Research Report Summary

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Detailed Analysis of Roadway Users Interactions with Flashing Yellow Arrows: *A Streamlined Approach to Data Collection*

Quantifying vehicle-pedestrian interactions in simple terms is achievable with the availability of the correct dataset. The feasibility of such approach has been demonstrated by previous work. However, the procedures required for obtaining the required datasets are labor-intensive and difficult to implement on a large scale. This project introduced a set of tools that can streamline the process of collecting the required data to study vehicle-pedestrian interactions both in the field as well as through driving simulation experiments.

Objectives

The key objective of the research effort was establishing procedures and tools that can be used to streamline the process of studying vehicle-pedestrian interactions on the field or using a driving simulation environment.

Field-Based Data Collection Tools Based on Radar

Quantifying vehicle-pedestrian interactions by analyzing vehicle trajectory data obtained from radar-based vehicle detection systems requires a reliable and accurate method of isolating the trajectories by movement. For example, isolating left or right turn trajectories is key to quantifying the vehicle-pedestrian interactions.

A new methodology, based on a dynamically generated support vector machine (SVM) linear classifier was created to identify those vehicle trajectories that can be included in the analysis.

The classification procedures develop relies on input data that is readily available from existing radar-based vehicle detection system deployed on the field and thus have applications beyond the stated research objectives.

Impacts of Field Procedures Developed Outside of Research

Applications of the vehicle trajectory classification approach expand beyond evaluating vehicle-pedestrian interactions. There is potential for the classification approach to be used for conducting turning movement counts and the approach developed represents an improvement on previous techniques.

The dynamic and streamlined nature of the linear SVM models created to classify vehicle trajectories makes the deployment of these models on embedded system (if additional steps are taken) a possibility.

As a result, methods presented can improve the state of the practice for conducting detailed turning movement counts on signalized intersections instrumented with compatible radar-based vehicle detection systems as well as improving the state of the practice for safety evaluations by simplifying the data need for pro-active safety evaluations.

Tools for Studying Vehicle-Pedestrian Interactions Using Driving Simulation

A collection of Unity objects ("pre-fabs") designed and programmed with the specific goal of supporting driving simulation research that involves FYA signal indications were created.

Three of the objects that are a key output of the project are: signal head objects along with the corresponding controllers, data collection streaming system, and ambient vehicle controllers.

When combined with existing tools and resources such as pre-configured pedestrian movements and study subject controls, the process of creating driving simulations using modern game engines that involve FYA is streamlined.

Making Driving Simulation Environment Signals More Realistic

One challenge of some of the popular platforms used by research teams for creating driving simulations is the inability of customizing signal sequences to reflect real life conditions that involve complex phasing operations such as those that involve FYA without having to rely on heavily customized code that often breaks native functionality in the simulation platform such as the proper control of ambient traffic.

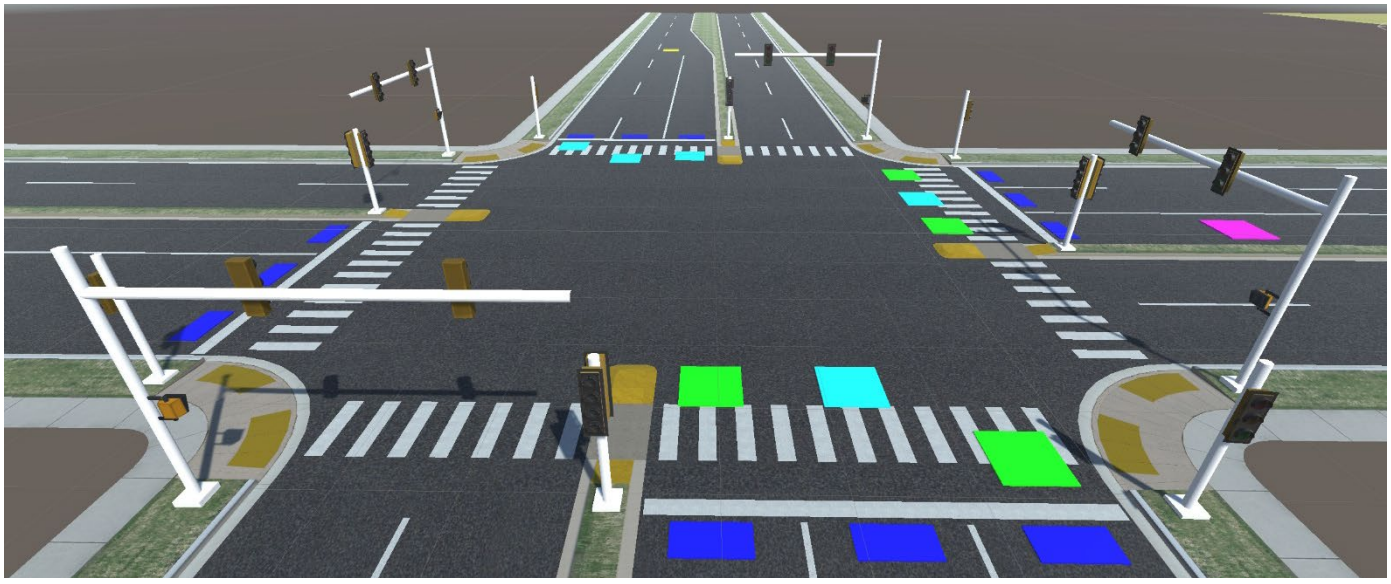
The signal sequence control procedures developed make it possible to signal sequences using an approach that closely resembles that of a real traffic signal controller and have traffic respond to the movement instructions indicated by the signal sequences.

Making Resources Available to Research Community

The collection of objects is available for download from a GitHub code repository listed ahead to simplify access to the resources by others and to provide access to future updates as the tools developed continue to evolve and support additional functionality.

The code repository provides access to individual simulation scenario elements, i.e., to prefabs, as well as to a template intersection scenario like the one shown in the screenshot ahead.

Link to Code Repository
https://go.wisc.edu/eqof27



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