Graz University of Technology
Institute for Rock Mechanics and Tunnelling

Master Thesis (MA, 30 ECTS)

Application of Artificial Neural Networks for

prediction of high resolution landslide monitoring data

Description

During the past decade, several applications of Artificial Intelligence (AI) for complex tasks in general, and geotechnical problems in particular have shown unprecedented success. Fueled by the easy availability of big datasets and computational power, the current "AI-hype" is to a great extent based on Artificial Neural Networks (ANN) who are able to model complex, nonlinear functions by dynamically adjusting their internal parameters.

This thesis' goal is to apply ANNs to analyze and predict the behavior of an active landslide in the proximity of a pumped storage power plant. This landslide represents a highly complex, dynamic system driven by gravitation, water level changes and precipitation. Because of the possibility of a sudden failure and the resulting flood wave, landslides like this are usually under constant observation to detect failure as soon as possible.

Following a finished PhD thesis, this study deals with several high-resolution datasets: chain inclinometer data, geodetic measurement points, pore water pressure gauges, reservoir water level monitoring data, precipitation data. The big quantity of the data makes it well suited for the deployment of ANNs who have shown their best performance on huge datasets.

Workflow:

1. Literature research (landslides, AI, preexisting similar applications of ANNs)
2. Acquiring a profound understanding of Machine Learning / Artificial Intelligence
3. Deploying AI-techniques on the problem
4. Evaluation and interpretation of the results

Python programming skills are mandatory to commence this thesis.

The study will be done in close cooperation with the Institute of Soil Mechanics and Foundation Engineering.

Start: April 2019

Duration: ca. 6months

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