Intelligent Road Control

Great People
Department of Data Science & Knowledge Engineering
Maastricht, The Netherlands
mails

Abstract

1 Introduction

T

1.1 Motivation

An intelligent traffic control system is a system that adjusts traffic in order to assure all people reach their destinations in the most optimal time and distance. These systems are important for the daily workings of major cities by alleviating traffic congestion and identifying problem areas. With advancements in technology and artificial intelligence, it is important to constantly keep these systems updated to assure optimal performance and safety of the general public.

1.2 Goal

1.3 Approach

In order to test the effect of different intelligent traffic control strategies, an appropriate simulation is required. For this work, maps are realised as undirected graphs in which vertices represent intersections and roads appear as edges between those. The simulation is *microscopic*. That is, instead of globally controlling traffic (*macroscopic*), the atomic parts of the simulation are locally controlled cars (see also Krajzewicz u. a., 2002). Car dynamics are modeled using the *Intelligent Driver Model* (IDM) (Treiber, Hennecke und Helbing, 2000). It models traffic flow time- and space-continuous as a combination of *free-road* and *interaction* behaviour. The *free-road term* is governed by a cars intention to reach its desired speed. The acceleration for this behaviour is calculated (Treiber, Hennecke und Helbing, 2000) as

$$v_{free} = a(1 - (\frac{v_a}{v_0})^\delta), \tag{1}$$

where a refers to a cars maximum acceleration, v_a is its current velocity and v_0 the desired velocity. When a car approaches a leading vehicle, it is supposed to slow down in order to avoid collision. This behaviour is modeled by an *interaction term* which incorporates the distance to the leading vehical and its speed (Treiber, Hennecke und Helbing, 2000).

$$v_{int} = -a(\frac{s_0 + v_a T}{s_a} + \frac{v_a \Delta v_a}{2\sqrt{ab}s_a})^2 \tag{2}$$

In the equation above, s_0 and T restrict the cars minimum distance in space and time respectively.

2 Theoretical Backgroud

3 System Architecture

4 Methodology

5 Results

6 Related Work

7 Discussion

8 Conclusion

Literatur

Krajzewicz, Daniel u. a. (2002). “SUMO (Simulation of Urban MObility)-an open-source traffic simulation”. In: *Proceedings of the 4th middle East Symposium on Simulation and Modelling (MESM20002)*, S. 183–187.

Treiber, Martin, Ansgar Hennecke und Dirk Helbing (2000). “Congested traffic states in empirical observations and microscopic simulations”. In: *Physical review E* 62.2, S. 1805.