

Project No.	Project Title	
2022-01-244	Safety analysis of signalized intersection data acquired by video analytics	
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Abstract

My research focuses on the Dilemma zone, the driver's crossing decision once the light signal turns yellow and the vehicle is driving towards an intersection at a certain speed and distance from the stop line. At the yellow change, drivers may find themselves too fast and close to stop safely before the stop line, or too far and slow to clear the intersection before running a red light. Although the driver's speed and distance at the time are set, factors such as the driver's temperament, their willingness to take risk or if they are rushing somewhere also come into play, making the forecasting of the driver's decision a stochastic problem.

The data for this project was collected in cooperation with a start-up company based in Israel called NoTraffic. Their solution is a camera-based traffic management platform that deals with traffic challenges. The videos from the intersections are processed in control units using video analytics methods. Past projects have been done using one week of NoTraffic's data from a single intersection in California in 2019, at a resolution of 2 FPS. For this project about 140 hours of data were downloaded over the course of 2 months, from 6 different intersections. Each entry in the data is a vehicle that was captured in a frame, at a better resolution of 10 frames per second. The new data contains the vehicles' speed, distance from stop line, lane, driving direction recognized by the units, traffic light signal and more. Analyses of this data will be a proof of concept for its validity, the potential it holds and will be expanded in my thesis.

The data was grouped by each vehicle, resulting in 146,538 vehicles. Some aggregated fields that were added were if the vehicle stopped or crossed, the signal when crossing and if the vehicle was recorded in a yellow signal. The current primary analysis focuses on 9,842 vehicles recorded in the light change from green to yellow with additional filtering criteria of cars only, recorded in 40 frames and over, that continued driving straight - leading to 5,830 cars. All the 5,830 vehicles were recorded crossing the intersection, but 2,807 were seen stopping in the crossing decision zone. These vehicles can be used to draw conclusions about the determining factors and probability which will lead a driver to cross or stop .

Keywords: Dilemma zone, traffic safety, signalized intersections, red light running