MODELLING AND FORECASTING RAINFALL IN NUWARA-ELIYA DISTRICT, SRI LANKA: A TIME SERIES APPROACH

Sandarenu N. V. N. * and Alibuhtto M. C.

Department of Mathematical Sciences, Faculty of Applied Sciences, South Eastern University of Sri Lanka, Sammanthurai, Sri Lanka. *sandunisansala727@gmail.com

Rainfall is one of the most important climatic factors that directly influence agriculture. The Nuwara-Eliva district is famous for vegetable cultivation, and the success of this cultivation mainly depends on the rainfall pattern. Nowadays, rainfall prediction has become a challenging task because both the amount and pattern of rainfall are changing significantly at global and regional levels due to global warming and climate change. Therefore, vegetable farmers face many difficulties in their plantation activities. The objective of this study is to establish a suitable time series model to forecast monthly rainfall in the Nuwara-Eliya district using data from January 2010 to October 2023. ADF and KPSS tests were performed to examine the stationarity of the data series. Log transformation was applied to reduce the variability, and further analysis was carried out using the log transformed series. The Box-Jenkins approach was used to model 154 observations, while the remaining 12 observations were retained for model validation. Seasonality was identified through seasonal plots, and the Kruskal Wallis test and HEGY test were employed to test the stationarity of the seasonal component. The best model was selected based on the accuracy measures such as AIC, SC, R², and loglikelihood values. Based on the analysis, SARIMA (0,0,2) $(1,0,1)_{12}$ model was selected as the best model for forecasting monthly rainfall in Nuwara-Eliya. The MAPE value of the estimated model is 7.73%, which is less than 10%, indicating that the estimated model is more accurate and appropriate.

Keywords: Forecast, Nuwara Eliya District, Rainfall, SARIMA model, Time series analysis.