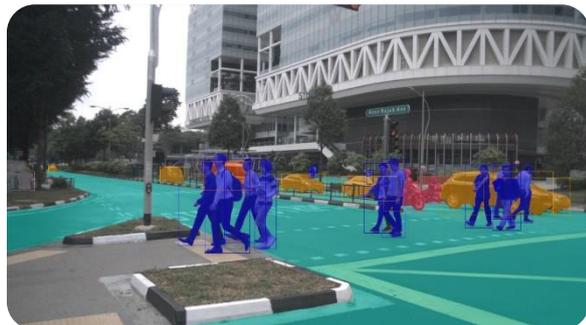


Graph Neural Networks for Point-Cloud-Based Object Detection in Autonomous Driving

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, processing point cloud data is challenging due to its sparse, unordered data structure with a variable number of points and its high dimensionality. Therefore, specialized network structures are used to process this kind of data.

The objective of this thesis is the implementation of a graph neural network for object detection on automotive radar data. The model should be built upon the current state of the art and extend the idea of graph neural networks to the radar domain. The utilization of graph neural networks enables the application of convolution operations on unordered data structures and brings the potential of object detection neural networks from the image to the point cloud domain.



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The first step of this project consists of a literature research on the current state of the art in graph neural networks and object detection on radar point cloud data. In the second step, the radar point cloud data should be transformed into a graph data structure. In the next step, a graph neural network should be built upon the current state of the art and applied to the generated graph to detect objects within the radar data. Finally, the results of the network architecture should be compared to the current state of the art and an outlook on future network architectures should be given.

Work packages

- Literature research on graph neural networks
- Transformation of the radar point clouds into a graph structure
- Implementation of a graph neural network for object detection
- Comparison of the results to the current state of the art
- Deduction of an outlook on future improvements on the network architecture

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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