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

Bachelor-/Semester-/Master-Thesis

Classification of Anomalies in Shared Mobility: Linking Causes and Types

Background

In shared mobility systems (cars, bikes, e-scooters), anomalies represent unusual deviations from expected demand and usage patterns. While anomaly detection identifies when and where such irregularities occur, classification provides the crucial next step: understanding what type of anomaly it is and why it happened. Possible causes include external events (weather, concerts, strikes), operational disruptions (vehicle stockouts, rebalancing issues), or structural shifts (policy changes, long-term demand trends). A robust anomaly classification framework allows operators not only to detect but also to interpret anomalies, supporting pro-active decision-making and revenue optimization.

Your Role

- Literature research: Review of anomaly classification methods in time series, mobility, and related domains.
- Taxonomy development: Define relevant classes of anomalies (e.g., point vs. collective, short-term vs. long-term, event-driven vs. structural).
- Data enrichment: Integrate external datasets (e.g., weather, event calendars, strike reports) to support classification.
- Model implementation: Apply and evaluate algorithms for anomaly classification (statistical, machine learning, or causal methods).
- Evaluation & visualization: Validate classification results on real-world shared mobility data from Munich and present findings in intuitive visualizations (maps, timelines, dashboards).

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: _____