Professorship of Remote Sensing Applications
TUM School of Engineering and Design
Technische Universität München

Master Thesis

Topographic Change Classification from Multi-Temporal Point Clouds

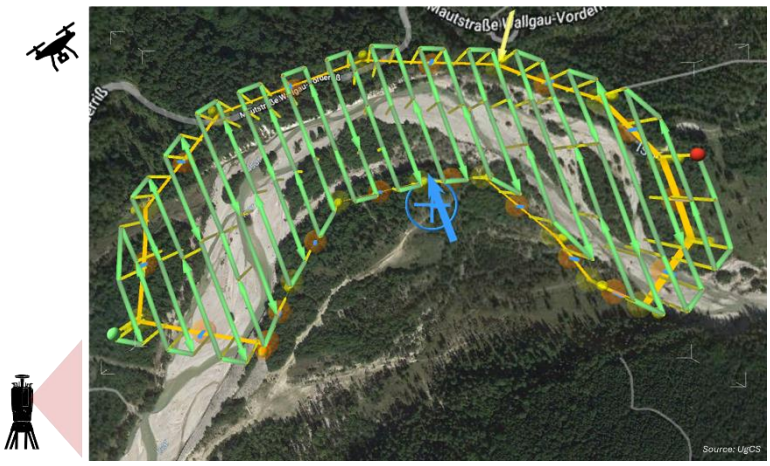

Figure 1. Data acquisition at Isar river.

Topographic change information is crucial for a variety of geospatial applications, including environmental monitoring, urban planning, and diaster management. Current advancement in LiDAR and photogrammetry technologies have made it possible to acquire high-resolution point clouds over large areas and across different time periods. Multi-temporal point clouds consist of 3D coordinates of a scene's surface at different times and thereby offer a detailed and accurate dataset with great potential for detection and classification of topographic changes over time. However, effectively detecting and classifying topographic changes from these vast datasets present significant challenges due to the complexity of the data and the need for generalizing methods.

The objective of this thesis is to develop and validate machine learning-based methods for detecting and classifying topographic changes from multi-temporal point clouds. Depending on the timeframe, we highly encourage students participating in our fieldwork for data acquisition and processing at Isar river with different sensors (e.g., UAV photogrammetry, Terrestrial Laser Scanning).

Learning outcomes of this thesis:

- Gain a comprehensive understanding of multi-temporal point clouds and data processing pipelines.
- Learn and apply deep learning techniques for 3D change analysis, to develop either supervised or unsupervised methods for detecting and classifying topographic changes.
- Strengthen research skills in analyzing complex data, presenting research findings, and writing scientific outputs.

The student requires experience with remote sensing data and analysis methods, equipped with basic programming skills (e.g., Python). Knowledge of machine learning methods is an asset. Motivation to work on deep learning and novel point cloud processing methods in programming environments is necessary.

Location: TUM Professorship of Remote Sensing Applications

Supervision: M.Sc. Jiapan Wang

Contact: jiapan.wang@tum.de