

Identify the Best model to Forecast the Monthly Rainfall in Jaffna District, Sri Lanka by Using Time Series Analysis

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Rainfall is an important component of the water cycle and is the main of giving fresh water to the earth. Also, rainfall is one of the most significant climatic elements that has a direct impact on agriculture. The Jaffna district is in the Dry Zone of Sri Lanka and the major source of water for agricultural production in the district is rainfall which receives mainly during October to December. However, in real-world practice, rainfall data have a seasonal pattern with short-term and long-term fluctuations; and therefore, forecasting monthly rainfall is important for making decisions in daily human activities and agriculture. The main purpose of this study was to find a suitable Seasonal Auto Regression Integrated Moving Average (SARIMA) model to the monthly rainfall data of the Jaffna district. In this study, the monthly rainfall of the Jaffna district is modelled by Box-Jenkins' time series approach. The 228 monthly rainfall data were gathered from the Department of Meteorology, Sri Lanka during the period of January 2002 to December 2020. Further, three statistical criteria; Akaike Information Criteria (AIC), Bayesian Information Criteria (BIC), and Mean Squared Error (MSE) were used in order to select the best model. According to minimum AIC, BIC, and MSE, it was found that Seasonal Auto Regressive Integrated Moving Average: $SARIMA(0,1,1)(0,1,3)_{12}$ is the best fitting model for the Jaffna district. Finally, the Ljung-box test was used to determine whether this fitted best model is adequate. Hence, the identified model can be used to assist scientists and policymakers in developing strategies for effective monitoring and mitigation of flood, urban planning, irrigation water management and other environmental management purposes.

Keywords: Box-Jenkins' Approach; Ljung-Box Chi-squared statistics; Monthly rainfall; SARIMA model