**Market Trend Analysis**

**Project Overview**

This project conducts a market trend analysis using historical sales data. It performs key data processing tasks, visualizes trends in revenue, identifies top products and countries by revenue, and uses a SARIMA model for revenue forecasting. Additionally, it applies RFM (Recency, Frequency, Monetary) analysis to segment customers.

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7. Tools and Libraries

**The project uses the following tools and libraries:**

1. **Python:** For data processing and analysis
2. **Pandas:** Data manipulation and processing
3. **Matplotlib and Seaborn:** Data visualization
4. **Statsmodels:** Time series analysis and forecasting
5. **Google Colab:** For running the code in a cloud environment
6. **Dataset**

**The dataset includes transactional sales data with fields like:**

**InvoiceNo:** Unique identifier for each transaction

**StockCode:** Product identifier

**Description:** Description of the product

**Quantity:** Number of units sold

**InvoiceDate:** Date of transaction

**UnitPrice:** Price per unit

**CustomerID**: Unique identifier for customers

**Country:** Customer's country

**Key Steps and Analysis-**

**Data Loading:**

* Load the dataset into a DataFrame using Pandas.
* Drop rows with missing values in Description and CustomerID.
* Remove duplicate records.

**Feature Engineering:**

* Revenue Calculation: Added a Revenue column as Quantity \* UnitPrice.
* Date Extraction: Extracted Year, Month, Day, and Hour from InvoiceDate.

**Data Visualization:**

* Monthly Revenue Trend: A line chart shows revenue over time.
* Top 10 Products by Revenue: A bar chart displays the highest revenue-generating products.
* Top 10 Countries by Revenue: A bar chart illustrates revenue contributions by country.

**Time Series Analysis:**

* Revenue Trend Decomposition: Used seasonal decomposition to identify trends and seasonality in daily revenue.
* Revenue Forecasting: A SARIMA model predicts future revenue, and the forecast is compared to actual values to assess performance.

**Customer Segmentation with RFM:**

* Calculated Recency (days since last purchase), Frequency (number of purchases), and Monetary Value (total revenue) for each customer.
* Aggregated data to create an RFM table for customer segmentation.

**Results**

* Monthly Revenue Trends: Visualization identifies high-revenue months and seasonal patterns.
* Top Products and Countries: Key products and regions contributing to revenue are identified.
* Revenue Forecasting: SARIMA model forecasts revenue trends and yields a Mean Absolute Error for performance evaluation.
* Customer Segmentation: RFM segmentation reveals customer behavior patterns, aiding in targeted marketing.

**How to Run**

* Setup Environment:
* If using Google Colab, mount Google Drive to access the dataset:
* from google.colab import drive
* drive.mount('/content/drive')

**Install Dependencies:**

* Install necessary libraries in your Colab or local environment:
* pip install pandas numpy matplotlib seaborn statsmodels

**Run the Code:**

* Load the dataset
* df = pd.read\_csv('/content/drive/MyDrive/Market Trend Analysis(project)/data.csv', encoding='Latin-1')
* Process the data, create visualizations, and analyze customer segments using RFM.
* Export the processed data to a CSV file:
* df.to\_csv("processed\_market\_data.csv", index=False)

**Download Processed Data:**

* Download the processed CSV file:
* from google.colab import files
* files.download("processed\_market\_data.csv")

**Project Structure:**

* **data.csv:** The input dataset with transactional data.
* **Market\_Trend\_Analysis.ipynb:** Jupyter Notebook with data processing, analysis, and visualization code.
* **Processed\_market\_data.csv:** Output file containing processed data for further analysis.

**Tableau Story Link:**

* View the Tableau Story for this Dashboard.

(<https://public.tableau.com/app/profile/raj.sharma2612/viz/Market_data_analysis/Story1?publish=yes>