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A Deep Learning Approach to Radar-Based QPE

Abstract

Quantitative precipitation estimation (QPE) is a method of approximating the amount of rain that has fallen at a location or across a region. In most cases, weather service providers use radar signals to estimate the amount of precipitation through the formula describing the relationship between radar reflectivity and the size of raindrop particles, Z–R relationship. The state-of-the-art QPE methods with adjusted Z–R relation are robust and accurate in general. Yet, they consider only the radar signal at a given location, which represented a point-to-point framework.

This study proposes an alternative volumetric-to-point approach to estimate rainfall based on considering signals over a wider spatial area and longer time span. By using deep neural networks (CNN) to process large amounts of data. The model extracts spatial and temporal features from the input data volume and then relates these features to rainfall at a specific location. Compared to the QPE method based on Z-R relationship, this study uses machine learning algorithms to automatically detect the evolution and movement of weather systems and associate these patterns with locations with specific terrain properties.

Keyword

QPE (Quantitative Precipitation Estimate) Back propagation

Reference

Yo, T.-S., Su, S.-H., Chu, J.-L., Chang, C.-W., & Kuo, H.-C. (2021). A deep learning approach to radar-based QPE. *Earth and Space Science*, **8**, e2020EA001340. https://doi.org/10.1029/2020EA001340