Lehrstuhl für Fahrzeugtechnik
Fakultät für Maschinenwesen
Technische Universität München

MA

TED – 3D Object Detection with Transformers for Autonomous Driving

Autonomous vehicles rely on an accurate and complete understanding of their surroundings. This means knowing where agents are (object detection) and how they will move in the future (motion prediction). Object detection contributes to this goal by detecting agents of different semantic classes around the ego vehicle. It highly influences downstream motion prediction, as upstream errors are propagated through the software stack, which leads to imperfect prediction inputs. Prediction is thus directly coupled to the detection performance.

The goal of this thesis is to develop a novel 3D object detection algorithm, which uses LiDAR point cloud and additional contextual information as inputs. Specifically, in a previous work, trajectories of agents (taken from a motion prediction module) were used as additional information for the detector. This approach should be further developed as it led to promising results. Specifically, the approach should be extended to transformer-based object detector architectures and evaluated in a representative way.

Work packages:

- Literature review: 3D object detectors
- Evaluation pipeline development
- Development and optimization of TED
- In-depth evaluation and comparison to SOTA

Requirements:

- Very good programming skills in Python.
- High personal motivation and independent working style.
- Very good language proficiency in German, English or French.
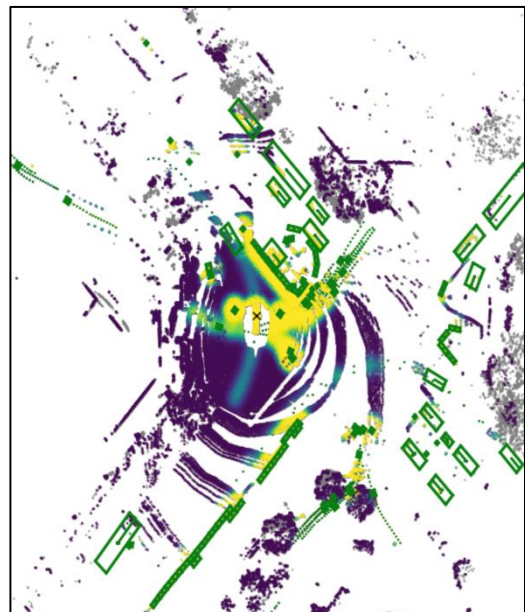
The thesis should clearly document the individual work steps. The candidate undertakes to complete the term paper independently and to indicate all scientific aids used.

The submitted work remains the property of the chair as an examination document.

Prof. Dr.-Ing. M. Lienkamp   Betreuer: Loïc Stratil, M. Sc.

Ausgabe:_____   Abgabe: _____