Tehcnalytics-round3

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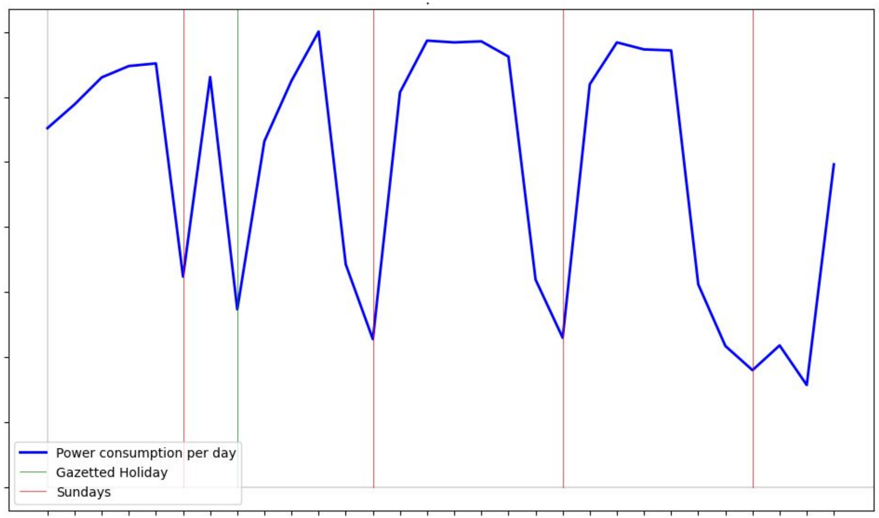
Background of Demand Forecasting

Demand forecasting is defined as the process of analysing past data and predicting the demand of a particular service or product for some time period in the future.

This is necessary and useful for any product or service in order to be appropriately prepared and minimize economic losses for instance.



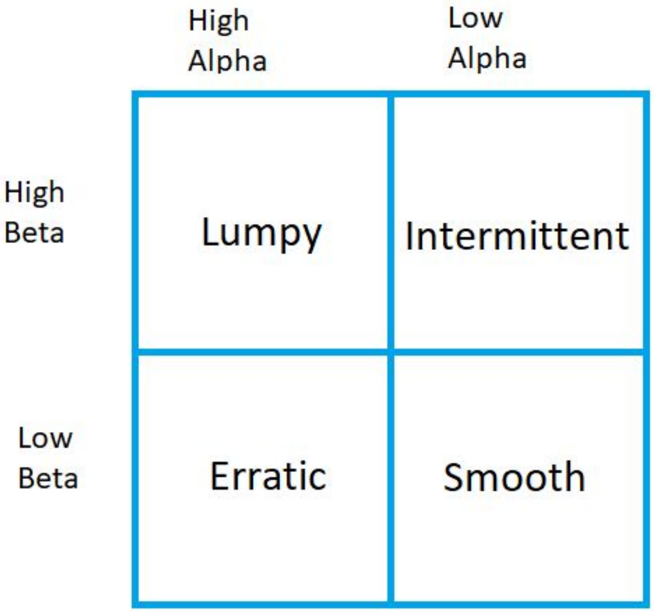
Various approaches

Broadly, there are two analytical approaches to this, namely, “traditional” forecasting methods such as Moving Average, Exponential Smoothing, ARIMA etc, and Machine Learning centric approaches which can use mostly any regression technique, such as K-Nearest Neighbours, Decision Trees, etc. Here, our focus is gonna be on the Latter.

ML techniques, broadly aim to minimize some sort of “loss function” which measures how far our prediction deviates from the actual historical data. Now, some of the ml algorithms, such as decision trees, knn and random forest require there to be additional features, in order to be able to even run them. If we don’t have such features such as exogenous variables, it will be necessary to break the date parameter into additional features, such as maybe whether a day is a weekend or a holiday and such. This introduces potential additional and unwanted “trends” which might be learnt by the model.

