



Technische Universität München



Faculty of Civil, Geo and
Environmental Engineering

Chair of Hydrology and
River Basin Management

Master Thesis – Environmental Engineering

Workload: 30 ECTS, 900 hours

Topic: Peak hydrological event simulation with deep learning algorithm

Study Objective:

In 2016, several severe flash floods events struck in southern part of Germany. The worst hit area was Simbach in the district of Rottal-In, Bavaria, where it caused huge damages of properties and at least 5 people were died. After this catastrophic flash flood event, the catchment of Simbach gained much importance for further analysis to better understand the event and its processes. Hydrological modelling of such kind of extreme events is a challenging task. It has been observed from some previous studies that conceptual hydrological models showed some limitations to capture the peaks of the flash flood event. The goal of this study is to reproduce the peaks of hydrological events of different magnitude through a deep learning model and compare its performance with a conceptual hydrological model.

Task:

In this study, we will apply a deep learning (DL) algorithm, e.g., LSTM, to reproduce 7 different size of peak flow events including big flash flood event of June 2016 in Simbach, Germany. The predictors of LSTM model are meteorological data. The DL model performance will be compared with the conceptual hydrological model HBV results. HBV model has been set up, calibrated, and validated for all the events in a previous study. The hypothesis is that DL model overperforms the conceptual hydrological model in terms of flood simulation, especially for large events.

The essential data for building the DL model are already well prepared for this project. Programming experience with Python from the candidate is required.

Time:

Since 1.2022

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