Disaggregate route choice estimation for the SUMO traffic microsimulator with the Cadyts calibration tool for improved traffic management

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Motivation

Both the offline design and the online deployment of traffic management measures benefit from the availability of well-calibrated transportation models. Arguably, the model class of greatest expressive power are microsimulators, capturing every critical element of the investigated transportation system at the individual level. In this research, we describe a traffic assignment calibration of the SUMO micro-simulator (sumo.sourceforge.net), which we conduct using the Cadyts software tool (transp-or2.epfl.ch/cadyts).

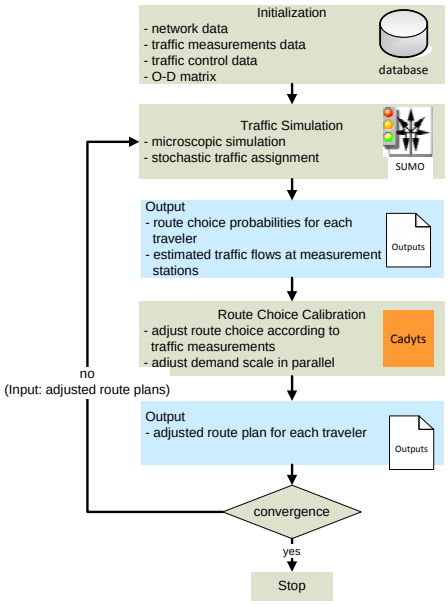
How the calibration works

Concepts

The Cadyts ("Calibration of dynamic traffic simulations") tool is used in this study to adjust the path flows in the SUMO microsimulation from traffic counts. Cadyts interacts iteratively with SUMO.

In every iteration, the following steps are executed. First, Cadyts adjusts the route choice of every single trip-maker in SUMO. Second, SUMO loads all vehicles on the network and feeds the resulting network conditions back to Cadyts. Finally, this information is used by Cadyts to compare simulated and measured traffic counts and to infer how to affect the route choice in the next iteration.

Process



Preliminary results

Synthetic network

Several tests with a small synthetic network, shown in Figure 1, have been performed in order to validate the technical correctness of interactions between SUMO and Cadyts and to examine the calibration performance.

Figure 2 shows some exemplary log-likelihood curves with different stand deviations of measured traffic flows on link L9, highlighted in blue in Figure 1. The higher the belief in the measurement (lower standard deviation σ), the better its reproduction: A zero log-likelihood indicates a perfect reproduction of the measurement on Link L9.

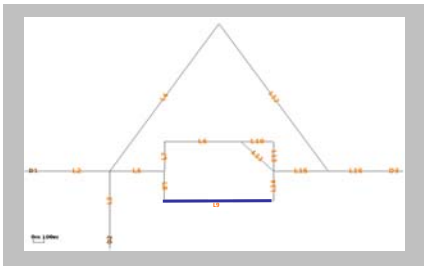


Figure 1 Layout of synthetic test network

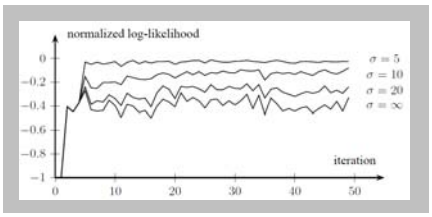


Figure 2 log-likelihood curves with different stand deviations of measured traffic flows on link L9

Real network

Current work focuses on the calibration of a partial network for the City of Bologna (see Figure 3). The input data, such as network, signal timing plans, O-D matrix, and traffic counts are currently being prepared and the calibration is being set up. First results are expected in the near future.

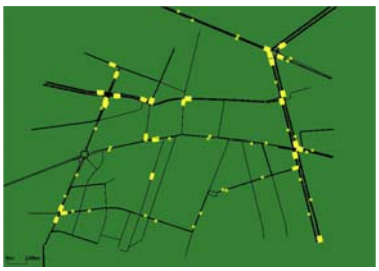


Figure 3 Layout of the partial network in City Bologna

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