Investigating the performance of different decomposition methods in rainfall prediction from LightGBM algorithm

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Abstract

This study investigates the roles of decomposition methods on high accuracy in daily rainfall prediction from light gradient boosting machine (LightGBM) algorithm. Here, empirical mode decomposition (EMD) and singular spectrum analysis (SSA) methods were considered to decompose and reconstruct input time series into trend terms, fluctuating terms, and noise components. The decomposed time series from EMD and SSA methods were used as input data for LightGBM algorithm in two hybrid models, including empirical mode-based light gradient boosting machine (EMDGBM) and singular spectrum analysis-based light gradient boosting machine (SSAGBM), respectively. A total of four parameters (i.e., temperature, humidity, wind speed, and rainfall) at a daily scale from 2003 to 2017 is used as input data for daily rainfall prediction. As results from statistical performance indicators, it indicates that the SSAGBM model shows a better performance than the EMDGBM model and the original LightGBM algorithm with no decomposition methods. It represents that the accuracy of LightGBM algorithm in rainfall prediction was improved with the SSA method when using multivariate dataset.

Keywords : Rainfall prediction, Decomposition method, LightGBM algorithm, Multivariate analysis

Acknowledgment

This study is supported by the National Research Foundation of Korea (NRF) grant funded by the Korea Government (MSIT) (2020R1G1A101362412).

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