Chair of Automotive Technology
TUM School of Engineering and Design
Technical University of Munich

1: Transparency and decision-visualization of a planning algorithm in the field of autonomous driving

The progress in the field of autonomous driving is tremendous. New technologies through the development of artificial intelligence are making this progress possible. Today, the first autonomous vehicles are already driving thousands of kilometers on test routes without the need for major intervention of human drivers. Developments in this area are accompanied by increasingly powerful algorithms. However, the increasing complexity of the used techniques does not only have advantages, as they are becoming more and more opaque. This intransparency means that certain decisions made by the vehicle are neither recognizable nor understandable to the user, the developer or the legislator. The non-transparent behavior is usually referred to as “black-box” behavior meaning that only the input and output variables are known to the developer. The operation within the black box remains opaque. Transparency is necessary for a broad market introduction of autonomous vehicle systems, as it is the basis of trust and legislation implementation.

A transparent decision-making process is important for the acceptance of autonomous driving systems. For this purpose, a system is to be developed that clearly displays the most important decisions of the vehicle. Within the scope of this work, an existing Frenet planning algorithm will be extended. In addition, possibilities of how environmental influences of the vehicle change the driving behavior shall be evaluated and implemented. The underlying properties of the planning algorithm can then be classified and adapted to desirable driving characteristics.

The following items are to be addressed:

- Literature research and familiarization with the topic.
- Identification of the requirements for explainability
- Investigation of suitable methods
- Implementation of the method
- Evaluation and validation of the results
- Comparison to other research projects

You should bring along:

- Creativity
- Independence
- Perseverance
- Good programming skills in Python (or willingness to learn)
- Social competence

The thesis should document the individual work steps in a clear form. The candidate undertakes to complete the Master's thesis independently and to indicate the scientific aids used.

The submitted thesis remains the property of the chair as an examination document and may only be made accessible to third parties with the consent of the chair holder.

Start: immediately

End: immediately + 6 months

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