

Project Report

CSL402 - Digital Image Analysis

Road Sign Detection and Recognition

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Table of Contents

- Abstract - page 3
- Algorithm - page 3
- Experiment- page 4
- Result - page 6
- Limitations- page 10
- Reference- page 10

Abstract

This report discusses about the detection and recognition of road signs based on geometric properties of standard signboards. We exploited the idea that ratio of width/height of “actual” sign to the rest of the sign board is fairly constant as far standard signboards are concerned.

Algorithm

1. Convert the input RGB image into a Y-Cb-Cr image. Intensities are represented in interval [0,1].
2. Threshold the Y component of image with value $y=0.56$.
3. Find the average of Y component throughout the image. Let avg denote the the average so calculated.
4. Threshold Cr component of image based on the value of avg .
5. Apply median filter the Cr component to reduce salt and pepper noise.
6. Dilate Cr component significant number of times(50).
7. Erode Cr component significant number of times(55).
8. At this step, whole inside of the board is white. Find the bounding rectangle of the signboard using standard libraries.
9. Obtain new image I' by ANDing the Y component and Cr component obtained so far. In I' only the sign will be white and rest of the image will be black.
10. Find the rectangle bounding the sign in image I' .
11. Calculate the ratio of width and height of bounding rectangles obtained at step 8 and 10.
12. Compare the ratio obtained with corresponding ratio in standard sign boards.
13. The standard sign board, having the closest ratio to the ratio obtained in step 11, will be the our answer

Experiment

Currently we experimented with signboards which are red in color. The signboards tested were “STOP” sign and “DO NOT ENTER” sign boards. The standard signboards used are





Result

We were able to successfully recognize signboards even if they are rotated or tilted a bit and even if they differ in luminous intensity from standard sign boards.

Input #1

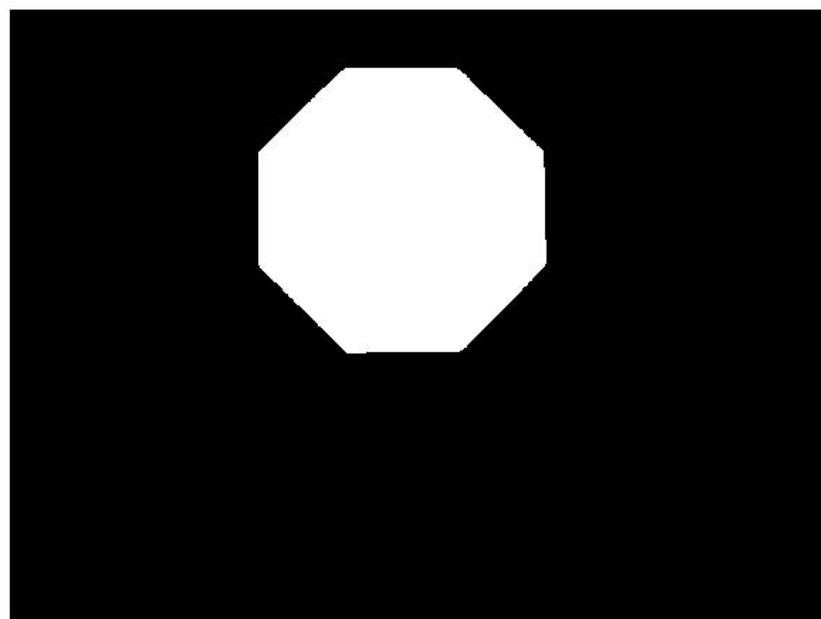
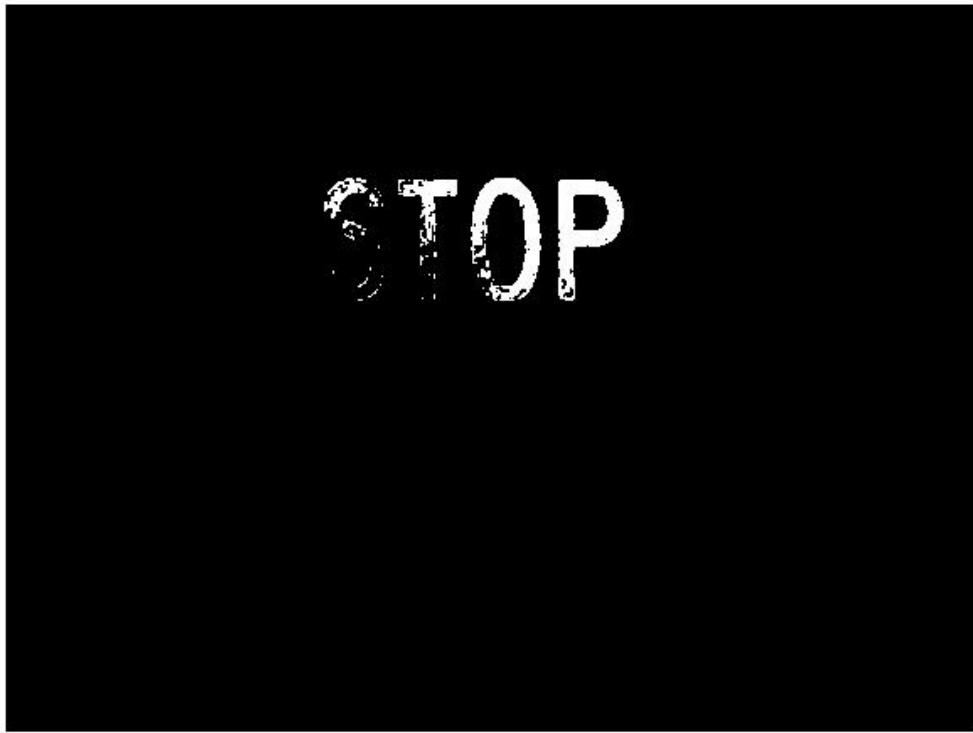


Image (above) after step 8



Image(above) after step10



Output (above) corresponding to input #1



Input #2

This is a Do Not Enter Sign



output(above) corresponding to input#2

Limitations

- This may not work if whole of the input image is covered by signboard.
- This may not work if in input image signboard is at very far distance because in that case we will not be able to compare the ratios effectively

Reference

Miyata, Shigeharu, et al. "Feature Extraction and Recognition for Road Sign Using Dynamic Image Processing." *Innovative Computing Information and Control, 2008. ICICIC'08. 3rd International Conference on*. IEEE, 2008.