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

Bachelor-/Semester-/Master-Thesis

Spatio-Temporal Anomaly Detection in Shared Mobility: A Comparative Analysis of Algorithms on Real-World Data

Background

In this thesis you will contribute to understanding the human mobility patterns derived from shared mobility usage. Detecting anomalies in shared mobility systems is crucial for ensuring operational efficiency, security, and overall system reliability. Anomalies, defined as deviations from expected patterns in location, time, or user behavior, can indicate a range of issues, from fraudulent activities and system malfunctions to unexpected surges in demand or unusual events impacting service availability. By identifying these anomalies, shared mobility operators can proactively address potential problems, optimize resource allocation, improve user experience, and enhance the safety and security of the system.

Your Role

- Literature research: Review of anomaly detection techniques in time series data.
- Algorithms implementation: Implement a selection of anomaly detection algorithms, potentially including statistical methods and machine learning algorithms.
- Anomaly detection and visualization: Apply the implemented algorithms to the preprocessed datasets to identify anomalies. Visualize the detected anomalies using appropriate methods (e.g., maps, time series plots) to understand their characteristics and patterns.
- Performance evaluation: Evaluate the performance of each anomaly detection algorithm using relevant metrics. Compare the results and identify the strengths and weaknesses of each approach in the context of shared mobility data.

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

Prof. Dr.-Ing. M. Lienkamp

Supervisor: Svetlana Zubareva, M. Sc.

Ausgabe:_____

Abgabe: _____