

Fundamental investigation about the inductive prediction of precipitation based on the time series data

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This work applied the artificial neural network (ANN) to observatory data and conducted a fundamental investigation about improving the prediction accuracy in precipitation. Especially, this work focused on the improvement of training data for the short-term prediction in precipitation.

The used data were precipitation, temperature, pressure, vapor pressure, wind speed, and wind direction with hourly interval edited by the Japan Meteorological Agency, and the ANN prediction model was constructed based on multilayer perceptron. Using these data and the ANN prediction model, this work tentatively predicted the time variation of hourly precipitation at Kumamoto, Japan. Then, through systematic changes of the training data, this work investigated how the accuracy of short-term prediction was improved. Especially, the contributions of each observation parameter and of increase of observatories were investigated. For the evaluation of prediction, this work employed the verification by comparing the peak values between prediction and observation and the appearance time of the peak that are both important for heavy rainfall prediction, and the sum of squared errors between predicted and real values.

This work found that setting the data to the west into the training data is effective for predicting Kumamoto's hourly precipitation. This work also found that the peak value in prediction was greatly improved from 30% to 80% by deleting the data at the time when no precipitation occurs in the training data. Then, the contribution of vapor pressure increases. We will continue to investigate how the precipitation prediction can be improved through the changes of parameters, observatories, and forecast lead times in the training data.

The results of this work will contribute to the construction of a simple precipitation prediction scheme at the location where sophisticated observation data can not be obtained.

Keywords: artificial neural network, prediction of hourly precipitation