# **Sales Performance Analysis**

**Objective:** The goal of this project is to analyze sales data over time, highlight top-selling products, assess the impact of discounts on profits, and provide insights into customer segmentation based on purchasing behavior. By leveraging Power BI, we aim to create an interactive dashboard that delivers key insights and supports data-driven decision-making.

**Tools Used:**

* **Power BI:** For data visualization and dashboard creation.
* **Python:** For ETL (Extract, Transform, Load) processes to clean and prepare the data.
* **SQL:** For querying and extracting relevant data from databases.
* **Jupyter Notebook:** For initial exploratory data analysis (EDA) and data transformations.

**2. Data Sources**

The primary dataset for this analysis is the **sales\_data.csv** file. It contains transactional data from sales operations, with the following key attributes:

* **Product:** The name or ID of the product sold.
* **Order Date:** The date when the order was placed.
* **Quantity:** The quantity of the product sold.
* **Sales:** The price per unit of the product sold.
* **Discount:** The discount applied to the product.
* **Region:** The region where the sale took place.
* **Customer Segment:** The category or type of customer (e.g., Individual, Business, VIP).

The raw data was first cleaned and transformed to ensure it was ready for analysis in Power BI.

**3. Data Cleaning Process**

To ensure the data was suitable for visualization and analysis, the following steps were taken:

1. **Converted Order Date to Date Format:**
   * The Order Date column was converted to a consistent **Date** format to ensure accurate time-based analysis.
2. **Removed Unnecessary Columns:**
   * Any columns that were not relevant for the analysis (such as internal IDs or extraneous metadata) were removed to simplify the dataset.
3. **Handled Missing Values:**
   * Missing or null values in the Discount column were replaced with zeros, as missing discount values could skew the analysis of profit margins.
4. **Calculated Revenue:**
   * A new calculated column for **Revenue** was created, based on the formula:

Revenue = Quantity \* Sales

* + This allowed for better tracking of financial performance in the visualizations.

**4. Power BI Visualizations**

Here are the key visualizations created in Power BI:

1. **Total Sales Over Time (Line Chart):**
   * **X-Axis:** Order Date
   * **Y-Axis:** Sum of Sales
   * This line chart visualizes the total sales trend over time, providing insights into seasonality or sales growth patterns.
2. **Top Selling Products (Bar Chart):**
   * **X-Axis:** Product
   * **Y-Axis:** Total Sales
   * This bar chart ranks products by total sales, highlighting which products contribute most to revenue generation.
3. **Sales by Region (Map/Bar Chart):**
   * **Legend:** Region
   * **Values:** Sum of Sales
   * This map or bar chart visualizes sales by region, showing geographic performance and helping to identify high-performing or underperforming regions.
4. **Customer Segmentation Analysis (Pie Chart):**
   * **Values:** Sum of Sales
   * **Legend:** Customer Segment
   * This pie chart visualizes sales distribution across different customer segments, allowing for targeted marketing and sales strategies.
5. **Profit vs Discount Impact (Scatter Plot):**
   * **X-Axis:** Discount
   * **Y-Axis:** Profit
   * This scatter plot helps analyze the relationship between discounts offered and the resulting profit, identifying whether higher discounts correlate with higher or lower profit margins.

**5. Insights & Analysis**

From the visualizations, the following key insights were derived:

* **Top Products:** The bar chart helped identify the top-selling products, providing focus areas for inventory and marketing strategies.
* **Region Performance:** The map or bar chart revealed sales performance by region, enabling a better understanding of regional strengths and weaknesses.
* **Discount & Profit Relationship:** The scatter plot highlighted that while some discounts led to increased sales, they did not always result in higher profits, underscoring the importance of strategic discounting.
* **Customer Segmentation:** The pie chart provided insights into the sales distribution across customer segments, allowing for more focused customer engagement and product offerings based on segment preferences.

**6. Next Steps**

1. **Data Expansion:**  
   Incorporating more granular data, such as customer demographics (e.g., age, income) and detailed product categories, will enhance the analysis and provide deeper insights into customer behavior.
2. **Predictive Modeling:**  
   Implementing predictive models, such as time series forecasting, could allow the business to predict future sales trends, optimize stock levels, and improve decision-making for promotions and discounts.
3. **Interactive Dashboards:**  
   Enhancing the dashboard with slicers, drill-through features, and more interactivity will empower users to explore the data further and gain personalized insights tailored to their needs (e.g., filtering by specific products, regions, or time periods).