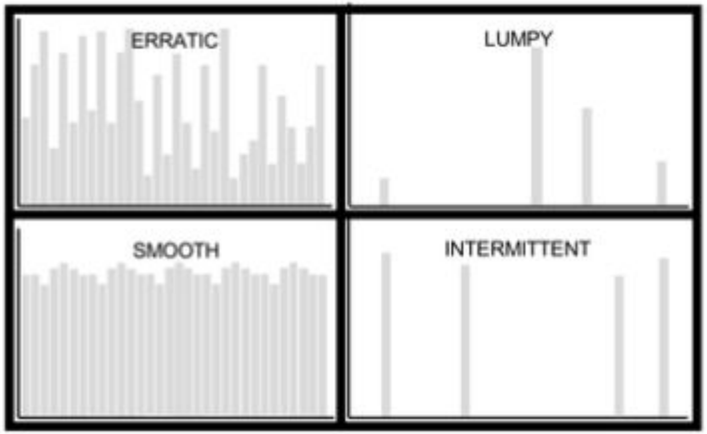
Datasets and Demand Curve types:

The classification is as shown, where alpha is the coefficient of variation, given by (sd/mean)^2 and beta is a term called ADI, which is the average length of the periods where the demand was zero.



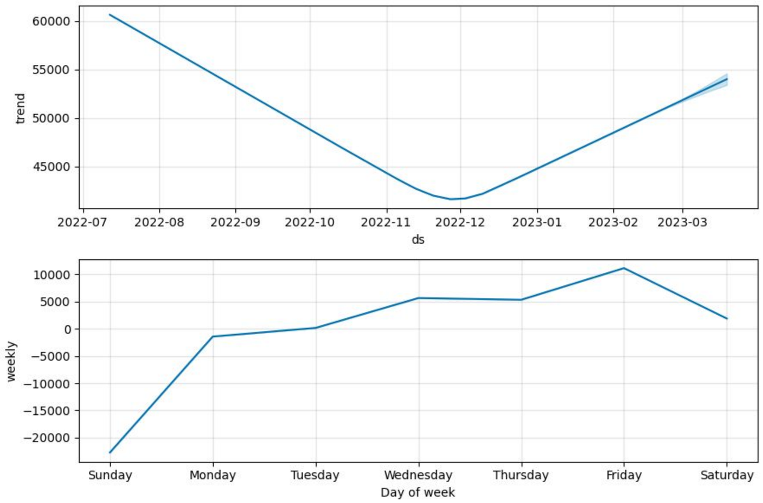
	High Alpha	Low Alpha
High Beta	Lumpy	Intermittent
Low Beta	Erratic	Smooth

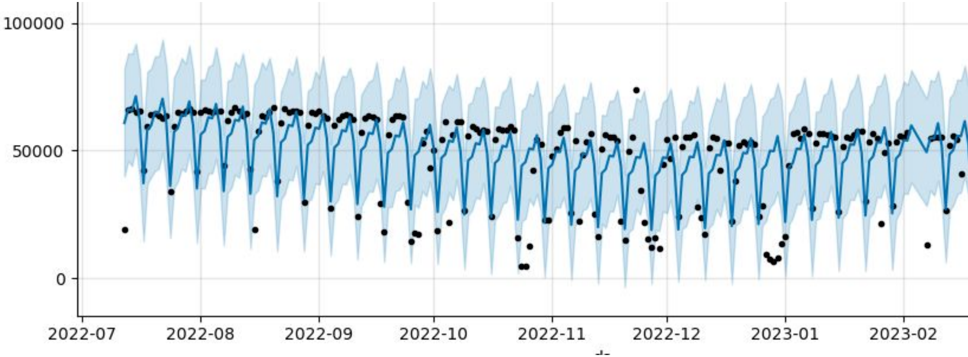
Examples of pattern types



Trend and Seasonality

Based upon the curve being fitted, the curve is gonna have three components, the trend the seasonality and some noise.





Algorithms used and best result.

Based on some basic hyperparameter tuning we got our best result from LIGHTgbm, which is gradient boosting framework developed by microsoft. The evaluation used for the competition was Weighted root mean squared scaled error, and we were able to reach a value of about 0.65. This was better than the other results by models such as DeepState(ES using deep neural networks) and XGBoost(extreme gradient boosting).

ThankYou