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Integrating Weather Patterns into Machine Learning Models for Improved Electricity Demand Forecasting in Sri Lanka

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The electricity demand in Sri Lanka is expected to increase steadily over time. Planning for future demand and ensuring an adequate electricity supply poses a significant challenge. It is crucial to accurately forecast the future demand in order to maintain an uninterrupted power supply. Previous studies have explored the correlation between weather factors and electricity demand with the aim of accurately predicting demand values. Thus, the objective of this study is to forecast the monthly electricity demand in Sri Lanka, by considering the influence of weather patterns. In this study, rainfall, humidity, and temperature weather parameters, along with historical monthly demand data, are taken into consideration. The identification of the most crucial weather variables is based on their correlation with electricity demand data. Various techniques have been employed for forecasting electricity demand over the past decade. However, the limitation of previous studies lies in their failure to incorporate past weather data alongside electricity demand data. This gap is addressed in the present study. This study used Vector Auto Regression (VAR) and Long Short-Term Memory (LSTM) models to forecast monthly electricity demand in each district of Sri Lanka. The VAR model demonstrated lower values by comparing the performance metrics, including Root Mean Square Error, Mean Square Error, Mean Absolute Error, and Mean Absolute Percentage Error. As a result, the VAR model was chosen as the most suitable model for forecasting monthly electricity demand by incorporating weather variables.

Keywords: *electricity demand, weather patterns, forecasting*