Analysis of the Traffic Signal Detection Quality for Automated Vehicles

Problem Description
One of the tasks autonomous vehicles have to perform in urban areas is the reliable detection of traffic signals and their state (e.g. green/red) when approaching signalized intersections. Traffic signals are typically detected by image sensors; algorithms that track the traffic signals and associate the position with the help of high-precision maps are currently under development. These algorithms must meet high safety requirements. In order to evaluate and improve the algorithms, the calculated traffic signal state is compared to reality. Currently this is done by manual annotation, which is connected with large financial and temporal effort. Some traffic signals are connected with central servers and are able to log and send their actual state. With the help of the log files, the annotation of real traffic signal states could be automated, which would reduce cost and time for the annotation.

Task Description
Within this project, the first task will be to obtain and understand the two data sources. On the one hand, data provided by the City of Munich describe the real traffic signal states from all traffic signals at various intersections. On the other hand, the log-data from automated vehicles will be provided by BMW and are stored as ROSbags. These include the traffic signal states calculated by the respective algorithms. The ROSbag files are logged during test drives and include all information about traffic signals detected within this drive. As a second step, the traffic signals from the ROSbags have to be assigned spatially and temporally to those that are logged and provided by the city with the help of map data. Finally, a software with the following qualities is to be developed within this project:

- Easy integration of new log data from the City of Munich
- Check for traffic signal log-data availability for new ROSbags
- Evaluation of the match of calculated and real traffic signal states for all traffic signals

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