LOAD FORECASTING FOR NATIONAL GRID USING RECURRENT NEURAL NETWORK TECHNIQUES

Research Dissertation

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ABSTRACT

Accurate short-term load prediction is crucial for effective energy management in order to ensure proper operation of national grids and optimal use of available resources. This research explores the application of Long Short-Term Memory (LSTM) networks, a Recurrent Neural Network (RNN), to improve the accuracy of short-term electricity load forecasting in Sri Lanka. Traditional methods, such as Multiple Linear Regression (MLR), have been found inadequate to handle the non-linear, complex associations of electricity demand. The LSTM model, able to dig up temporal relations in time-series information, is trained on historical load demand data set extracted by Kaggle and other environmental and economic variables such as temperature, humidity, and GDP. The model is better in accuracy than the MLR approach, and performance metrics such as Mean Absolute Percentage Error (MAPE), Mean Absolute Error (MAE), and Root Mean Squared Error (RMSE) have a significant improvement. The research proves the potential of LSTM-based models for real-time load prediction, which can enhance grid stability, reduce resource wastage, and enhance the efficiency of operation. The findings are advantageous to the increased application of deep learning models within energy systems, particularly within the developing world, to offer valuable insights to future systems for energy forecasting and management.

Key words: *Recurrent Neural Network, Long Short-Term Memory, Multiple Linear Regression, Mean Absolute Percentage Error (MAPE), Mean Absolute Error (MAE), Root Mean Squared Error (RMSE)*