MASTER THESIS

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Machine learning with application to weather forecast

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Background and objectives

Forecasting weather conditions such as precipitation is important for hydropower operation and flood management. Mechanistic meteorology prediction based on Navier Stokes equation (3D CFD) is extremely demanding w.r.t. computing power: generating a 14 day weather forecast can easily take 12 hours on super computers.

Today, a large amount of weather data (temperature, pressure, humidity, precipitation) is readily available, e.g., from the Norwegian Meteorological Institute (MET), from Netatmo weather stations, etc. An interesting question is whether a large amount of data in combination with machine learning can give decent forecasting quality with low computational power.

In this thesis, Python APIs are developed for reading public weather data. A deep neural network model is built and trained to predict the weather in Porsgrunn based on data from carefully chosen geographic locations throughout Eastern Norway and beyond.

Scenarios to investigate

- Assuming a correlation between recent past and near future weather conditions, thus predicting the weather at a single location using the model and historical data at point of interest
- Predict the future weather at point of interest using real time data at geographical points in the region surrounding the point of interest.