

## Image-based rainfall prediction from a novel deep learning method

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### Abstract

Deep learning methods and their application have become an essential part of prediction and modeling in water-related research areas, including hydrological processes, climate change, etc. It is known that application of deep learning leads to high availability of data sources in hydrology, which shows its usefulness in analysis of precipitation, runoff, groundwater level, evapotranspiration, and so on. However, there is still a limitation on microclimate analysis and prediction with deep learning methods because of deficiency of gauge-based data and shortcomings of existing technologies.

In this study, a real-time rainfall prediction model was developed from a sky image data set with convolutional neural networks (CNNs). These daily image data were collected at Chung-Ang University and Korea University. For high accuracy of the proposed model, it considers data classification, image processing, ratio adjustment of no-rain data. Rainfall prediction data were compared with minutely rainfall data at rain gauge stations close to image sensors. It indicates that the proposed model could offer an interpolation of current rainfall observation system and have large potential to fill an observation gap. Information from small-scaled areas leads to advance in accurate weather forecasting and hydrological modeling at a micro scale.

**Keywords :** Rainfall prediction, Deep learning, CNN, Image processing

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