

Domain Adaptation of Synthetic Data for 3D Traffic Environment Perception

Background

As part of the research project Providentia++ funded by the federal ministry of transport and digital infrastructure under the initiative “Digital Test Beds for Autonomous Driving”, a group has come up to conduct research in the field of intelligent transportation systems, and to come up with solutions and recommendations for improving traffic safety, efficiency and comfort. Within the framework of this project, an existing infrastructure for real-time localization of traffic participants on the Highway A9 will be extended from the highway into an adjacent urban environment. Project video is available on: <https://youtu.be/4oCnQlGFuc4>.

Description

Labeling real data in autonomous driving for 3D perception is costly, while leveraging synthetic data has emerged as a promising approach. The objective of the work is to utilize generated synthetic data to develop domain adaptation algorithms specified for 3D traffic environment perception. Multiple research topics are available, including but not limited to:

- **Monocular 3D Object Detection**
- **Sim2Real Domain Adaptation**
- **Semantic Image Synthesis for Traffic Environment**
- **Data-Driven Algorithm Performance Optimization**

Your Tasks

- Explore perception algorithms, domain adaptation methods and relevant machine learning topics via literature research
- Development of algorithms for specific problems
- Algorithm evaluation with synthetic and real data

Requirements

- Strong interest in computer vision, and autonomous driving
- Experience with deep learning frameworks (**Tensorflow**, **PyTorch**, etc.)
- Good knowledge of at least one programming language (ideally **Python**)

Supervisor: Prof. Alois Knoll
Contact: M.Sc. Xingcheng Zhou
xingcheng.zhou@tum.de

Technical University of Munich
Faculty of Informatics, Chair of Robotics,
Artificial Intelligence and Real-time Systems