Project Title: Demand Forecasting

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October 2020

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1. Introduction

Demand Forecasting is the key movement which pretty much controls any remaining exercises of Supply Chain Management. It is an important element in planning and decision making in any business/company management. Many reputed companies rely on demand forecasting to make major decisions related to production, expansions, sales, etc. Forecasting is known as an estimation/prediction of an actual value in future time span. However, it is common that there may be forecast error as real outcomes/values differ from the predicted one [1].

Various methods are available to produce forecasts. The choice of technique differs on the basis of data patterns, availability of data, business requirements. [4]

The objective of this project is to pull the data of Cement Factory into Microsoft Azure SQL Database using Microsoft Azure Data Factory. The pulled data will then be read into Microsoft Azure Databricks where a predictive machine learning model will be built. The predictions will be made into Microsoft Azure Databricks using the trained Machine Learning model. The predictions will then be exported to the SQL database and will then be visualized on PowerBI.

2. Problem Statement

People have been trying to predict the future since decades achieving different levels of success. Thankfully, the world hasn't ended yet, but major events in the market can certainly cause great amounts of panic and erratic collective societal behavior. This has become more relevant now more than ever with the rise of the COVID-19 pandemic, leading to mass unemployment and highly unpredictable market movements.

3. Motivation

To maintain a business easily and settling on strong functional choices perform precisely. Demand Forecasting is so vital on the grounds that it permits a business to set right stock levels, value their items accurately, and see how to extend or get their future tasks. Poor predictions/forecasting can prompt lost deals, drained stock, troubled clients, and millions in lost income [1].

4. Methodology

Step 1: - First, deploy services to be used within the same resource group on Microsoft Azure, i.e. DataFactory, Storage Account, SQL Database, SQL Server, Databricks.
Step 2: - All the services are linked through DataFactory as an ETL pipeline.
Step 3: - Browse the dataset from Local File Storage and import this data in the BLOB storage under the created Storage account.

Step 4: - Then, we run SQL queries to import the dataset in a tabular format as a SQL Database. Use the CopyData function in DataFactory to transfer data from Blob to SQL Database.

Step 5: - This SQL data is used as an input for Azure Databricks, where we develop a model that generate predictions. The input data that we have is from 2015 to 2020. And, the demand forecasting is done for 2021 to 2025. The prediction is done on the basis of the Target value and the Production value.

Predicted Production value = Average of previous 5 years Production values.

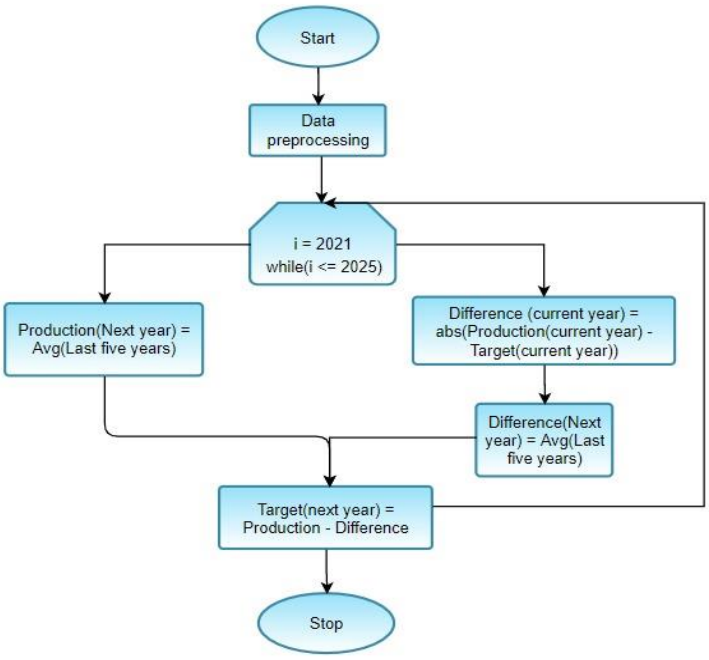
Predicted Target value = Average of previous 5 years Production values - Average of previous 5 year Difference value

Where, Difference value = Production value - Target value

Step 6: - The predictions made are then used as an input to Power BI where predictions are being visualized. In Power BI use the following attributes for the visualizations:

