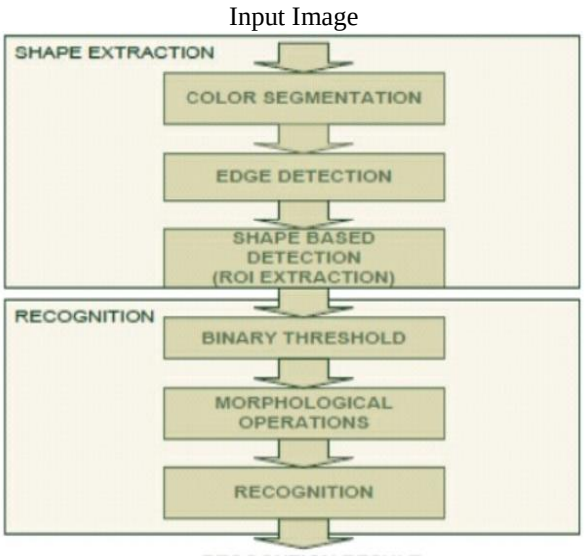

Figure2. Flow diagram of Traffic Sign Recognition

EXPERIMENTAL SETUP

The whole system is implemented using Raspberry Pi board. A USB Camera is used to detect and capture images. These images are saved in system memory and basic edge detection operations are performed on the test images captured by the camera. OpenCV serves as the interface on which edge detection algorithms are allowed to run and perform basic image processing functions. The OpenCV provides several inbuilt libraries for image processing.

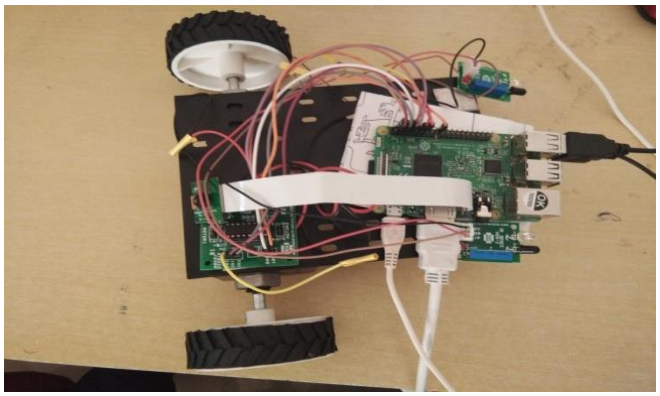

Figure3. Experimental setup of Traffic Sign Recognition

5. RESULT

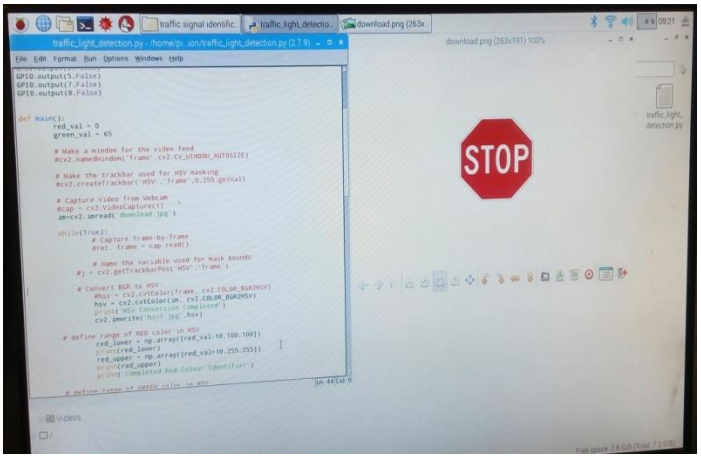

Figure4. The algorithm successfully detected and identified the sign.

The above figure shows the algorithm to recognize STOP sign. A stop sign is a traffic sign to notify drivers that they must come to a complete stop and make sure no other vehicles are coming before proceeding. The convention allows for the world "STOP" to be in either English or National Language of the particular country. At a junction where two or more traffic directions are controlled by stop signs, generally the driver who arrives and stops first continues first. If two or three drivers in different directions stop simultaneously at a junction controlled by stop signs, generally the drivers on the left must yield the right-of-way to the driver on the far right.

CONCLUSION AND FUTURE WORK

The traffic sign recognition is a very helpful driver assistance technique for increasing traffic and driver safety. This paper proposes efficient real-time traffic sign detection scheme and integrates the proposed scheme with intelligence vehicles. The proposed scheme detects color by dynamic thresholds in HSV color space. And then the proposed scheme uses low computing complexity, adaptive and accurate mechanisms to extract portion of the image which contains the traffic sign. In Future algorithms for recognition of the extracted traffic signs can be implemented using appropriate techniques.

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