Trading Behaviour and Market Sentiment Analysis

Submitted by:

Tanishka Sharma
Data Science Assignment -Web3 Trading Team

1. Objective

The goal of this project is to understand how market sentiment, represented by the *Fear and Greed Index*, influences trader behaviour. By studying both market mood and real trading activity, this analysis explores how emotions such as fear and greed impact trade size, risk-taking, and overall profitability.

2. Datasets

1. Trader Data (historical_data.csv)
Contains details of individual trades, including trader accounts, trade size in USD, position type, and closed profit or loss. It helps in understanding trader performance and activity.

2. Market Sentiment Data (fear_greed_index.csv)
Shows the daily emotional state of the market as Extreme Fear, Fear, Neutral, Greed, or Extreme Greed. Each day's sentiment score helps interpret the market environment in which trades took place.

Both datasets were combined using the date column so that each trade could be matched with the market sentiment of that day.

3. Methodology

Data Cleaning: Removed duplicates, corrected column names, handled missing values, and converted timestamps into date format.
Data Merging: Joined both datasets on the date column to align every trade with the day's sentiment.
Feature Preparation: Created a sentiment column from the classification field and used one-hot encoding to convert text labels into numerical form for further analysis.
Exploratory Data Analysis (EDA): Calculated averages, visualised results using bar charts and boxplots, and identified the top-performing trader accounts.
Visualisation Tools: Used Seaborn and Matplotlib to highlight relationships between profit, trade size, and sentiment.

4. Insights and Findings

Profit vs. Sentiment:
Traders earned higher average profits during Greed periods, showing they take larger risks when optimism is high. However, results were also more unpredictable during Greed, reflecting a higher-risk, higher-reward environment.

Trade Size Behaviour:
Trade sizes were significantly larger in Greed phases. Traders tend to invest more when confidence rises. During Fear, trades were smaller, suggesting cautious and risk-averse behaviour.

Top Performing Traders:
Only a few trader accounts contributed to most of the profits. This concentration shows that a small number of experienced traders drive the majority of positive outcomes.

Correlations:
A mild positive link was observed between trade size and profit, meaning bigger trades can bring higher profits or losses. Other variables showed weak correlation, implying profitability depends on multiple combined factors.

Market Mood Distribution:
The market spent slightly more days in Fear than in Greed. This aligns with general market behaviour, where uncertainty dominates most of the time.

5. Visual Results

Key visuals created during analysis:

- Bar Chart: Average profit comparison between Fear and Greed
- Boxplot: Spread of profit values across sentiments
- Heatmap: Correlation between trade size, PnL, and position variables
- Leaderboard: Top 10 trader accounts ranked by total profit

All visuals are available in the outputs/ folder in the GitHub repository.

6. Conclusion

The study shows that trader behaviour is deeply influenced by market sentiment. When the market feels optimistic (Greed), traders take bigger risks and trade in higher volumes, which can lead to larger profits but also higher volatility. In contrast, during Fear, traders prefer smaller and safer trades. These patterns reveal the emotional side of financial decision-making and highlight how sentiment data can help forecast trading activity or guide better risk management strategies.

7. Tools Used

- Python (Google Colab)
- Libraries: Pandas, NumPy, Seaborn, Matplotlib
- Visualisation and Reporting: Matplotlib charts and GitHub for version control