

Forschungspraxis

Failure Prediction for LIDAR-Based Semantic Segmentation

LIDAR sensors allow to capture a scene in 3D while being more robust than cameras to distortions like rain. They are therefore an important part of autonomous driving, where they can be used for semantic segmentation of the environment. For this, each point in the 3D point cloud is classified as belonging to a semantic class such as "car", "pedestrian" or "road". In a safety-critical application such as driving, knowing when such a classification can be trusted or not is important. To this end, failure prediction methods such as introspection [1] can be used to predict where the segmentation failed.

In this internship, a state-of-the-art neural network such as [2] will be implemented to perform semantic segmentation of LIDAR point clouds. After implementing the semantic segmentation, a state-of-the-art failure prediction approach will be implemented to detect incorrect classifications. The evaluation will be done using the CARLA driving simulator [3]. A reference implementation based on camera input for both semantic segmentation and failure prediction is available for a comparison.

References:

[1] "Introspective Failure Prediction for Semantic Image Segmentation", Kuhn et al., IEEE ITSC 2020

[2] "RangeNet++: Fast and accurate LiDAR semantic segmentation", Milioto et al., IEEE IROS 2019

[3] <https://carla.org/>

Prerequisites

Basic knowledge of Machine Learning, Python and Linux

Advisors

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