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Report: Enhanced Road Sign Detection

Introduction

For this project, the methodology of Voila-Jones cascade training and Haar Classifier utilization was to be implemented. The algorithm would build a cascade file based on training data set which would then be utilized in the identification of traffic signs. This method is chosen due to the fact that recent papers show this method to be more robust against variations in traffic sign color hue due to adverse weather conditions [1] and the speed required to detect a sign during video monitoring (driving) is maintained [1]. Other methods, such as Neural Networks (NNs) provide more robust detection but require much more processing and is reliant on pre-processed images from the video feed based on color channel segregation, edge detection, and filtering [2]. As such, an implementation of the Voila Jones sign detection method was chosen.

Results

Performance

Discussion

The alternative method of Neural Networks is specifically good at recognizing traffic signs against complicated scenery. The majority of systems today initially split an image based on color channels, narrowing down the possible signs based on color. This however leads to problems in the real world where adverse weather may affect the color of the road sign. Additionally, algorithms such as KNN slow as the K value increases [1].

If trained properly, the Voila-Jones algorithm is fast and accurate. Comparably, Neural Network classifier based on CNN has been shown to perform with 98.5% accuracy [3].

References:

[1] Traffic Sign Detection and Recognition Using Open CV by Prache Gawande
https://www.irjet.net/archives/V4/i4/IRJET-V4I4275.pdf

[2] Traffic Sign Recognition Using Neural Network on OpenCV by Auranuch Lorsakul and Jackrit Suthakorn
http://bartlab.org/Dr.%20Jackrit's%20Papers/ney/1.TRAFFIC_SIGN_Lorsakul_ISR.pdf

[3] (Extended Abstract) Rogue Signs: Deceiving Traffic Sign Recognition with Malicious Ads and Logos by Chawin Sitawarin, Arjun Nitin Bhagoji, Arsalan Mosenia, Prateek Mittal, and Mung Chiang
https://arxiv.org/pdf/1801.02780.pdf