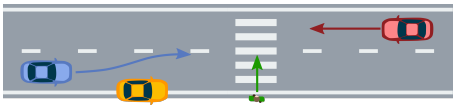
Combinatorial Behavior Generation in a Semantic State Space

Background

Behavior planning remains one of the biggest challenges for autonomous driving in order to achieve full autonomy. The behavior planning problem is to find an optimal motion regarding safety and comfort under the premise of obeying traffic rules, vehicle kinematics and dynamics. Satisfying real-time demands to ensure reactiveness to dynamic obstacles in critical scenarios is a key challenge for all planning algorithms. Our team at fortiss GmbH (An-Institut Technische Universität München) develops new behavior planning approaches for autonomous vehicles.



Description

Motion planning for urban environments with numerous moving agents needs to be viewed as a combinatorial problem to be solved using local optimization techniques. With passing an obstacle before, after, right or left, there are multiple options an autonomous vehicle could choose to execute [1, 2]. These combinatorial aspects need to be taken into account in the planning framework. The combinatorial problem formulation allows for a high-level maneuver selection in a semantic state space, which we want to investigate to increase the dependability of the behavior planner.

Requirements

- Very good academic results
- Very good knowledge in at least one programming language: C++, Python, Matlab
- Very good mathematical knowledge, knowledge of dynamic systems
- Able to work independently

Your Application

- Transcript of Records
- Curriculum Vitae
- Motivation Letter
- Certificate of Enrollment

Further Information

Only students of the Technische University München can be supervised. This document is not a specific thesis offer, but a general description of an area of research. Please contact us if you are interested in our field of research.

References

[1] K. Esterle, P. Hart, J. Bernhard, and A. Knoll, "Spatiotemporal Motion Planning with Combinatorial Reasoning for Autonomous Driving," in *IEEE Conference on Intelligent Transportation Systems, Proceedings, ITSC*, 2018.

[2] J. Park, S. Karumanchi, and K. Iagnemma, "Homotopy-Based Divide-and-Conquer Strategy for Optimal Trajectory Planning via Mixed-Integer Programming," *IEEE Transactions on Robotics*, vol. 31, no. 5, pp. 1101–1115, Oct. 2015.

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Advisor:
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Type:
BA, MA

Research area:
Autonomous Driving, Motion Planning, Behavior Planning

Programming language:
MATLAB

Required skills:
Motion Planning

Language:
english

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