

Meteopress spol. s r.o. / weather prediction

Overview

Meteopress spol. s r.o., a meteorological company offering complete, high-quality dual-polarization radars for weather forecasting and artificial intelligence tools for [extending nowcasting capabilities](#).

Datalab, a data science lab at the Faculty of Information Technology, improves artificial intelligence methods and uses them for data processing, modeling, and reporting. Meteopress and Data Lab jointly developed an efficient

system that, based on current meteorological data, can predict radar precipitation images with high accuracy for the following hour. This is used in predicting storms, flash floods, and other extreme weather fluctuations.



Keywords

**weather
next-frame prediction
physics-informed machine learning**

Situation

Meteopress needs to optimize weather prediction calculations because the calculations themselves are very demanding and require a huge amount of computing power. Another issue is the time it takes to calculate, which means that the forecast is not based on the latest data.

Predicting sudden meteorological events is problematic, as we have to quickly respond to changing situations, meaning models and predictions must function quickly and adaptively.

Solution

Datalab applied new methods based on advanced spatiotemporal neural networks (deep learning methods) for precipitation nowcasting, i.e., very short-term forecasts (2 hours). High-resolution radar images (1km x 1km) were used, where accurate precipitation was predicted.

For longer-term weather forecasts, Datalab and Meteopress combined various data sources (radar, satellite images, numerical forecasts) and again applied advanced machine learning methods such as deep learning.

Requirements

Speed up and improve the accuracy of weather prediction (up to 24 hours in advance)

Reduce computational requirements by optimizing existing models and methods.

Simplify the means of obtaining meteorological data using artificial intelligence and smart pre-processing of the system.

Benefits and Results

Meteopress has acquired an efficient system that can accurately predict radar precipitation images for the next hour based on current meteorological data. This is used in predicting storms, flash floods, and other extreme weather fluctuations.

The results from Datalab's research prototypes were transformed by the Meteopress team into a product that runs in real-time on real data. Predictions from radar precipitation can be observed [here](#).

- Datalab's research resulted in a 37% improvement in the accuracy of precipitation nowcasting and a 26% improvement in 24-hours prediction. In the case of temperature and wind gust prediction, the error rate decreased by up to 32%.
- Some research results will be published in prestigious academic journals. The team also won the Weather4cast competition at one of the best AI conferences, Neurips 2022.
- Part of the project also involved designing the integration of various data sources for longer-term weather prediction (radar, satellite, numerical forecast), which will be used in future joint research projects.