**Capstone Project 3**

**Electricity Demand Estimation**

*Data from one of the leading Electricity Distribution Company is used to forecast the electricity consumption for*

*the next 24 months. Numerous forecasting techniques were used to understand the demand for next*

*2 years.*

* Business Objective
  + Estimating demand for electricity to manage the production of electricity and managing the electricity procurement vendors. Accurate estimation of demand leads to timely production or procurement of electricity.
* Input
* Data of monthly electricity consumption from January1973 to September 2019

* Data Understanding
* Dataset consists of 2 features
  + Date – In form of YYYY-MM-DD
  + Electricity Consumption – Electricity Consumption In Trillion Watts
* Model evaluation
* Mean absolute percentage error (MAPE) is used for model validation
* Model Selection
* Different types of forecasting techniques used to forecast electricity consumption:
  + - Decomposition model-
      1. Using **statsmodel.tsa** package
      2. Using **stldecompose** package
    - Econometric Time Series Models (ETS) model
    - ARIMA/SARIMA model
    - Fb Prophet
* Model Validation
* Forward and backward testing using MAPE –
  + - Forward testing – Splitting time series data into train and test.
      * + Test data consists of last 7 months data.
        + Train data starts from1973 to end, excluding last 7 months.
        + Training the model on train and forecasting for last 7 months.
        + MAPE calculation using actual and forecasted values.
    - Backward testing – Performed on train data
      * + Selected model is used to forecast for entire train data.
        + MAPE calculation for predicted values by model and actual values.
* Final Model selection
  + Model which gives us least MAPE value is selected.
  + In our case, Econometric time series (ETS) model gives the least MAPE value.
    - * Forward testing – 0.86% MAPE
      * Backward testing –2.5% MAPE
  + To forecast for next 24 months ETS model is used.