A Deployable Electrical Load Forecasting Solution For Commercial Building

Abstract :
For efficient energy management, Electrical Load Forecasting plays a very important role in the smart grid electrical systems with the help of accurate forecasting. Real-lifeReal life issues of energy distribution can be solved using this method. Electrical Load Forecasting algorithms are developed using Non-Linear AutoRegressive model with eXogenous (NARX) input means input from outside of the model data with Artificial Neural Network and Support Vector Regression (SVR) to forecast the power consumption for day ahead, week ahead and month Ahead with the precision of 15 minutes granularity.

Conclusion:
The total power consumption in a building depends on all of the loads operating in It. Major loads are Heating, Ventilation and Cooling (HVAC), Lighting and Computing which constitute almost 80% of the total power consumption in a building, and are in turn influenced by factors like temperature, humidity, behavioral pattern of the occupants ,holidays etc. These factors vary throughout the season(Spring, Fall, Rainy season) etc. Which means people tend to use more electricity in rainy days etc. As a result, the consumption of electricity in throughout the year vary drastically and this is what makes the forecasting problem very challenging. Henceforth accurate prediction of the power consumption is very helpful in efficient energy management.

The following benefits can be achieved using this method.
- It helps in optimizing the cost incurred in buying electricity from the utility.
- Addressing Demand Response of power consumption during the peak-pricing periods.
- The Load Forecasting model can be used to identify deviations in building power consumption i.e large discrepancies between the predicted and actual power consumption pattern under similar conditions would be alerted to the building manager or respective authority.

Electrical Load Forecasting is a good solution for forecasting the Office Building energy for different time horizons at a high granularity.

This can be done by particularly addressing two problems
- Effective handling of the outliers/missing values.
- Incorporation of pertinent features and contextual information to capture underlying dynamics of Energy Distribution.

The Electrical Load Forecasting Model is based on SVR and NARX, which solitrilly captures the heterogeneous behaviour of the power consumption time series because of the different patterns on weekdays, weekends and holidays. The model gives the result preciously. Hence the performance results on the actual buildings demonstrating their efficacy, pointing to the usefulness of the proposed solution in Energy Management.