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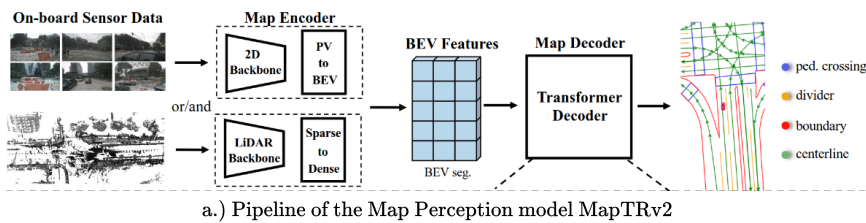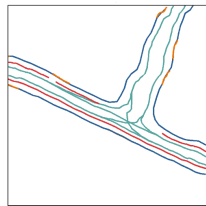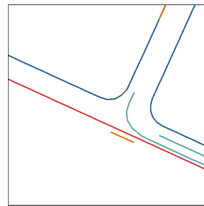**Bachelor Thesis / Master Thesis**

a.) Pipeline of the Map Perception model MapTRv2
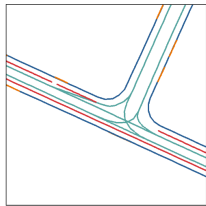
b.) Map example   c.) Inaccurate labeled map   d.) Missing map elements

Deep Learning + Software Engineering: Effect of noisy map labels on the map perception task

Current state-of-the-art map construction methods such as MapTRv2 use sensor data (360° surround view camera setup and LiDAR) to construct high definition maps. These methods extract features from the sensor data and transform them into a Bird's Eye View (BEV) representation and derive maps in polyline representation using transformer-based architectures. However, the construction of high quality maps requires accurate labels, but due to road construction or human error in labeling, the quality can not always guaranteed.

The goal of this thesis is to investigate the effect of map label noise on the performance of map construction models. Therefore, different types of map label noise should be implemented in the label generation process of the dataset Argoverse 2[1]. Afterwards the map construction model MapTRv2 should be trained with noisy labels and the performance evaluated on a validation dataset without map label noise.

The proposed thesis consists of the following parts:

+ Literature research about Map errors, the AV2 map format and Map perception
+ Implementation of different noises in the mal label generation process (e.g. Gaussian noise, Perlin noise, Missing labels, etc.)
+ Training of MapTRv2 with the different noise types
+ Evaluation of the effect of the different noise types on the map perception

I am happy to answer any questions you might have. Feel free to ask for an appointment or directly ask at my office!

Literature

1. Bencheng Liao et al., MapTRv2: An End-to-End Framework for Online Vectorized HD Map Construction, `https://arxiv.org/abs/2308.05736`

2. Samuel M. Bateman et al., Exploring Real World Map Change Generalization of Prior-Informed HD Map Prediction Models, `https://arxiv.org/abs/2406.01961`

[1]Argoverse 2: `https://www.argoverse.org/av2.html`

Institute of Measurement and Control Systems (MRT)
Prof. Dr.-Ing. Christoph Stiller

Advisor:
Jonas Merkert, M.Sc.

Programming language(s)[1]:
Python   advanced

System, Framework(s):
Linux, PyTorch

Required skills:
- Experience with Neural Networks in Deep Learning context
- Experience with PyTorch, NumPy and Matplotlib
- Motivation and independent work style with the interest learning new things

What we offer:
- Work with state-of-the-art methods and cutting-edge research
- Access to large GPU servers and HPC clusters
- Supervision by experienced researchers in Deep Learning

Language(s):
German, English

A (partially) successful thesis may lead to a joint **international conference publication** of the scientific work

For more information please contact:

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Or directly send in your application including your current grades as well as our questionnaire!