





Out-of-Distribution Detection in 3D Semantic Segmentation

Master Thesis

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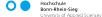
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1. Introduction

2. Methodology

3. Experiments & Results







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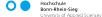






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Experiments & Results









Lessons Learned

Learning's during the duration of the thesis are

- 1. Training and evaluation of 3D DNNs are time consuming and resource intensive.
- 2. Finding the proper prior for Flipout layers is hard and currently we use brute force to find the best fitting prior.
- 3. OOD benchmarking require in depth analysis of datasets like studying the structural similarties in the datasets and also color spectrum.
- LiDAR datasets have large memory requirements especially for the preprocessing and metric computation.
- Getting 100% OOD detection performance is not possible with the post-hoc methods used as some points in the ID dataset also have low probability scores.













Future Work

This thesis can be extended in the following ways.

- 1. This thesis is limited to only point based models, this can be extended to graph and projection based models.
- 2. The datasets involved are only static datasets and this thesis study can be further extended to other type of datasets such as synthetic and sequential datasets.
- 3. Since this thesis utilzes post-hoc threshold methods for OOD detection. Other methods such as Mahalanobis distance based OOD detection [1] or MetaSeg [2] can be added as an extension to this thesis.





References



Kimin Lee, Kibok Lee, Honglak Lee, and Jinwoo Shin.

A simple unified framework for detecting out-of-distribution samples and adversarial attacks.

Advances in neural information processing systems, 31, 2018.



Philipp Oberdiek, Matthias Rottmann, and Gernot A. Fink. Detection and retrieval of out-of-distribution objects in semantic segmentation. In IEEE/CVF Conference on Computer Vision and Pattern Recognition, CVPR Workshops, pages 1331–1340, Computer Vision Foundation / IEEE, 2020,







