Introduction

The development of Deep Neural Networks (DNNs) made tasks such as object classification [**?**] and object detectio

TThe DNNs utilized in the perception module need to be trained on the dataset, which should be similar to its dep

Figure **??** and Figure **??** depicts the misdetections from the Tesla autonomous driving system. The problem in the

OOD/Anomaly/Distributional shift [h!] 0.333 [height=0.15width=0.95]images/intro$_o$od$_a$nomaly/old$_s$hip.jpg 0.333

Let us time travel back to 18^{th} century and assume that we had implemented a DNN model to detect ships, the da

An anomaly can be defined as the patterns that do not conform to the expected training behaviour as proposed in

The input for out of distribution (OOD) is drawn from an unknown distribution of unknown data, which is not nea

Problem Statement In this thesis, we study the application of out-of-distribution (OOD) detection over the 3D sem

The other major issue we address in this thesis is the OOD detection methods. Existing OOD detection methods a

The research questions answered by this thesis are:

R1 How to create a benchmark over 3D segmentation datasets for the OOD setting?, i.e., create the in-distribution and out

R2 How to extend current OOD detection methods from 2D classification task to 3D semantic segmentation?

R3 Is uncertainty quantification an effective approach to classify OOD detection in 3D semantic segmentation models?

R4 How to evaluate the OOD detections over the 3D semantic segmentation task?

Contributions The contributions made in this thesis are

A complete survey on the available 3D LiDAR datasets

A detailed survey on existing 3D semantic segmentation models

Benchmarking of 3D LiDAR datasets for OOD detection. Proposed two benchmark datasets Sematic3D vs S3DIS and S

A survey on the uncertainty estimation methods and classical OOD methods.

An evaluation of OOD on benchmarked datasets over RandLA-Net model using Deep ensemble technique for uncertaint

To summarize this chapter, we discussed the motivation behind the problem of OOD detection like how errors in pe