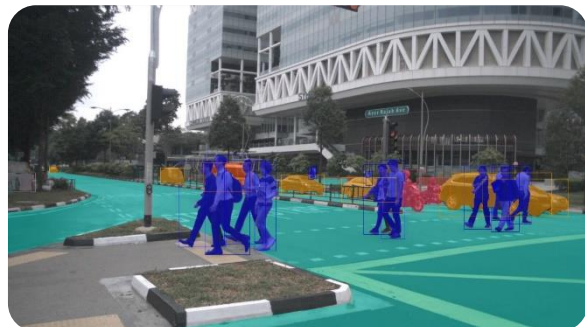# High-Level Fusion for Object Detection with Deep Neural Networks in Autonomous Driving Applications

Successfully mastering the autonomous driving task depends highly on an accurate representation and understanding of the environment. To achieve such a detailed knowledge of the surrounding, current object detection algorithms use not just camera but also lidar or radar data. However, utilizing the advantages of different sensor modalities without the loss of redundancy is a challenging task, which should be tackled by the development of a high-level fusion approach for camera, lidar and radar data.

The objective of this thesis is the development of a high-level fusion approach to combine the object detections of multiple different neural networks. The fusion network should improve the overall detection quality (especially in severe environmental conditions), while maintaining the independency of the individual detection pipelines. The goal is the development of an improved object detection trough sensor fusion and the integration in a real-world autonomous vehicle.

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The first step of this project consists of a literature research on the current stat of the art in object detection and sensor fusion. In the second step, a pipeline should be implemented to feed the outputs of multiple different object detection algorithms to the fusion module. In the next step, a high-level fusion network should be developed which improves the detection quality while preserving the independency of the detection pipelines. Finally, the results of the work should be compared to the current state of the art and validated on a real-world autonomous vehicle.

Work packages

- Literature research on high-level fusion
- Injection of the objects lists into the fusion network
- Development of a high-level fusion network for object detection
- Comparison of the results to the current state of the art
- Validation and deduction of an outlook on future improvements

Requirements

- Programming experience in Python
- Involved working attitude
- Ideally experience with Docker
- Ideally experience in machine learning

The thesis can be written in German or English language. Should you be interested in this project or any other project in the context of autonomous driving, send a CV and transcript of records to:

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