Target value, Production value, Plant ID, Year

6. Flow Chart



7. Results

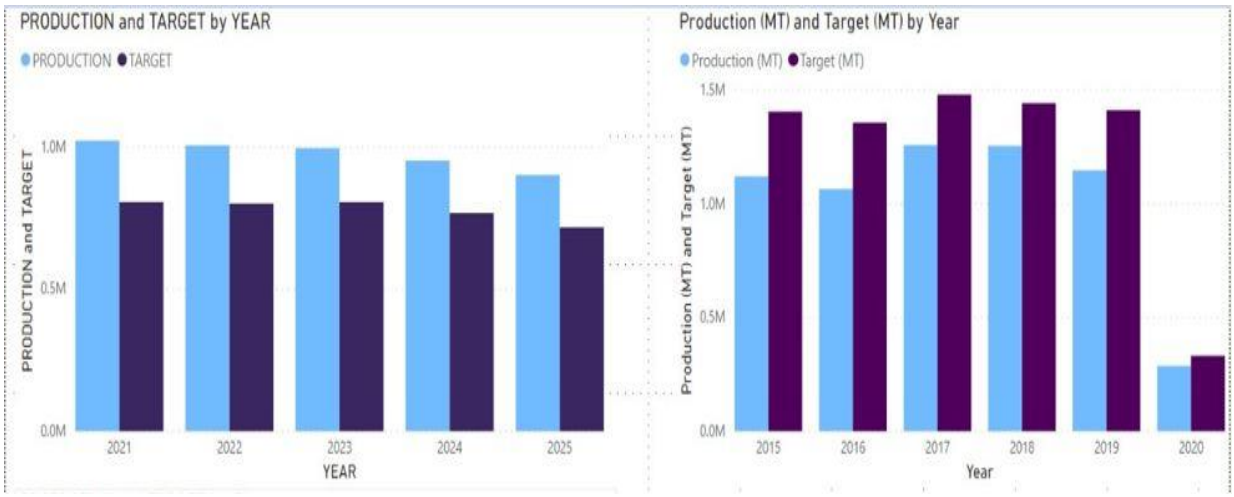


Fig: Comparison between Forecasted Data (2021-2025) Vs Given Data (2015-2020).

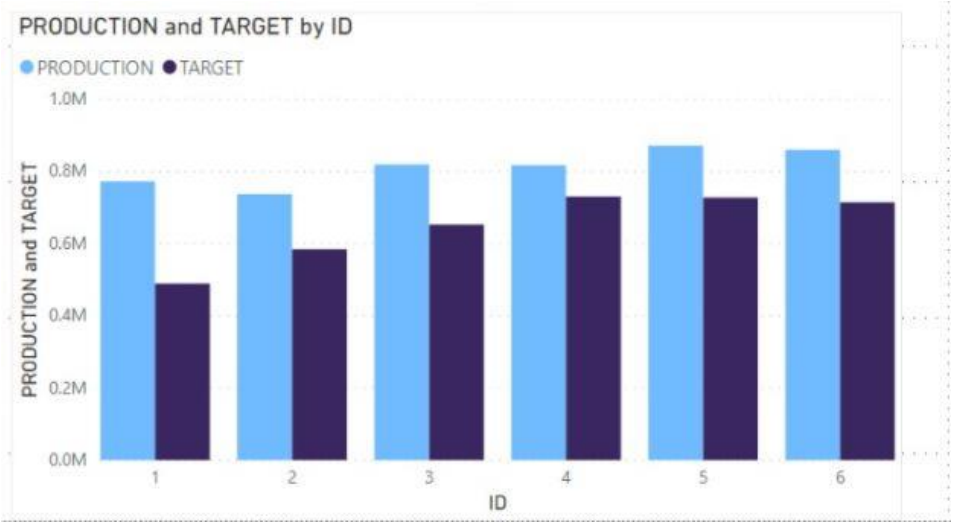


Fig: Forecasted Data grouped by Different Plant ID's.

8. Conclusion

We built a predictive model to analyze or predict the future targets or sales so that any firm can work on their various factors to improve their future sales or productions based on the forecasting. In this model we are also visualizing the predictions on Power BI which proves to be user friendly. This model helps different sectors like the Cement Factory dataset on which we have performed the analysis to enhance their various fields.

13. References

[1] https://forecasters.org/wp-content/uploads/gravity_forms/7-c6dd08fee7f0065037affb5b74fec20a/2017/07/SilveiraNetto_Carla_ISF2017.pdf
[2] https://searchcloudcomputing.techtarget.com/definition/Windows-Azure
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