

# AUTOMATIC TRAFFIC SIGN DETECTION USING MATLAB

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## ABSTRACT

*The main overview of this paper is to use basic image processing technique to automatically recognize different traffic sign in an image. Matlab image processing toolbox is used for this project. It involves the acquisition of the image, pre-processing such as thresh holding, grey scale conversion, color and shape analysis etc. for detection of signs and finally the road sign recognition technique is performed. The project also discusses the problems in which the sign cannot be detected. So, there is a lot more work to be done in this field. New techniques should be developed to detect the image during night, when the sign is inclined, and also increase the robustness of the system and increase the processing speeds for real time applications.*

## 1. INTRODUCTION

Traffic signs are integral part of our day to day life. They define a visual language that can be interpreted by the drivers. They ensure a safe and convenient drive depending on the current traffic situation on the road. Also, the signals indicate dangers and give warnings to avoid any unpleasant circumstances.

The traffic sign detection and recognition system provides similar functionality to facilitate numerous applications like intelligent vehicles and driver support systems.

There are four types of traffic signs in the traffic code:

- Prohibition: Circular in shape having specific figure in each case over a white or a blue background and a red border.
- Warning: Equilateral triangles with vertex at the top depending on the shape and color.
- Obligation: Circular in shape with a figure over a blue background.
- Informative

The identification of traffic signs can be achieved in four phases. They are Image Acquisition, Image Pre-processing, Detection Module, Recognition Module. In the acquisition phase, a digital camera is used to capture the image of the

traffic sign. It is then loaded manually in to the system. In the pre-processing phase, the image is subjected to some techniques such as enhancement, RGB thresh holding etc. are used so that the sign can be efficiently detected by the system. Then in detection module, the image is segmented based on the color and shape of the sign in the image. In this phase the techniques used could be image segmentation, edge detection and minor blob removal. The image recognition phase involves the matching of the output segmented image which contains the possible traffic sign. Each image is tested against a certain set of patterns to decide whether it is in the group of road signs or not. The color and shape of the sign plays a very important role in identifying the sign easily. So, the set of patterns are classified based on the color and shape in to triangles, circles, etc. and red, blue etc. Each sign has a different pattern based on the type of sign.

The recognition of the sign is made by using either the color or the shape of the sign or both. Using both the properties may yield better results. But it increases the execution time. In this project I used both shape and color information for different signs based on the type as discussed above but not both for the same sign.

## 2. BACKGROUND

There are several other previous work done by many researchers that indicate the similarity with this project.

1. Hasan Fleyeh and Mark Dougherty [4] described a method for road sign detection, recognition and classification of road signs. Their recognition techniques involves both shape and color based analysis. In shape based analysis, the image is pre-processed until the sign can be easily segmented by the detection module. Then the shape detection module is run to detect the sign. In the color based analysis, the image is subjected to color space conversion and then the color detection is done to get an output segmented image. These two segmented images are sent to the recognition and

classification module to get the suitable output. This method is very efficient as it involves both the color based and shape based algorithms.

2. Garcia [2] proposed a system for offline traffic sign detection using Matlab Image processing toolbox. The first step in the algorithm is to obtain the gradient image and its vertical edge projection. In the next step, the color and shape analysis is performed. The signs are segmented based on these properties. The most common technique used for segmentation is to use grey level images, red components and to project pixels at edges onto the axes. This algorithm is valid for every type of road sign and there is a classification stage done using a template.

From these works, I understood that the color and shape properties are the most important features in detecting the signs. The classification of the signs can be easily done by the differences in the color and shape properties which are explained in the above section. The template matching is used for identification of the exact sign.

### 3. PROBLEM STATEMENT

The problem statement is the detection and recognition of the road signs in static images using Matlab. The road and traffic sign recognition is one of the important fields in the intelligent transport systems. The signs play a very important role while driving. So detection and recognition of these signs while driving using a digital camera and sending messages to the driver may give warnings to them, show dangers and difficulties, tell them speed limits and other signs even though he misses any of the signs while driving.

### 4. PROJECT PLAN

1. Possible enhancements: The proposed plan is done for static images. This can be extended by placing a camera for a vehicle and detecting the traffic sign for moving images. This requires a high performance computing system for fast processing of the images. And also the digital camera used also effect the efficiency of recognizing the sign because the vehicle is moving which results in distorted or blurred images.
2. Possible problems: The algorithm either fail to work or falsely remove the sign region if the image is too dark to recognize the sign image or the sign pole is bent which changes the shape of the segmented image. There are many problems

associated but these are the main one. This shows that there is still much room to improve the algorithm.

### 5. CONCLUSION

The goal of the project is to detect and recognize the traffic signs using Matlab image processing toolbox. This project tried to get many image processing techniques introduced in the class. I will be using the basic image processing methods to achieve this goal.

### REFERENCES

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