Internet Technologies and Systems
PD. Dr. Haojin Yang
Multimedia and Machine Learning Research Group
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Hasso Plattner Institut
Digital Engineering · Universität Potsdam

Predicting Extreme Weather Events

Background

Weather forecasting and the prediction of extreme weather events require enormous amounts of data and computing resources. Traditional weather forecasting models rely on numerical simulation with complex physical models. For example, the ICON (Icosahedral Nonhydrostatic) model used by the German Weather Service (DWD) requires one hour on DWD's supercomputer for a 7-day forecast, which requires about as much electricity as one average person per year in Germany.

With the proliferation of earth observation satellites over the last decade, the amount of data has increased dramatically. The need for efficient data processing and the success of deep learning (DL) in recent years leads to the application of deep learning.

Challenge

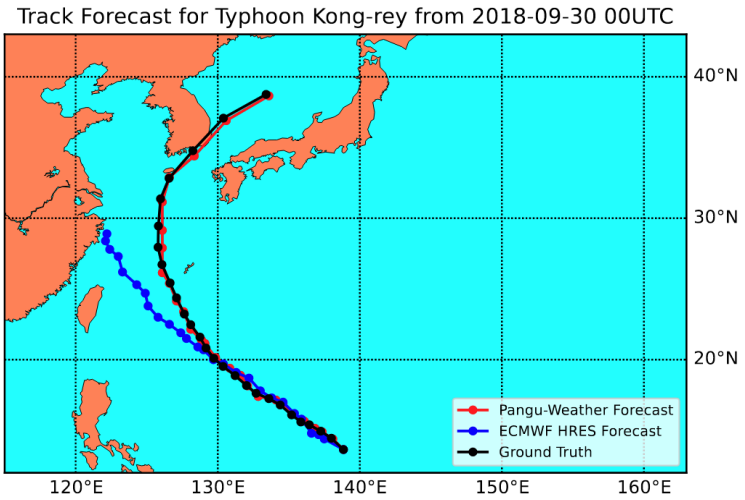
Weather models are both expensive in computation and demanding on domain expertise. DL as a data-driven method can address both difficulties and has demonstrated impressive potential for various Earth system forecasting tasks.

The amount of data and the nature of the different parameters makes it a challenge to choose the best parameters for the prediction of extreme weather events. Especially in the context of resource efficiency and limited available computational capacity.

Goal

The goal of this project is to apply deep neural networks on large-scale weather datasets to predict extreme weather events accurately and efficiently. For this, we are going to:

- Familiarize with the different large-scale weather datasets (ERA5, ClimateNet, …)
- Compare state-of-the-art approaches and select a basis
- Improve and streamline the selected approach
- Evaluate the prototype and present the results



Studiengänge

- IT-Systems Engineering
- Data Engineering
- Cybersecurity

Teaching team

Joseph Bethge, Gregor Nickel, Jona Otholt, PD Dr. Haojin Yang

Reference

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