Graz University of Technology

Graz University of Technology
Institute for Rock Mechanics and Tunnelling

Master Thesis (MA, 30 ECTS)

Finding Structure in Data - Analysis of TBM advance data

Description

Modern tunnel boring machines continuously record a variety of parameters. By treating the mechanized tunneldrive as one major exploratory drilling, the recorded data is seen as a function of the encountered geology.

This thesis is looking into TBM data from a section of the exploratory tunnel “Ahrental – Pfons”, a part of the Brenner Base Tunnel project. The considered sequence of TBM data comprises the transition from the “Innsbrucker Quarzphyllite” to the “lower- /upper Schieferhülle” (two major geological units). The transition is not only characterized by the change in lithology but also by faults and folds / changes in the orientation of geological structures.

The goal of the thesis is to explore how this heterogeneous geology is reflected within the TBM data. Additional data sources that are to be used are exploration drillings from within the TBM and the geological documentation. A focus will be to figure out if there are patterns within the data that correlate with certain geological features.

Methodology

The methods will focus on statistically analyzing and visualizing the TBM data (data distribution and modes of individual features, correlation analysis, scatter-, line-, histogram plots…). This analysis is to be done for the whole dataset and for different geotechnically relevant sections of the tunnel.

Due to the big amount of data, the analysis will require skills beyond MS Excel. Prior programming skills (Python) are recommended but can also be acquired during the thesis (additional efforts for this shall be considered).

Workflow

1. (acquiring necessary programming skills (Python))
2. Literature research (focus on the regional geology, statistics, prior works with TBM data)
3. Statistical analysis and visualization of data with focus on different geological units
4. Interpretation

Start: by appointment

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