ABSTRACT

In a liberalized deregulated environment, Electric Power Load Forecasting (EPLF) is an important process in any power system network to make it an efficient, secure and consumer friendly electric power distribution utility. Electric power load increases tremendously especially for a Metropolitan city like Delhi due to climatic conditions, population growth, local area development, industries expansion, air pollution, thermal devices usage, etc. Hence, the accuracy of electric power load forecasting is a deciding factor for the electric power distribution utility to retain as an efficient and consumer friendly network. The proposed day-ahead EPLF models are built on a new multiple parallel inputs and output architecture with selected calendar, weather, smart grid factors and lagged electric load power features. This dissertation is mainly focused to deal with the selection and identification of best suitable features for creation of new architecture for EPLF model. The correlation analysis of EPL with respect to each selected feature is performed and presented. It also deliberates the implementation of RReliefF algorithm for selection and ranking of input features required for EPLF model. The real time data used for this research work were collected from Tata Power Delhi Distribution Limited (TPDDL). The EPLF models are developed using seven different techniques i.e: Multi-variate linear regression (MvLR) and Feed-forward neural network(FFNN), Cascade forward neural network(CFNN), Function fitting neural network(FFitNN), Layer Recurrent neural network(LRcNN), Standard LSTM deep learning network and Sequence-to-Sequence Regression LSTM deep learning network technique which are developed and implemented using MATLAB programming environment. The evaluation criteria for EPLF are presented with determination of various statistical errors. The performance of each model is analyzed and the results are presented with different techniques. As per the manner of usage of historical data, many methods have been proposed to study the performance of EPLF models. The performance of EPLF models are tested for different weather forecast errors. The proposed day-ahead ELPF models are evident for its simplicity, less measurement requirement and easiness in implementation with higher accuracy.