

## Appropriate identification of optimum number of hidden states for identification of extreme rainfall using Hidden Markov Model: Case study in Colombo, Sri Lanka

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### Abstract

Application of Hidden Markov Model (HMM) to the hydrological time series would be an innovative way to identify extreme rainfall events in a series. Even though the optimum number of hidden states can be identify based on maximizing the log-likelihood or minimizing Bayesian information criterion. However, occasionally value for the log-likelihood keep increasing with the state which gives false identification of the optimum hidden state. Therefore, this study attempts to identify optimum number of hidden states for Colombo station, Sri Lanka as fundamental approach to identify frequency and percentage of extreme rainfall events for the station. Colombo station consisted of daily rainfall values between 1961 and 2015. The representative station is located at the wet zone of Sri Lanka where the major rainfall season falls on May to September. Therefore, HMM was ran for the season of May to September between 1961 and 2015. Results showed more or less similar log-likelihood which could be identified as maximum for states between 4 to 7. Therefore, measure of central tendency (i.e. mean, median, mode, standard deviation, variance and auto-correlation) for observed and simulated daily rainfall series was carried to each state to identify optimum state which could give statistically compatible results. Further, the method was applied for the second major rainfall season (i.e. October to February) for the same station as a comparison.

**핵심용어 : Hidden Markov chain Model, Extreme Rainfall, Sri Lanka**

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