

Benchmarking Anomaly Detection on Camera and Lidar Data with 3D Voxel Representation

Bachelor / Master Thesis

The scope is designed for a Master Thesis.
For a Bachelor Thesis, we can customize it.

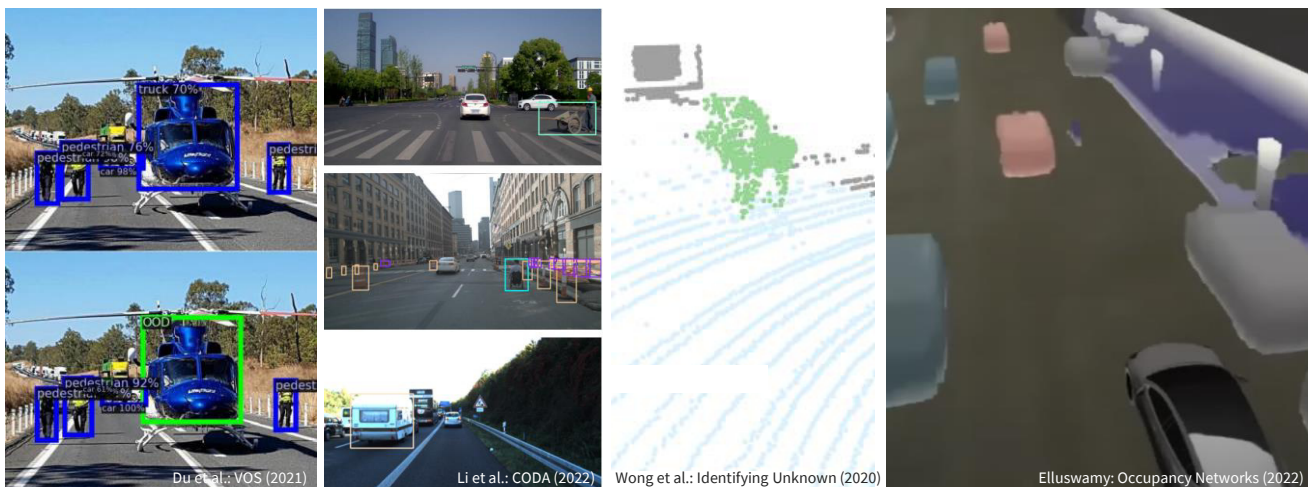
Autonomous Driving

Deep Learning

Perception

Simulation

We don't have autonomous vehicles around us yet because they're not very good at dealing with the many, crazy things we see on the roads of the world. Therefore, anomaly detection is particularly important to detect the unknown and deal with it. In this thesis you will work with a set of state-of-the-art anomaly detection methods, map anomaly scores onto a 3D voxel state and evaluate the results.



The Topic

- You will implement a set of state-of-the-art anomaly detection methods, such as reconstruction errors, ensembles or Monte Carlo Dropout. Based on a detailed analysis, you will make the selection of the methods to be considered.
- You will use environments and virtual sensor data from the CARLA simulation engine
- The results of the methods, which are either in camera or in lidar space, will be mapped onto a common 3D voxel representation
- You will compare the methods and evaluate them based on a set of scenarios, which you will choose and design

Your Skills

- You study Computer Science or a related course of study
- You are deeply interested in topics such as Autonomous Driving, Robotics, Deep Learning or Computer Vision
- You are able to read and write scientific texts in English
- You are fluid in Python, first experiences with PyTorch
- You show an above-average degree of initiative and commitment as well as a thorough way of working

What We and I Offer

- You get exciting insights into our research and gain valuable practical experience
- We use the latest hardware and software. Together with us you work in first-class laboratories (on-site or remotely)
- Regular and extensive support: Weekly 1:1 meetings, bi-weekly student group meetings, monthly 1:1 strategy meetings
- Collaboration with other students to get tips, learn together, and fix issues quickly
- High-quality theses will be published on KITopen, with the code on GitHub
- We aim to publish this work in an IEEE paper with shared first authorship

Application

- Start: Immediately
- Shoot me an e-mail at daniel.bogdoll@kit.edu with your CV, grades, and a few sentences why you are interested. No cover letter necessary 😊