Investigating Ecological Impacts on selected Traffic Management Methods

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Emissions Modelling

➤ HBEFA-based microscopic emission model, including CO_2, CO, HC, NO_x und PM_x, as well as fuel consumption

➤ Integration into the traffic simulation package SUMO, both as output and for visualisation

➔ Investigations on ecological impacts of traffic management methods

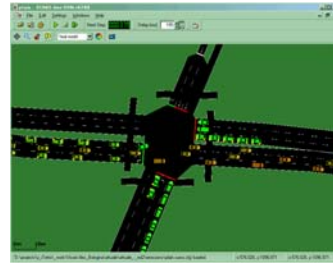

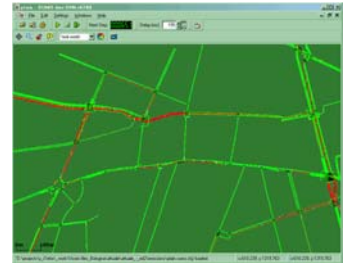Fig. 1: Visualisation of single vehicles' current CO2 emissions

Fig. 2: Visualisation of the current fuel consumption on the road network's lanes

Travel Time vs. Emissions

ECO-Routing

Attempt to reduce traffic emissions by weighting routes by produced emissions, not travel time.

The Pearson-correlation between the investigated measures shows

➤ high dependency

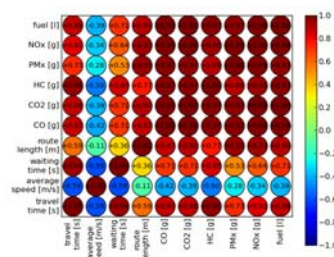➤ but also some potential to reduce a certain pollutant

Fig. 3: Pearson-correlation of investigated measures

Route Choice

Large-scale simulation results show that the overall emission of a certain pollutant can be slightly (~2-3%) reduced by using this pollutant's emissions as a weight during routing.
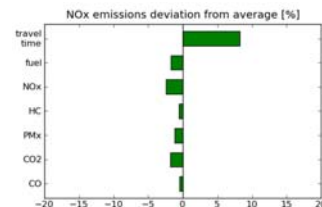

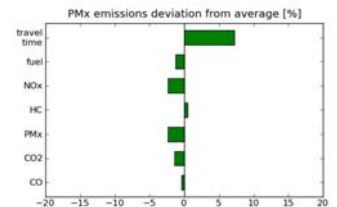Fig. 4: Deviation of NOx emission from the average of different all simulation runs

Fig. 5: Deviation of PMx emission from the average of different all simulation runs

Traffic Lights Controlling

➤ major result: a strong, mostly linear correlation between the delay time and the amount of emissions of CO_2, CO, HC, NO_x und PM_x exists

➔ it seems to be possible to optimize against the delay time only; there is no need to optimize against a set of measures

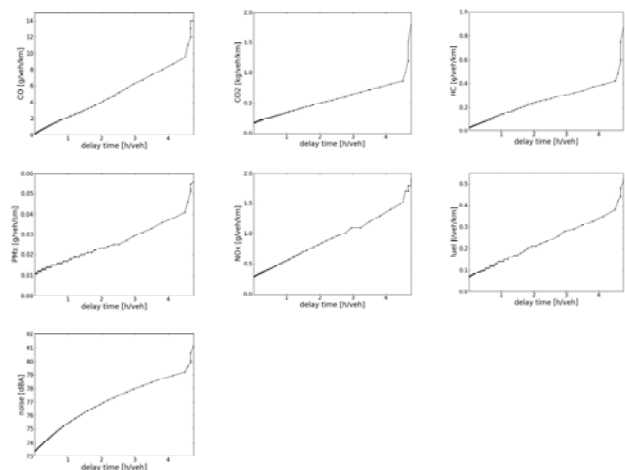➤ noise emission is also growing with growing delay time, though not linear

Fig. 6: Dependency between the delay time and the evaluated measures (pollutant emission amount, fuel consumption, and noise emission)

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