Objective:

The notebook aims to analyze the relationship between **market sentiment (Fear–Greed Index)** and **trading performance metrics**, such as **Closed PnL**, **trade volume**, and **position size**.

Datasets Used

1. **historical_data.csv** – Includes trade-level details (timestamp, side, size, PnL, price, etc.).

2. **fear_greed_index.csv** – Contains daily sentiment classification (Fear, Greed, Extreme Fear, Extreme Greed, Neutral) with corresponding dates.
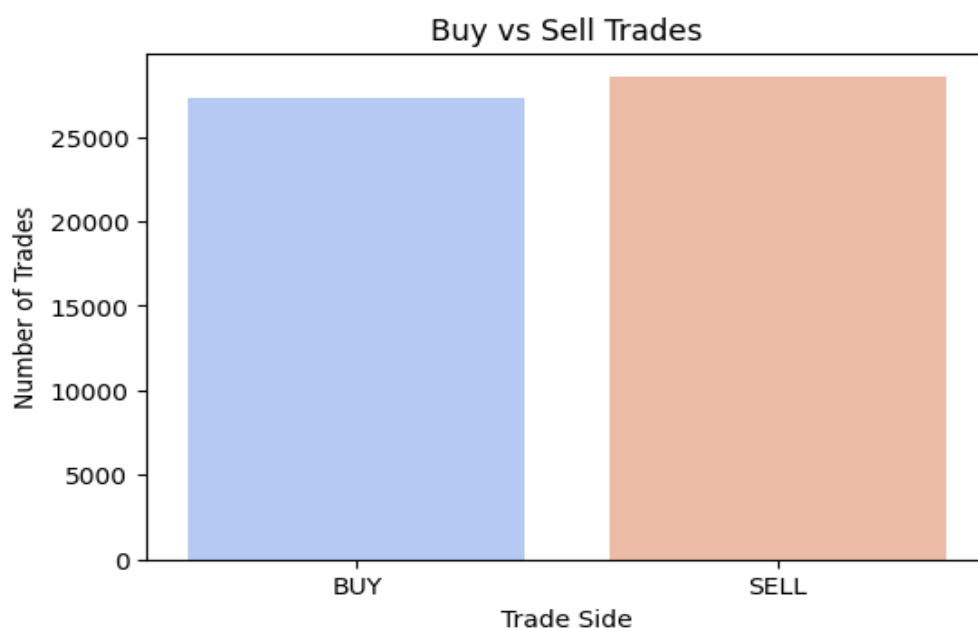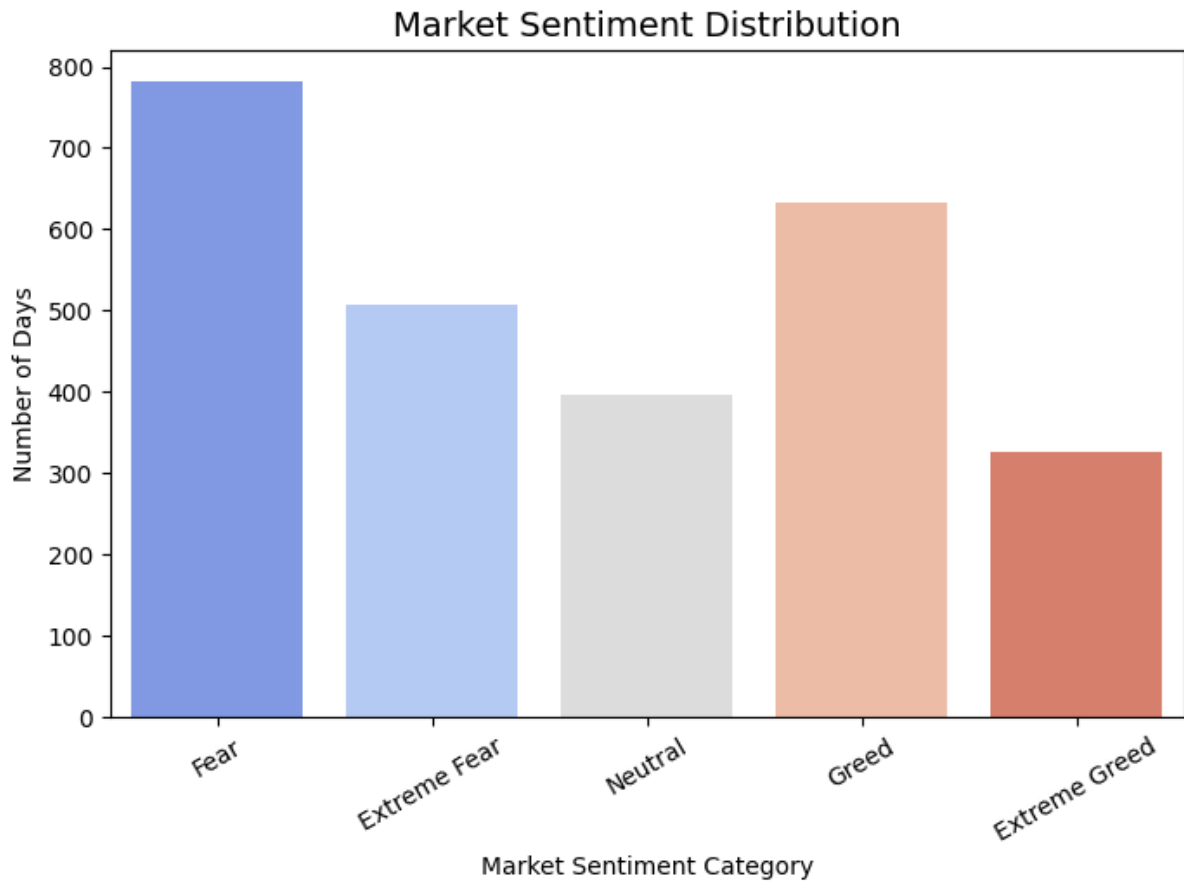
Key Steps & Analysis

