CSCI 4220U Course Project: Real Time Sign Detection

Imran Mustafa

April 5, 2024

Abstract

This report highlights the steps needed to apply the techniques taught in class to develop a computer vision system for the real time detection of road signs.

1 Introduction

To create a better system then the original template matching that was employed in lab 1. I've chosen to use a more advanced neural network (YOLOV8n it this case) to see if that shows greater improvements in percussion and accuracy.

2 Template Matching

In the original template matching system a was quite simple with its ability to match only an image of a stop sing to a target image. The system also not draw a bounding box over the resulting image leading to limited use as anything more then a stop sign detector.

Besides these limitations the greatest issue with this system was its poor precision. As it would almost always miss any stop sign in an image unless they where extremely similar to the template. This led to the system being unable to detect most of the signs in the test images.

3 YOLO

To make improvements over the original template system I decided to use a neural network as the base of the new system. In this case YOLO, which should have been highly preforming leading to the ability for it to run in real time. while also being easy to use with a wide array of tools to create the new model. The model I constructed is based off of YOLOv8n which was then further trained traffic signs (kaggle dataset).

4 Results

This system is capable of detecting road signs with a similar degree of accuracy and much greater precision, while running in real time. The network was also able to detect much more then only stop signs leading to much more complex use cases.

below are a sample of test images that the model was used on.


stop 0.96
STOP
crosswalk 0
crosswalk 0.31


speedlimit 0.93
40
crosswalk 0.98

5 Conclusions

This shows that the YOLO system was capable of greater precision, while also being able to classify more objects. leading to it being the more capable system of the two.

A Source Code

To view the full project and run the code for yourself please visit the GitHub repository at `https://github.com/Seg-fau1t/csci4220u-project`.