Multivariate Short Term Load Forecasting using Machine Learning Methods

Sumedh Sankhe

1 Introduction

Load forecasting is an important electric utility task for planning resources in Smart grid. This function also aids in predicting the behavior of energy systems in reducing dynamic uncertainties. The efficiency of the entire grid operation depends on accurate load forecasting. An accurate short term load forecasts with forecasting horizons up to atleast 24-48 hours are necessary for scheduling functions such as hydro-thermal power generation coordination in order to establish the hourly schedules for generation resources that will minimize the system operating cost. Such forecasts are also used for economic dispatch, predictive frequency control, security analysis, systems restoration, and energy trading. Recent global privatization and deregulation initiatives in the sector has made accurate forecasting vital not only for operational but also for the profitability and sustainability of privatized deregulated utilities.

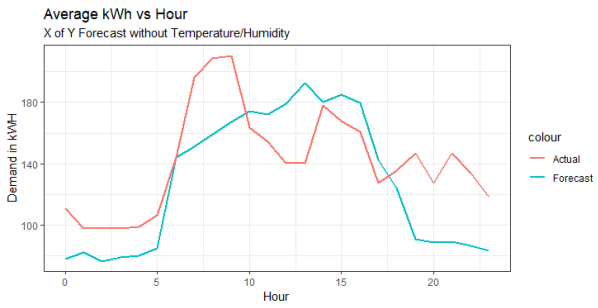

Figure 1. X of Y forecast

2 Overview

To create a baseline comparison with our highly tuned and complicated models we will create a X of Y baseline, which essentially gives out a forecast load with simple mathematical logic, due to some proprietary logic the revolves around the calculation of this forecast, only the values of the forecast will be used. As seen in the Fig 1. the forecast here shows a similar trend and is quite close to the actual load, we will try to minimize the difference observed in the entirety of it. We will implement and assess various configurations of Neural Networks as well as simple regression techniques and time-permitting some ARMA/ARIMA based techniques to compare our performances. Along with MAE we will compute an average time required to perform our training and forecasting load, as a measure of performance

3 Dataset and Evaluations

The dataset that will be used is an anonymized collection of load data for the Boston Metropolitan area over the past year, the data was provided at 5 minute intervals. This data is going to be aggregated to hourly values and then combined with temperature and humidity metric provided by NCDC (National Climatic Data Center) for the past year at hourly intervals. This dataset will be divided into test and train partitions of 80/20, and the mean absolute error (MAE) will be metric that will be used to measure the performance of differing models and also average time to calculate the forecast including training of network

References

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