Implementation of a real-life Traffic Signal Control Interface into an open-source Traffic Simulation Software Package

Call for an Interdisciplinary Project Work in the Application Subject of Traffic Engineering and Control

Background Information / Problem Description
Traffic Simulation is a powerful tool when modelling and evaluating the effectiveness of traffic planning and traffic management measures. SUMO (Simulation of Urban Mobility) is a free and open-source traffic simulation software package which is widely used in academia and allows the modelling of intermodal traffic systems – including road vehicles, public transport, cyclists and pedestrians. It can be enhanced with custom models and provides various APIs to remotely control the simulation.

So-called traffic engineering workstations are used by traffic engineers to calculate, evaluate and supply quality-assured traffic signal controls for individual intersections, for road stretch coordinations (e.g. “green waves”) and for entire road networks. While usually having interfaces to commercially available traffic simulation tools, interfaces to open-source software packages like SUMO often have not been developed yet. In the context of the research project “KIVI - Artificial Intelligence in the Traffic System in Ingolstadt”, the implementation of the real-life traffic signal control in SUMO states one important factor in the development of a realistic traffic simulation for Ingolstadt, that forms the basis for further work in the research project.
**Task Description**

The implementation of such a traffic signal control interface for a state-of-the-art traffic engineering workstation to the open-source traffic simulation tool SUMO forms the main task of this IDP. The following Figure 2 shows a basic concept of the interface that is expected to be developed in the scope of this IDP.

![Figure 2: Basic concept of the traffic signal control interface to SUMO](image)

Since the developers and providers of the traffic engineering workstation being of concern for this IDP task are one of the partners in the previously mentioned research project, there will be close contact between the IDP student and the corresponding traffic engineering office, that’s working closely with the city of Ingolstadt concerning its traffic control system since many years. The implementation of the traffic signal control interface of the traffic engineering workstation to a commercially available traffic simulation software has already been realized, which will serve as a reference for the described IDP task (Sharma, Lüßmann, & So, 2019).

**Requirements**

- Interest in Traffic Control & Traffic Simulation (experience is not necessary, but a plus)
- Strong programming skills (Python)

**Accompanying Lecture**

In general, the accompanying lecture can be selected in consultation with the supervisor from the entire list of courses offered by the Chair of Traffic Engineering and Control. For this IDP, the attendance to one of the following lectures is recommended:

- Traffic Control Basics (winter term)
- Traffic Flow Simulation Basics (summer term)
- Traffic Flow Simulation Extension (winter term)

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**References**