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LIDAR Point Cloud Processing for Rigid Body Motion Estimation of Naval Platforms and Object Detections.

ABSTRACT - Masterthesis

The goal of this master's thesis is the 3D objection detection in point clouds from Li-DAR sensors and subsequently the rigid body motion estimation of navel platforms. A lot of research was done on object detection in images, but very few researches have focused on 3D object detection in point clouds.

In this thesis, the 3D object detection is realized with a convolutional neural network in TensorFlow 2. The KITTI dataset was used for the training and testing of the network structure. This dataset provides different recorded traffic scenarios in the form of points clouds from a LiDAR sensor and corresponding camera images. Because the raw point cloud data is not compatible with an ordinary network structure, a customized input data pipeline is deployed for the task.

The neural network was trained to detect only cars on the preprocessed KITTI dataset, because their frequent occurrence sped up the learning to a large degree. After the training process, the network was able to make quite accurate predictions on unseen test data. Cars in the vicinity of the LiDAR sensor were detected with a high probability and framed with a bounding box.