



# Traffic Sign Recognition Using MATLAB

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## Abstract

The main objective of this report is to design a MATLAB program to recognize traffic signs. Being said, the project studies two main approaches to achieve our goal: recognizing circular and other shaped signs from a simulated video or an image.

Recognition was obtained and accomplished by detecting, identifying and distinguishing signs using deferent building blocks and methods.

## Introduction

The field of road sign recognition is not very old; the first paper appeared in Japan in 1984. The aim was to try various computer vision methods for the detection of objects in outdoor scenes. Since that time many research groups and companies where interested in this field, and enormous amount of work has been done. Different techniques have been used, and big improvements have been achieved during the last decade.

Road and traffic sign recognition is one of the important fields. This is due to the importance of road signs and traffic signals in daily life. They define a visual language that can be interpreted by drivers. They represent the current traffic situation on the road, show the danger and difficulties around the drivers, give warnings to them, and help them with their navigation by providing useful information that makes the driving safe and convenient [8].

## Motivation

The automatic traffic sign recognition system would help reducing the number of traffic accidents and that is achieved by using this recognition system as a driver support system. The general idea is to support the driver in some tasks, allowing him to concentrate in driving.

Such a system exists but by taking the advantage of GPS (Global Positioning System). It could always be flawless if an updated traffic location database would be available. But few cars have GPS installed and some cars with outdated GPS systems have an old database. So a real-time video processing could be helpful. A visual recognition system can be implemented with the help of a MATLAB's image processing.

## Design Overview

Circular shaped signs: This is the main approach of the project where we were able to detect and segment a circular shaped sign from a video frame, identify its color and then use methods of template matching to recognize it. The approach is illustrated in the following flowchart.

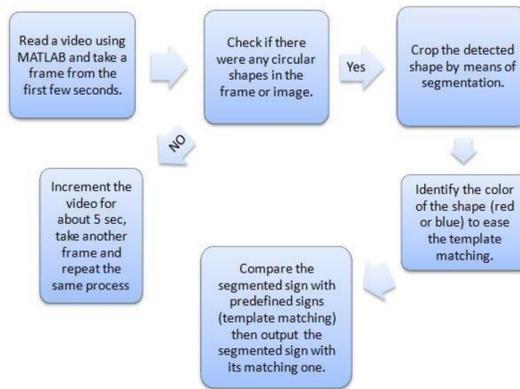


Chart 1: Circular shaped sign diagram

Other non circular shaped signs weren't detected because the method we've used for detecting shapes (hough transform) only works on circles and in sometimes on octagons (STOP sign). So another program was developed that works with manually segmented signs where the original input is an image of a cropped sign not a video. And in this traffic sign recognition approach we had to ways for template matching. A flowchart that illustrates this approach is given below.

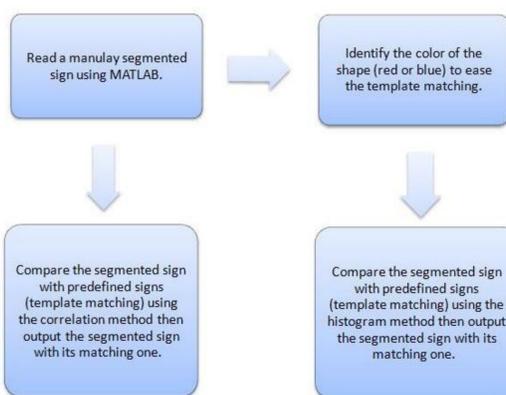


Chart 2: Non-circular shaped sign diagram

## Building Blocks

- Shape Detection
  - Hough Transform
  - Correlation

- Color Identification
  - K-means
  - Correlation
  - VIBGYOR
- Template Matching
  - Histogram
  - Correlation

## Results

After doing the procedure in the flowchart given earlier the program worked perfectly with a number of selected signs to be detected from a perfectly simulated video. An example of sign segmented from a video taken on KFUPM campus (Bld. 59 parking) is given below.



fig 1: Original frame



fig 2: MATLAB output

## Conclusions

There are many methods to recognize traffic signs. In this report, two methods were used according to the shape of the sign. Both methods mainly construct from the same building blocks but defers with the inputted image whether it's a frame from a video or a manually cropped sign. The method concerned with videos is the method where circular shaped signs are recognized.

Since other shapes weren't detected automatically, we had to approach our goal in a simpler way which is working with manually cropped signs (all shapes). Detecting other non-circular shapes such as triangles, squares, etc. was one of our main challenges. At the moment, we haven't implemented an optimal solution for detecting triangles and other shapes but the theory behind it was illustrated using correlation.

The building blocks of the project are simple concepts of image processing combined together to achieve our goal of sign recognition. Most of the building blocks were implemented after being fully studied and understood.

In conclusion, this paper reached its aim of building a successful program of circular traffic sign recognition system. Our recommendation is to utilize this system for circular shaped signs of all colors. The next step is to be able to recognize other non-circular shaped signs using correlation.

## Contact

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