

An Introduction of Various Deep Learning Studies for Weather Phenomena in the KISTI

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We will introduce one on-going study and four finished deep learning studies focused on weather phenomena in the KISTI since 2017.

A preliminary study for ground-based cloud classification study is on-going using transfer learning system with pre-trained deep learning model VGG16 and VGG19 and fine-tuning of modified CNN models is done for 6-type cloud dataset.

Weighted Broadcasting is a deep learning model trained with weather radar observation data using the encoding-forecasting structure for rainfall amount prediction. This model emphasizes the influence of the latest feature map of the observed data. Experimental results show that the proposed model exhibits superior performance in many aspects compared with the existing model.

DeepTC is a deep learning model trained with WRF model simulation data using ConvLSTM for typhoon track prediction. Experimental results demonstrate that the model is promising. The main reason is that ConvLSTM can easily learn spatial and temporal representations of the atmosphere simulated by WRF.

DeepRain is a deep learning model trained with weather radar observation data using ConvLSTM for rainfall amount prediction. For the experiment, radar reflectivity data were used for a two-year period whose input is in a time series format in units of 6 min divided into 15 records.

GlobeNet is a deep learning model trained with weather satellite imagery data using CNN for typhoon track prediction. A particular combination of activation between convolutional filters and dense layers provided the best results in the experiments (exponential linear unit & hyperbolic tangent). However, the model only focused on single-event typhoons in remote sensing images.

Key words: Weather Phenomena, Deep Learning, Cloud Classification, Precipitation Prediction, Typhoon Track