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Camera-Radar Fusion with Transformer Neural Networks for Object Detection in Autonomous Driving Applications

Successfully mastering the autonomous driving task depends highly on an accurate representation and understanding of the environment. To achieve a detailed knowledge of the surroundings, current object detection algorithms use not just cameras but also lidar or radar data. However, utilizing the advantages of different sensor modalities without losing information is a challenging task that should be tackled by the development of a transformer model for camera-radar fusion.
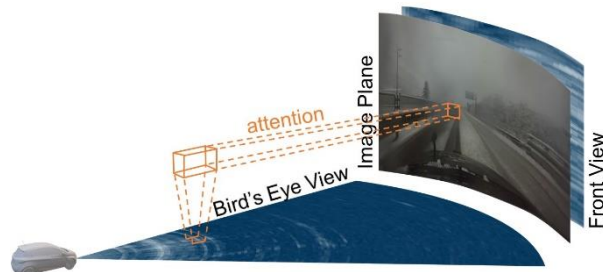
The objective of this thesis is the development of a transformer-based sensor fusion approach for object detection. The fusion network should improve the overall detection quality (especially in severe environmental conditions), without losing sensor information or a significant increase in calculation time. The goal is the development of improved object detection through sensor fusion and validation on real-world driving data.

The first step of this project consists of literature research on the current state of the art in object detection and sensor fusion. In the second step, a pipeline should be implemented to fuse the data of multiple different sensor modalities. In the next step, a sensor fusion network should be developed, which improves the detection quality and preserves the sensor information. Finally, the results of the work should be compared to the current state of the art and validated on real-world driving data.

Work packages

- Literature research on camera-radar sensor fusion
- Development of a transformer-based sensor fusion concept
- Implementation of a 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

- Enthusiastic about deep neural networks
- Excited about Python programming
- Involved working attitude

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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