Traffic Priority Simulator (TPS)

MSSI 2017

Domain characterisation

On a daily basis, drivers are faced with unconscious decisions on whether they have priority on street crossings or not. This decisions have to be done quickly as the vehicles are usually moving when this situations occur, and can be affected by several contextual visual information that the driver gathers. Some of the information that drivers usually take into consideration are:

- Width of both the street they are driving at, and the street that another vehicle is coming from
- Type of pavement of the roads (concrete, asphalt, composite, cobbles, …)
- Existence or not of road signs indicating priority (“stop” signs, “give way” signs, “priority” signs, …), as well as the type of said signs
- Orientation of the road signs in relation to the streets (e.g. given two roads, A and B, that intersect, a “stop” sign can be 30º from road A and 40º from road B)

The purpose of this project is to develop and test a framework that gathers data from driver’s decisions on situations where they have to decide quickly whether or not they have priority on a specific situation, and how the information described above affects those decisions. With this approach, we expect to develop a reasonable model of the decision process, that we can use to draw conclusions on which of the decision factors matter the most. This allows the testing of different scenarios in terms of what kind of traffic signals are worth being placed and removed as well as the positioning and angle.

The simulation would use the framework explained below to show users different decision scenarios, so that the resulting data can then be analysed to produce the desired conclusions.

After studying the obtained data, we hope to have a clear model that estimates the influence of the decision factors on how correct the driver’s decisions were.

Framework

To analyze the traffic situations mentioned, we will develop an open-source framework that allows the development and execution of complex quizzes. The quiz would be composed by a set of questions, followed by post-questions. For each question, there will be a text, a Google Street View scene and images of traffic signs that overlay the Street View image, with a placement, rotation and scale that can be specified by the creator of the

quiz. Also, for each question, there could be an imposed time-limit to view the image. Finally, the question would have a set of answers, from which the user must choose exactly one. Following the question, there would be a set of post-questions, that should be designed to obtain further information regarding the answer to the main question.

This would make the platform very flexible, being able to produce quizzes for a lot of different scenarios. Also, being open-sourced, anyone could adapt it even further for other situations.

Domain speculation

By requesting personal information from the subjects before conducting the test, some correlations could be made by taking into account factors such as the driving experience and age. Also, by applying some changes to the testing methods, we could evaluate the influence of other factors such as the blood alcohol level, effects of narcotics or even of phone usage while driving.

Related work

Peter Bonsall, Paul Firmin, Monica Anderson, Ian Palmer, Peter Balmforth, “Validating the results of a route choice simulator,” *Transportation Research Part C: Emerging Technologies*, Vol. 5, No. 6, 1 December 1997, pp. 371-387.
doi: 10.1016/S0968-090X(98)00003-5

https://link.springer.com/article/10.1007/s12544-011-0050-9

Work plan

Week 1 - (06/03 - 10/03):
- Definition of the project scope and purpose
- Work plan

Week 2 - (13/03 - 17/03):
- Quick investigation of related work
- Work plan refinement

Week 3 - (20/03 - 24/03):
- Definition of framework technologies

Week 4 - (27/03 - 31/03):
- Extensive investigation of related work
- Framework development

- **(30/03/2017) 1st assignment: problem formalisation; methodological approach**

Week 5 - (03/04 - 07/03):
- Framework development

Week 6 - (10/04 - 14/04):
- Framework development

Week 7 - (17/04 - 21/04):
- Framework development

Week 8 - (24/04 - 28/04):
- Definition of paper structure
- Framework development

Week 9 - (01/05 - 05/05):
- Definition of paper structure
- Definition of test cases/scenarios

- **(05/05/2017) 2nd assignment: paper structure; related work**

Week 10 - (08/05 - 12/05):
- Data collection

Week 11 - (15/05 - 19/05):
- Data collection

Week 12 - (22/05 - 26/05):
- Data collection
- Demo preparation

Week 13 - (29/05 - 02/06):
- Paper production

Week 14 - (05/06 - 09/06):
- Paper production

- **(09/06/2017) 3rd/Final assignment: Demo and paper**