

Traffic Sign Recognition
Functional Description and Complete System Block Diagram

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Introduction

The objective of the Traffic Sign Recognition project is to identify a traffic sign from a digital photograph. The sign may be viewed from various angles and in many diverse background situations. The identified sign will then be highlighted after identification. All image processing will be done in MATLAB. Initially, the system will be designed to identify specific signs (stop, crosswalk, curve, etc.). Ultimately this system will be able to identify several signs.

Overall System Block Diagram

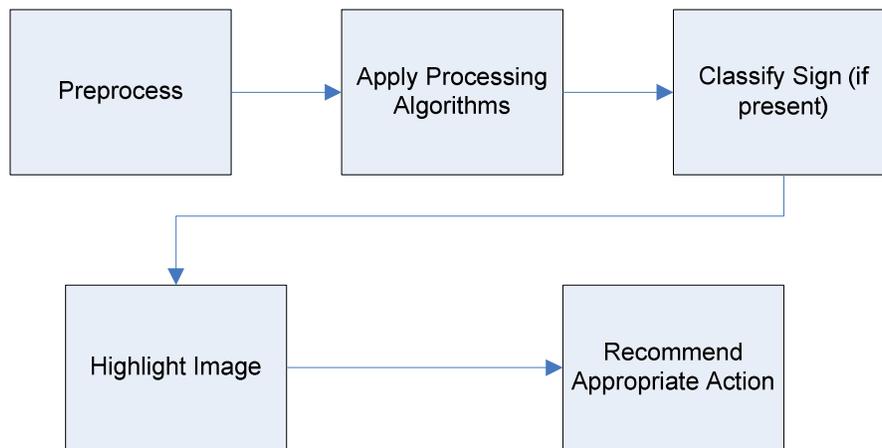


Figure 1 – Overall system block diagram

Input to the system will be an image loaded from the computer's hard drive. Preprocessing including contrast, brightness, clarity will then be performed. The actual image processing including color detection and edge detection will be applied next, and the software will then attempt to determine if a sign is present. If present, the sign will be classified and highlighted. Figure 1 shows the overall system block diagram. To allow for future expansion, action will be recommended to a hypothetical vehicle based on the nature of the sign observed.

Functional Description

Preprocessing Block



Figure 2 – Preprocessing block

Preprocessing will load the image as well as check contrast, brightness, and clarity. Figure 2 shows the flow of the preprocessing block. If these parameters are off from our desired values for these, adjustments will be performed. This will allow the

design team to be able to ensure that the image is suitable for processing. If the software cannot obtain the contrast or brightness needed, it may not be able to identify if there is a sign in the image.

Image Processing and Recognition

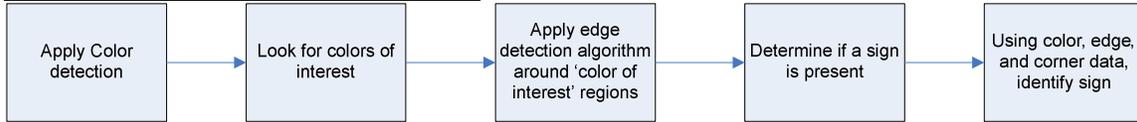


Figure 3 – Image Processing and Recognition (Apply Algorithm block)

This block will process the actual image, and is where the majority of this project is contained. First, the system will detect colors and then look for colors of interest. Colors like red, yellow, and white that constitute road signs will be considered colors of interest. The image processing and recognition block is represented in Figure 3. The system will then define the region in which these colors are concentrated and outline the shape of the sign. If no sign is present, there will not be any sign to identify; nothing (or an error) will be output. With the data gathered from the image, the system will determine if a sign is present and will proceed identify it if possible.

Output

This subsystem will take the data and create the final output. Output subsystem is show in Figure 4 which shows the flow of the block. Without a sign identified, nothing will be output. If a sign has been identified the system will outline that sign and depending on the type of sign it is, generate a decision variable. This variable will be reserved for future use and could be implemented for an autonomous vehicle control at a later time.

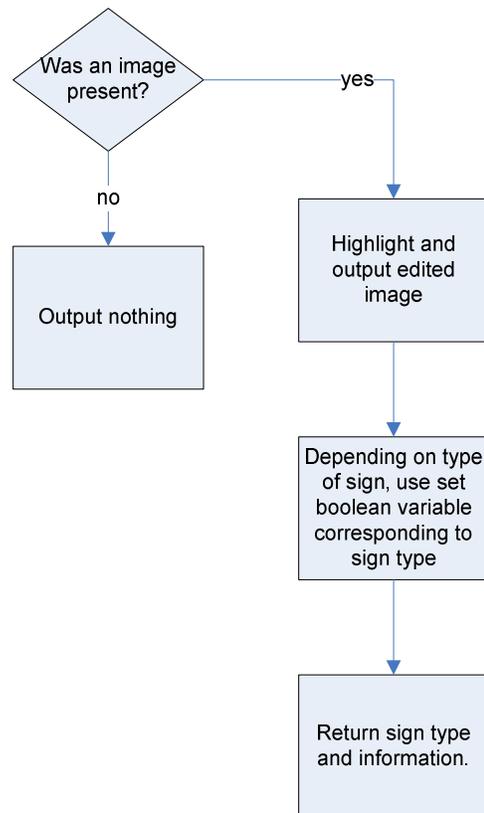


Figure 4 – Output block

Advisor Suggestions

Originally the design team proposed a camouflage recognition project that would allow a system to identify and artificial pattern in a natural background. After further thought, Dr. Stewart is now considering the camouflage recognition as a possibility if things go well and the design team believes it can tackle this problem.