

# Traffic Sign Detection and Reading using MATLAB

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## ABSTRACT

*The main overview of this paper is to use basic image processing technique to detect Traffic signs in an Image and Read them to display them to the driver. MATLAB Image Processing toolbox is used in this project. It involves image acquisition, pre-processing such as thresholding, grey scale conversion, red-scale conversion, color and shape analysis for detection of the signs and finally read them to the driver. This project also discusses the problems in which the sign cannot be processed to save the information without white washing it with the background. New Algorithms must be tested to make the image readable during low-light occasions. Work also must be done with the robustness of the system because time is of the essence while driving and the faster the information is provided, the more time the driver must react to the surroundings.*

## 1. Introduction

Road signs are placed in specific areas to ensure the safety of drivers. These markers let drivers know how fast to drive. They also tell drivers when and where to turn or not to turn. Road and traffic control signs are crucial and must be taken seriously even after the conclusion of your driving test. They're useful during your entire driving experience. Road signs are designed to make sure that every driver is kept safe. They help to create order on the roadways and are employed to provide essential information to drivers. Signs which are taken out of specific places or not visible because of wear and tear can pose undesirable risks to drivers. The municipalities and states are the ones in charge of installing and maintaining these signs to protect the safety of all drivers.

Mobile visual search has gained popular interest with the increasing availability of high-

performance, low-cost camera-phones. In recent years, visual search systems have been developed for applications such as product recognition and landmark recognition. In these systems, local image features are extracted from images taken with a camera-phone and are matched to a large database using visual word indexing techniques. Although current visual search technologies have reached a certain level of maturity, they have largely ignored a class of informative features often observed in images: text. In fact, text is particularly interesting because it provides contextual clues for the object appearing inside an image. Given the vast number of text-based search engines, retrieving an image using the embedded text offers an efficient supplement to the visual search systems.

### Traffic signs can be categorized into:

- A. Danger warning signs
- B. Priority signs
- C. Prohibitory or restrictive signs
- D. Mandatory signs
- E. Special regulation signs
- F. Information, facilities, or service signs
- G. Direction, position, or indication signs
- H. Additional panels

### Image Processing to read texts on signs goes in the following steps:

- Detect Candidate Text Regions Using MSER
- Remove Non-Text Regions Based on Basic Geometric Properties
- Remove Non-Text Regions Based on Stroke Width Variation
- Merge Text Regions for Final Detection Result
- Recognize Detected Text Using OCR

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.

## 2. Background

The work that is previously done that indicate similarity with this project:

1. [Huizhong Chen](#) [1] proposed a novel CC-based text detection algorithm, which employs Maximally Stable Extremal Regions (MSER) as our basic letter candidates. Despite their favorable properties, MSER have been reported to be sensitive to image blur. As opposed to texture-based methods, the CC-based approach extracts regions from the image and uses geometric constraints to rule out non-text candidates. The top scoring contestant in applies an adaptive binarization method to find CCs. Text lines are then formed by linking the CCs based on geometric properties. With the extraction of edge-enhanced MSER, we obtain a binary image where the foreground CCs are considered as letter candidates. As in most state-of-the-art text detection systems, we perform a set of simple and flexible geometric checks on each CCs to filter out non-text objects.
2. This paper aims to demonstrate a system which employs algorithms that are very much different from the standard color segmentation or shape detection algorithms. The algorithms used achieve quicker execution speed and higher accuracy. In this system, the picture is acquired initially and then it is preprocessed to convert it from RGB to a Red segmented image. Filtering is then carried out to remove the noise and for edge detection by utilizing non-linear filters. Then it undergoes thresholding and segmentation. To recognize the traffic sign in the image, the Single layer perceptron neural network is employed.

## 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 are one of the important fields in the intelligent transport systems. The signs play a very important role while driving. So, detection and recognition of what is written on them is also important and drivers tend to skip through these signs, while promoting safer 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 or just couldn't read any of the signs while driving.

## 4. Project Plan

**Possible Enhancements:** Since they've tried to read all the characters on the signs. We can work on improvisation so that there are minimal errors while reading the signs.

**Possible Problems:** Since they read the signs directly without converting them into red background. It may happen sometimes that they might miss something and may cause an issue, so we'll try and include that too in the solution in our project.

## 5. Conclusion

The goal of the project is to detect and recognize the traffic signs with better success rates and less errors using MATLAB image processing toolbox. Using the basic image processing methods to achieve this goal.

## 6. References

- [1]. Chen, Huizhong, et al. "Robust Text Detection in Natural Images with Edge-Enhanced Maximally Stable Extremal Regions." Image Processing (ICIP), 2011 18th IEEE International Conference on. IEEE, 2011.
- [2] Mohit Bhairav Mahatme; Mrs. Sonia Kuwelkar. "Detection and recognition of traffic signs based on RGB to red conversion" 2017 International Conference on Computing Methodologies and Communication (ICCMC), 2017 18<sup>th</sup> July IEEE International Conference on. IEEE, 2017.