**TimeSeries (PoC)**

**Introduction:**

Time series analysis comprises methods for analyzing time series data in order to extract meaningful statistics and other characteristics of the data. Time series forecasting is the use of a model to predict future values based on previously observed values. While regression analysis is often employed in such a way as to test theories that the current values of one or more independent time series affect the current value of another time series, this type of analysis of time series is not called "time series analysis", which focuses on comparing values of a single time series or multiple dependent time series at different points in time. Interrupted time series analysis is the analysis of interventions on a single time series.

**Objective:**

The Objective of this project is to forecast sales of products.

**Process:**

Used AWS: Sagemaker and EC2 to train and deploy deep learning model on AWS. AWS S3 was used as storage service. AWS Redshift along with AWS Lambda was used to pull the required historical data. Performed Data Cleaning with Outlier Detection and Feature Engineering using Python 3.6 (Pandas, NumPy) along with user defined functions. Anomaly Detection using Autoencoders and Decoders.

Statistical Analysis using to check stationarity of historical sales data. Constructed Baseline model using Moving Average for benchmark score. Achieved scalability, accuracy, and speed by developing a Hybrid Time Series Forecasting model using CudNNLSTM (with Moving Average) which runs on GPU. Cross Validation was implemented using TimeSeriesSplits to choose the best epoch for model. Model Testing using evaluation metrics like RMSE and MAE.

Used Tableau 2020.1 to develop visualizations of sales over years and Kibana for log and time-series analytics. Documented procedures to maintain an accurate record, improve quality and efficiency of the work completed.

**Environment:**

Python 3.6, Jupyter Notebook6.0.3, TensorFlow2.0, Tableau 2020.1, AWS: DLMAI, EC2, ECR, S3, Redshift, GitHub

**References:**

<https://www.analyticsvidhya.com/blog/2018/02/time-series-forecasting-methods/>