# **Product Based Insights**

## **Introduction:**

Fab-predict model is a generic core model designed to analyze historical sales data and forecast future sales. This model, developed using Microsoft fabric, capitalizes on the powerful capabilities of Lakehouse, Notebook and Power BI to deliver comprehensive insights into sales trends by integrating retails data, Fab-Predict offers a robust foundation for understanding sales patters over years.

Microsoft fabric is a versatile data platform that provides a unified environment for data engineering, data integration and advanced analytics.

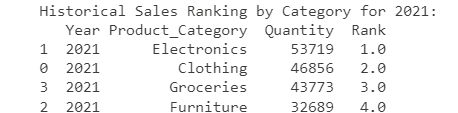
By leveraging the Microsoft fabric components, Fab-Predict can be customized to deepen sales predictions for product brand for instance, incorporating additional features can enhance the model’s precision and relevance.

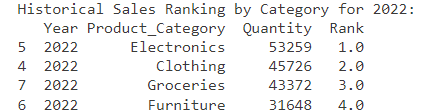
This granular approach enables businesses to better anticipate market demands optimize inventory management and improve customer satisfaction.

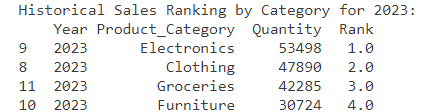
## **Use Case:**

**Inventory Management:** Retailers and manufacturers can optimize their inventory levels to ensure they have sufficient stock to meet predicted demand while minimizing excess inventory.

## **Historical Analysis by Product Category:**

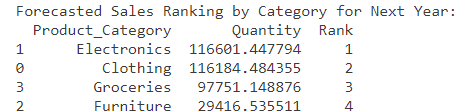






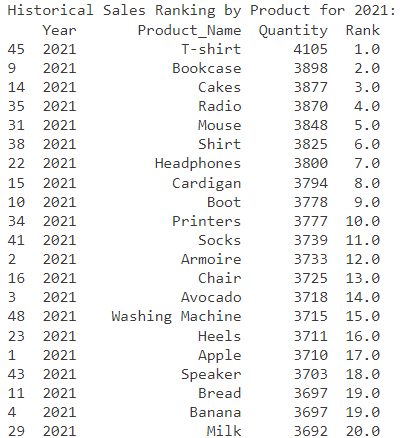
* Electronics is the highest selling category for the last 3 years as per the given dataset with Clothing, Groceries and Furniture following.

## **Forecast Analysis by Product Category (Prophet Model):**

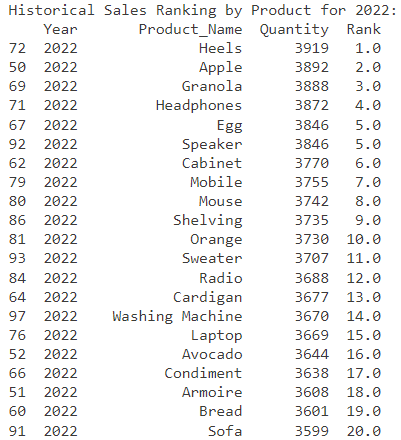


* Electronics is the highest selling category for coming year with Clothing, Groceries and Furniture following.

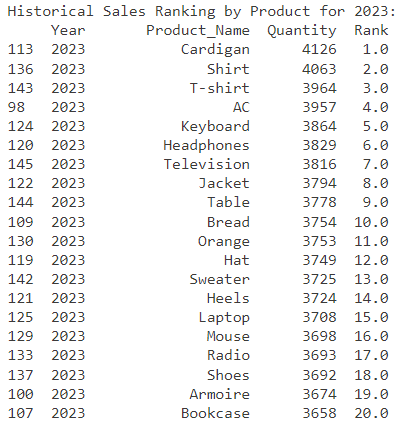
## **Historical Analysis by Product Name:**



* T-shirt is the highest selling product in year 2021



* Heels is the highest selling product in year 2022



* Cardigan is the highest selling product in year 2023

## **Forecast Analysis by Product Name for Year 2024 (Prophet Model):**



* AC is the highest selling product for coming year 2024 followed by Cardigan, Laptop…

## **Factors and Model Affecting to Predict the Sales:**

### Historical Sales Data (Quantity column)

**Sales Volume:** The past sales volume data (Quantity) is the core input to the Prophet model, influencing its understanding of trends and seasonality.

### Temporal Factors

**Time Series Data:** The ds column in the Prophet model, which includes the date information derived from the Year column, is essential for identifying temporal patterns.

**Seasonality:** Prophet detects and models yearly and, optionally, other forms of seasonality present in the historical sales data.

### Trend Detection

**Long-Term Trends:** Prophet identifies, and projects long-term trends based on the historical data, which helps in understanding the general direction of sales (upwards or downwards).

**Short-Term Changes:** Recent changes in sales patterns also impact the trend component of the model.

### Forecasting Model Characteristics (Prophet)

**Additive Model:** Prophet uses an additive model where the observed value is a sum of the trend, seasonality, and holiday components.

**Automatic Outlier Detection:** Prophet can automatically detect and adjust for outliers in the historical data.

**Flexibility:** It can accommodate missing data and shifts in the time series.

### Calendar Effects

**Holidays and Special Events:** While not explicitly modeled in your code, Prophet allows the inclusion of holidays and special events that can significantly impact sales.

### Data Preprocessing Steps

**Datetime Conversion:** Converting the Year to datetime format is crucial for time series analysis.

**Data Aggregation:** Aggregating data by year, category, and product ensures that the model receives structured and relevant inputs.

### Model Parameters

**Default Prophet Parameters:** Prophet comes with a set of default parameters for detecting seasonality and trends. Customization of these parameters can further refine the forecast.