LITERATURE REVIEW:

The paper[1] uses four models for the accurate Medium Term Load Forecasting with the help of Machine Learning and and Deep Learning including Random Forest (RF), Support Vector Machines (SVM) , Recurrent Neural Network (RNN) ,and non-linear auto-regressive exogenous(NARX) Neural Network. The comparison between the results of these models has been drawn to get the best selection of forecasting model. Results are calculated using RMSE and MAPE measurements. Hourly energy data is gathered from database of 10 years to train models and find results with temperature and wind speed as the most important independent variables. MAPE values for RF, SVM, LSTM, NARX models were found to be 10.25%, 14.11%, 10.21%, and 4.2%. After comparison of all models in terms of metrics accuracy, error and computational time, NARX showed the best results for forecasting energy demand.

In paper[2] multi-variable linear and non linear regression is used for hourly load prediction of Jordanian power system. Three models including linear, polynomial and exponential are implemented and their results are tested for energy forecasting in the paper. Conclusions showed that exponential least performed for peak load forecasting as compared to other models. Linear model was suitable for predicting patterns in Jordanian power system.

For learning relationship in time series, Long Short term memory, Multiplayer Perception and Constitutional Neural Networks were studied deeply in [3] and their results were compared. These models were fit on electricity data from January 01, 2008 to December 31, 2009. They were mainly used for learning and extracting pattern. Predictions for 24 hours, 72 hours, one week, and one month forecasting is done using these methods. As a conclusion, MLP and LSTM proved to be better forecasting models for STLF and for MTLF, CNN and LSTM gave more better results.

Paper [4] addresses the challenge of Medium Term Load Forecasting by proposing a composite method consisting of Multi Layer Perceptron Neural Network and two search algorithms (particle swarm optimizer and improved ant lion optimiser). These searching algorithms are used to find best parameters (number of hidden neurons, limits of threshold and values for weights and biases) for Multi layer Perceptron and minimize MSE and MAPE errors. Forecasting technique used in the paper consisted of normalization, modelling the data,feature selection, shuffling and training and testing steps. By using the effective technique for feature selection and shuffling of training data, the overall accuracy and training of neural network increased. Mainly the paper focused on obtaining the most optimal data for the best fit of the model and to find the most optimized structure of the neural network that could result in minimized error and maximized forecast accuracy. Results showed that newly proposed optimization algorithm outperformed the other algorithms for forecasting.

The paper[5] explained the methods artificial neural network with nonlinear autoregressive exogenous multivariable Inputs, multivariate, linear regression model, and adaptive boosting model (AdaBoost) for load forecasting.

For long term energy forecasting, a recursive time series prediction strategy is used in [6]. This strategy used the predicted values as data to further forecast the future values. Support Vector Regression model is used which is based on principle of structural risk minimization (SRM). Its main goal is to find that linear regression function in high dimensional feature space where data is mapped from linear to non-linear function. Various features including temperature, calendar attributes and time series energy load were used in SVR model building. Papers discusses the approaches for Grid Search and

Cross Validation for the best parameter selection. One month forecasting results were best shown with time series and day features.

Paper[7] focuses on the daily peak load prediction of one month ahead. It discusses the hybrid approach consisting of a preforecast mechanism and a hybrid forecast method for prediction. Forecast method used the multi layer perceptron with Levenberg–Marquardt (LM) algorithm as a best learning algorithms. Due to lack of training data, the risk for overfitting the model increases. Hence, cross validation technique is used to prevent overfitting.

Medium Term load Forecasting faces the biggest problem of scarcity of data. This lack of data can be avoided by augmenting the time series training data. By enhancing the data as close as possible to the original data we can increase the forecasting accuracy of the model. Authors of paper [8] discusses the approach of Time Warping with Discriminative teacher for data augmentation. It uses the technique of Dynamic Time Warping (DTW) or shape DTW to use their alignment properties for creating similar patterns or new augmented time series. Results of data augmentation were tested with models LSTM and VGG and it concluded that shape DTW gave most promising results as compared to all other techniques.

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