Institute of Automative Technology
TUM School of Engineering and Design
Technical Univercity of Munich

Bachelor-/Semester-/Master-Thesis

A Realistic Synthetic Dataset for Shared Mobility Anomaly Detection: Balancing Fidelity and Utility for Research Applications

Background

Reliable anomaly detection in shared mobility requires high-quality data, yet real-world datasets often lack sufficient labeled anomalies, exhibit biases, and raise privacy concerns. To address these limitations, this thesis focuses on creating a realistic synthetic dataset, enabling controlled generation of diverse anomalies and ensuring a comprehensive representation of potential system disruptions. A key advantage of synthetic data is the provision of a clear ground truth, facilitating rigorous evaluation and comparison of anomaly detection algorithms. By balancing data fidelity with practical utility, this research aims to produce a valuable resource for developing more effective and resilient shared mobility systems.

Your Role

- Scenario Design and Development: Develop a diverse set of realistic anomaly scenarios within the shared mobility system. These scenarios should consider different types of anomalies.
- Simulator implementation: Implement the designed scenarios within the existing simulator.
- Data Generation: Run the simulator for each implemented scenario to generate synthetic datasets containing both normal and anomalous events.
- Ground Truth Labeling: Create a clear and accurate ground truth for each generated dataset, labeling each event as either normal or anomalous. The ground truth should be based on the scenario design and implementation, ensuring that the anomalies are correctly identified.

What should you bring along?

- Strong interest and motivation in mobility data science
- Initiative & independent way of working
- Basic programming skills (Python)

Language

English/German

The thesis should document the individual work steps in a clear form. The candidate undertakes to complete the term paper independently and to indicate the scientific aids used.

The submitted work remains the property of the chair as an examination document

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Ausgabe:_____

Abgabe: _____