Student Assistant / Thesis

Learning-Based Motion Planning for Connected and Automated Vehicles

Problem Statement

The development of autonomous driving is taking an innovative turn with the emergence of connected and automated vehicles (CAVs). CAVs have great potential to improve road safety and efficiency due to their connectivity enabled by a shared communication network that promotes cooperative driving. Additionally, the field of motion planning has undergone a substantial transformation with the incorporation of machine learning methods. In recent years, there has been a significant increase in research concerning learning-based motion planning, yielding planners that can adapt to various environments and traffic scenarios. However, much of this research does not directly target CAVs, with most planners attempting to predict the driving intentions of other traffic participants instead of leveraging communication.

This research project aims to use machine learning methods to design a learning-based motion planner for CAVs, with an emphasis on the effective use of inter-vehicle communication. This planner should be able to make risk-aware decisions by leveraging communicated data. As illustrated in Fig. 1, vehicle 1 plans to overtake vehicle 2 and communicates its planned motion to vehicles 2 and 3. In response, vehicles 2 and 3 effectively adjust their motions to avoid potential collisions with vehicle 1.

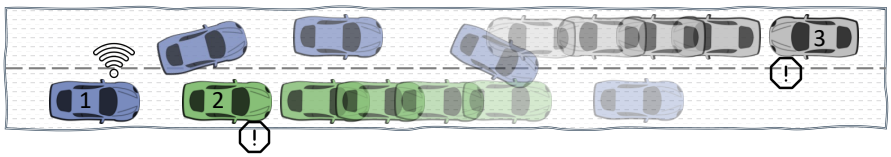

Fig. 1: Vehicles 2 and 3 make risk-aware decisions because vehicle 1 communicates its plan to them.

Your Tasks

- Discuss with your advisor which machine learning method will be used to train the motion planner
  If applicable, determine which (publicly available) dataset(s) will be used as training data
- Develop and train the motion planner
- Evaluate the efficacy of the trained motion planner

Your Profile

- Student in Computer Science, Automation Engineering, Mechanical Engineering, or a similar field
- With hands-on experience or a profound interest in motion planning and machine learning (preferably deep learning)
- With experience or an interest in programming with Python

Our Offer

For student assistant:
Positions are to be filled as soon as possible and are limited to 3 months. If suitable, an extension is possible/desired. The regular weekly working hours are 7-9 hours.

Contact

Please read our Instructions for Applications.

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