

Windsurf Alert

A machine learning based alerting system for the water sports community at Walensee.

Graduate



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Definition of Task:

The aim of the work was to develop a web application so that wind surfers can configure their personal notification service for the Walensee. For this purpose, existing weather models were evaluated and own models were developed to predict wind gusts in the next three hours.

Approach:

The developed models were trained on data from weather stations from the last 2 years within a radius of 50 km around the Walensee. Other important features such as the well-known Föhn or Bisen charts have been integrated.

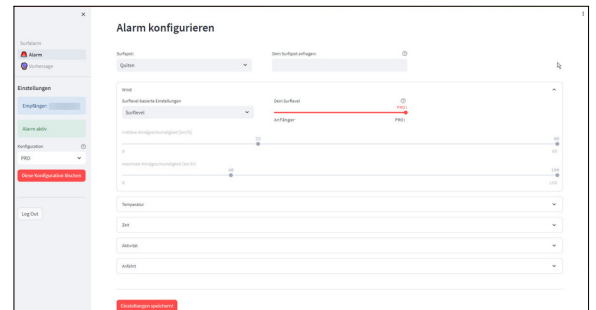
For the preprocessing of the data, feature selection, the fitting of different learners and their hyperparameter optimisation, a machine learning pipeline was developed in Python.

Result:

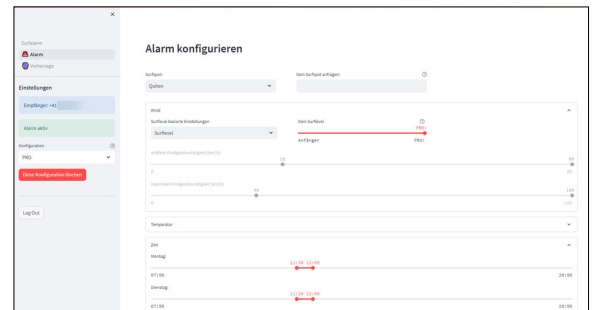
The developed models can predict wind gusts in Quinten over a forecast horizon of 3 hours better than ARIMA or SWISS1K, which have been evaluated to be the best numerical weather models for this task. The errors of the developed models are around 6 km/h (MAE), respectively 9 km/h (RMSE). Complex Neural Networks such as LSTM or AR-LSTM could hardly achieve significant improvements on the existing data.

With an interactive web application, actual forecasts can be viewed and personal alarms can be configured. The verification and sending of alerts is done via Telegram. Latest weather data are loaded through the API of Meteomatics AG. New forecasts are updated every 10 minutes.

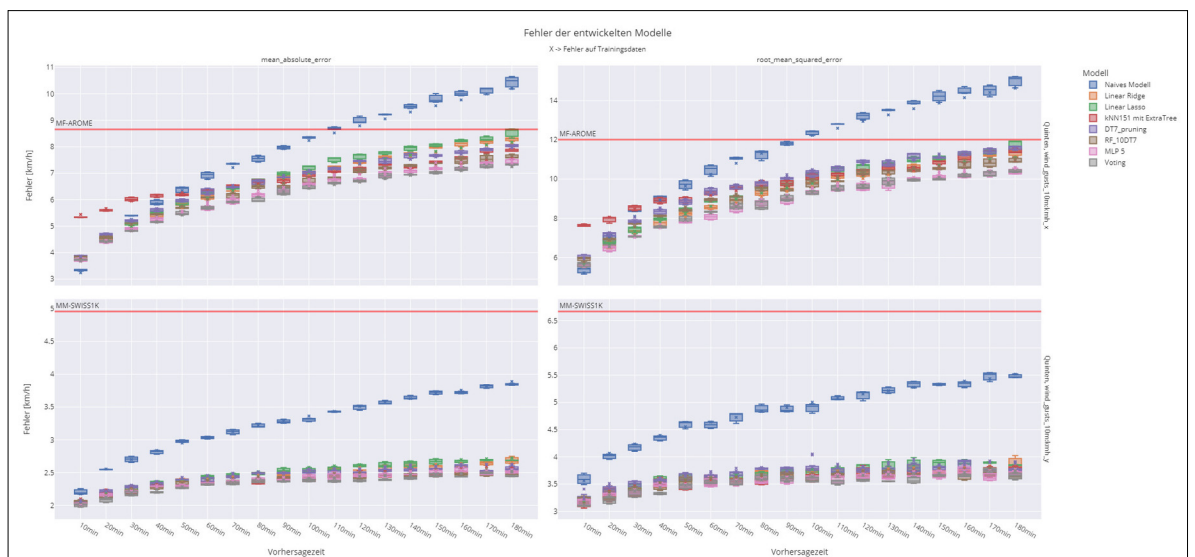
Via a web application, alerting services with the preferred surfing conditions can be configured...
Own presentation



...current predictions of the developed models can be retrieved.
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The models developed are better than the best numerical weather models ARIMA or SWISS1K.
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Subject Area
Computational Engineering

Project Partner
Institute for Computational Engineering ICE