

Occluded Traffic Sign Detection with YOLOV3

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Abstract

Traffic sign detection is an essential component for intelligent transportation systems and self-driving vehicles nowadays. Nevertheless, occlusion of signs due to features like other vehicles often negatively affects detection accuracy. In this project we advance an occluded traffic sign detection system using You Only Look Once version 3 (YOLOv3), a state-of-the-art deep learning algorithm for real-time object detection. The approach is tailored and assessed to measure performance explicitly on occluded test cases from traffic sign datasets.

Moreover, when it comes to automatically identifying and detecting road signage from cameras mounted on vehicles, computer vision is essential. Sign occlusion is still a major problem, though. Partial or complete blockage on the road is frequently caused by distance, people, trees, and other things. When signs are obscured, mainstream sign detecting systems perform noticeably worse. For this we used occlusion-robust techniques to overcome the problem.

In this project, we present detailed methodology, develops and analysis on building an occlusion-focused traffic sign detection system using deep learning that has engaging real-world applications to measure the detection of traffic sign accurately.

Research Objectives

- The main objective of this study is to measuring recognition of accuracy for Occluded Traffic Signs by using deep learning algorithm with real-time object detection.
- Secondary objective is using the study to improve the accuracy of the occluded traffic sign recognition for automated and self-driving vehicles.

Methods

In this study we used YOLOV3 object detection algorithm to detect recognition of occluded traffic sign accurately.

YOLOv3 is the third reiteration of the common YOLO (You Only Look Once) real-time object detection algorithm published in 2018. It builds on previous versions YOLO and Fast YOLO to improve detection accuracy while maintaining real-time speeds.

The main idea behind all YOLO algorithms is to frame object detection as a single regression challenge directly from image pixels to spatially split bounding boxes and correlated probabilities. This facilitates end-to-end training and real-time implication unlike established detection pipelines.

YOLOv3 brings in a more complex deep learning architecture compared to prior editions. It utilizes convolutional levels of multiple sizes focused throughout predicting detections at 3 different scales. It also uses up to 75 varying convolutional layers for robust attribute extraction.

Analysis

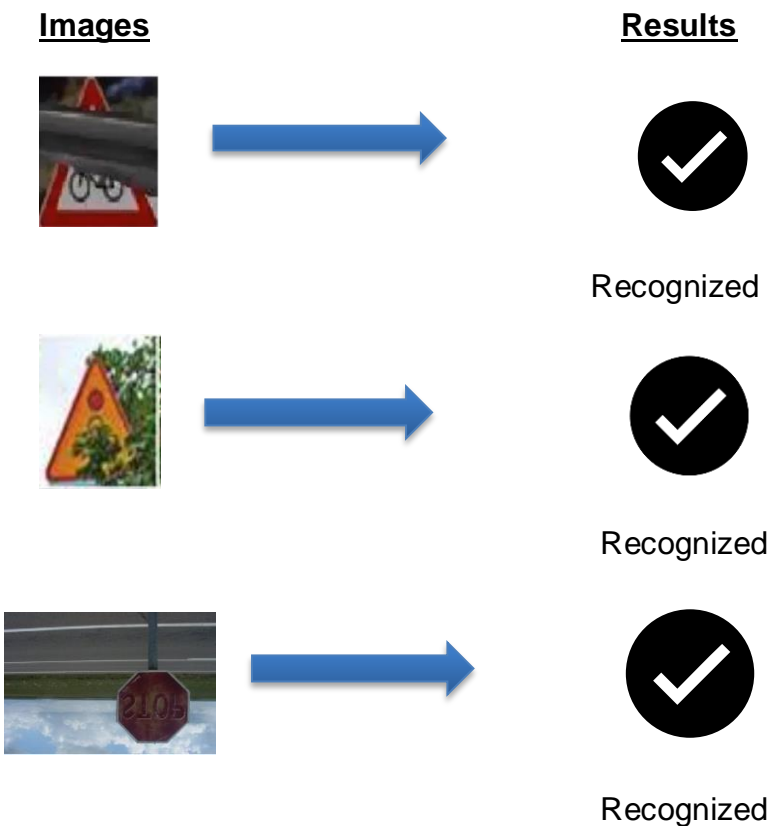
The dataset we used in this report are Road Sign Detection.

The Road Sign Detection dataset contains 877 RGB images categorized into 4 road sign sets: Stop Sign, No Entry Sign, Speed Limit Sign, and Pedestrian Crossing Sign. Image sizes vary, around 30-50 pixels for the smallest edge. The dataset offers a reasonable distribution with classes: Stop Sign (290 images), No Entry (216 images), Speed Limit (134 images), and Pedestrian Crossing (237 images).

These images are unearthed frames from driving video sequences, showcasing real-world scenarios with diverse lighting, angles, distances, and occlusions caused by objects like trees and poles. This dataset functions as a solid foundation for training and testing road sign detection and classification algorithms.

Findings/ Results

Here's some occluded traffic sign we used with the YOLOV3 algorithm are given below. First one is occluded by the pole on the road, second one covered by the tree and the last one is hard to read due to discolor are correctly detected by the algorithm-



Discussion

In this project, we tried 40 images with the YOLOV3 algorithm which detected all the occluded signs accurately. We have 100% accuracy rate for recognizing occluded traffic signs with algorithm. These results can assist more detailed study to other computer vision-based studies like that.

Future Directions

An occlusion in image or video is quite normal for our daily life. Because most of the professional computer vision-based data sets are prepared in a studio. When we have occluded images/videos for the faces, traffic signs, and other data sets, we can offer to use YOLOv3 object detection algorithm for the recognition process.

This approach will help to increase the accuracy for the vision-based tasks in machine learning. There are also other occlusion-based data sets and algorithms. Their performance can be tested for the different tasks in this discipline.

References

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