1. **Data Loading & Cleaning**

   o   Loaded both datasets using Pandas.

   o   Checked for missing and duplicate values — minimal issues found.

   o   Converted timestamps (Timestamp IST and date) to datetime format.

   o   Merged datasets on the date field for combined sentiment–trade analysis.

2. **Exploratory Data Analysis (EDA)**

   o   **Count Plots:**

      ▪   Visualized Buy vs Sell trades.

      ▪   Visualized distribution of market sentiment categories (Fear, Greed, etc.).

   o   Found that trades occur under varying market conditions with Fear and Greed being most frequent.
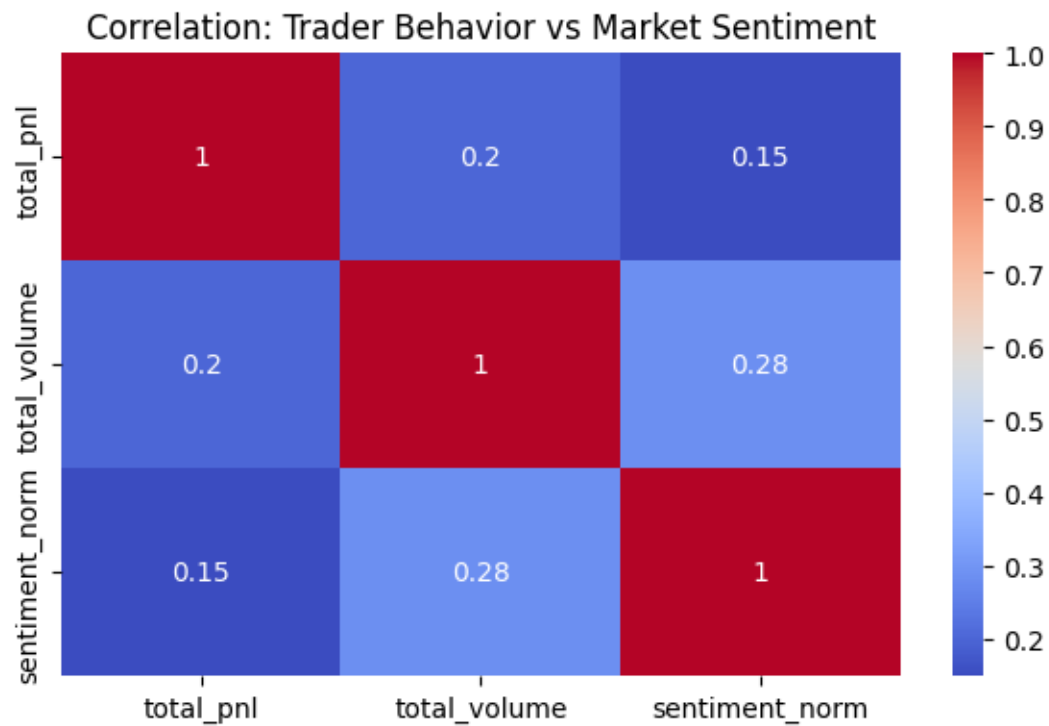
Market Sentiment Distribution

3. **Sentiment-Wise Performance**
    - o Calculated **mean**, **median**, and **standard deviation** for:
        - ▪ Closed PnL → measures profit/loss performance.
        - ▪ Size Tokens → trade volume.
    - o Grouped results by classification (sentiment).

4. **Correlation Analysis**
    - o Explored relationships between:
        - ▪ Profitability (total_pnl or Closed PnL)
        - ▪ Trade volume (total_volume / Size Tokens)
        - ▪ Price volatility and normalized sentiment.
    - o Generated correlation heatmap using seaborn.heatmap.

Correlation: Trader Behavior vs Market Sentiment

5. **Insights**

   o Periods of **Extreme Greed** often corresponded with **higher trade sizes** and **more volatile PnL**.

   o **Fear and Extreme Fear** phases had **smaller trade volumes** and **more consistent but lower PnL** — indicating cautious trading behavior.

   o **Neutral sentiment** days showed balanced trade activity.