Title: Trader Behavior vs Market Sentiment

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1. Introduction

This project analyzes how trader behavior varies under Fear and Greed market sentiment using historical trading data and sentiment index.

2. Dataset Description

- Trader Data: execution price, size, side, leverage, PnL
- Sentiment Data: Date, Classification (Fear / Greed)

3. Methodology

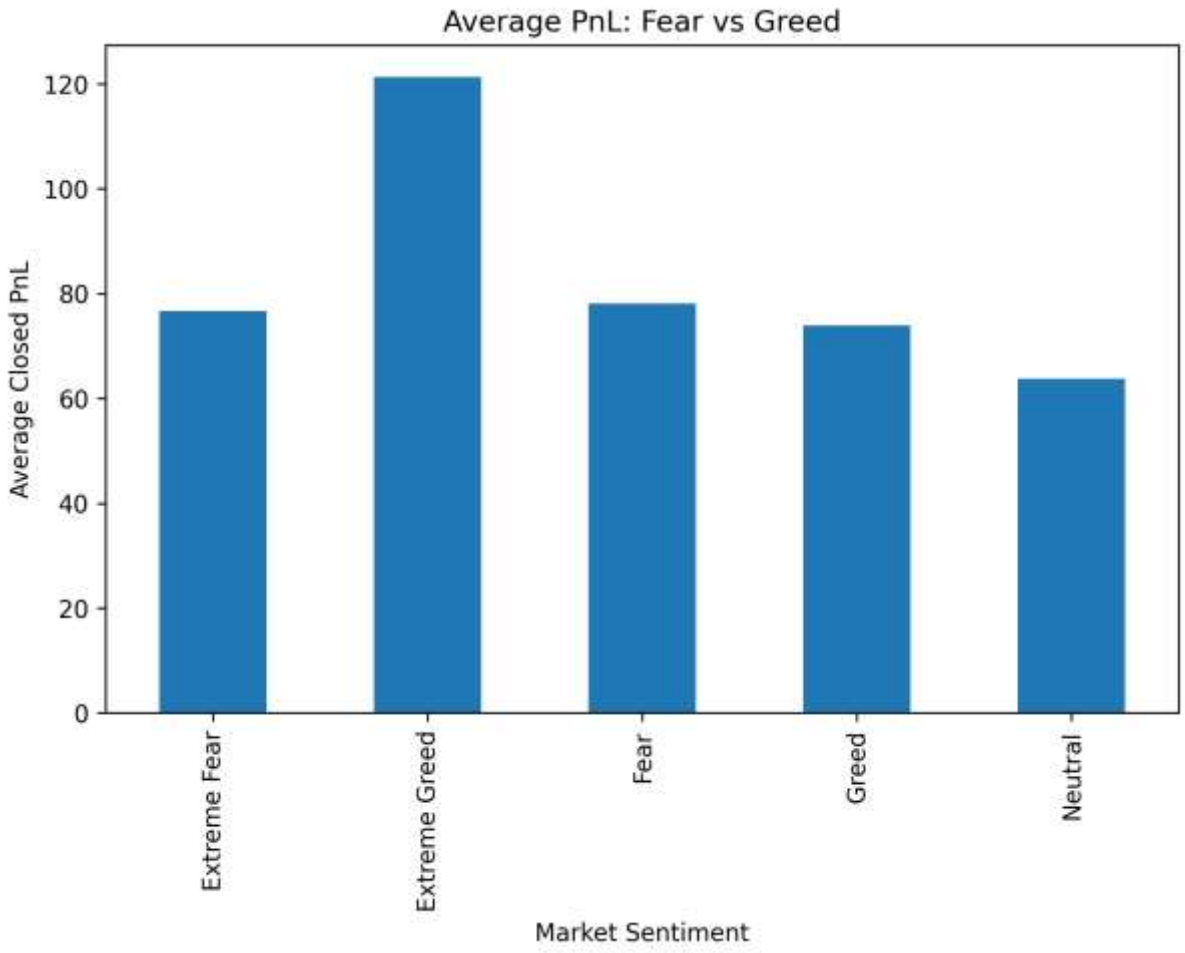
- Cleaned missing values
- Converted timestamps
- Merged datasets using date
- Segmented data into Fear and Greed

4. Key Insights

- Traders take higher leverage during Greed periods
- Fear periods show lower volume but controlled risk
- Greed leads to higher profits but larger losses

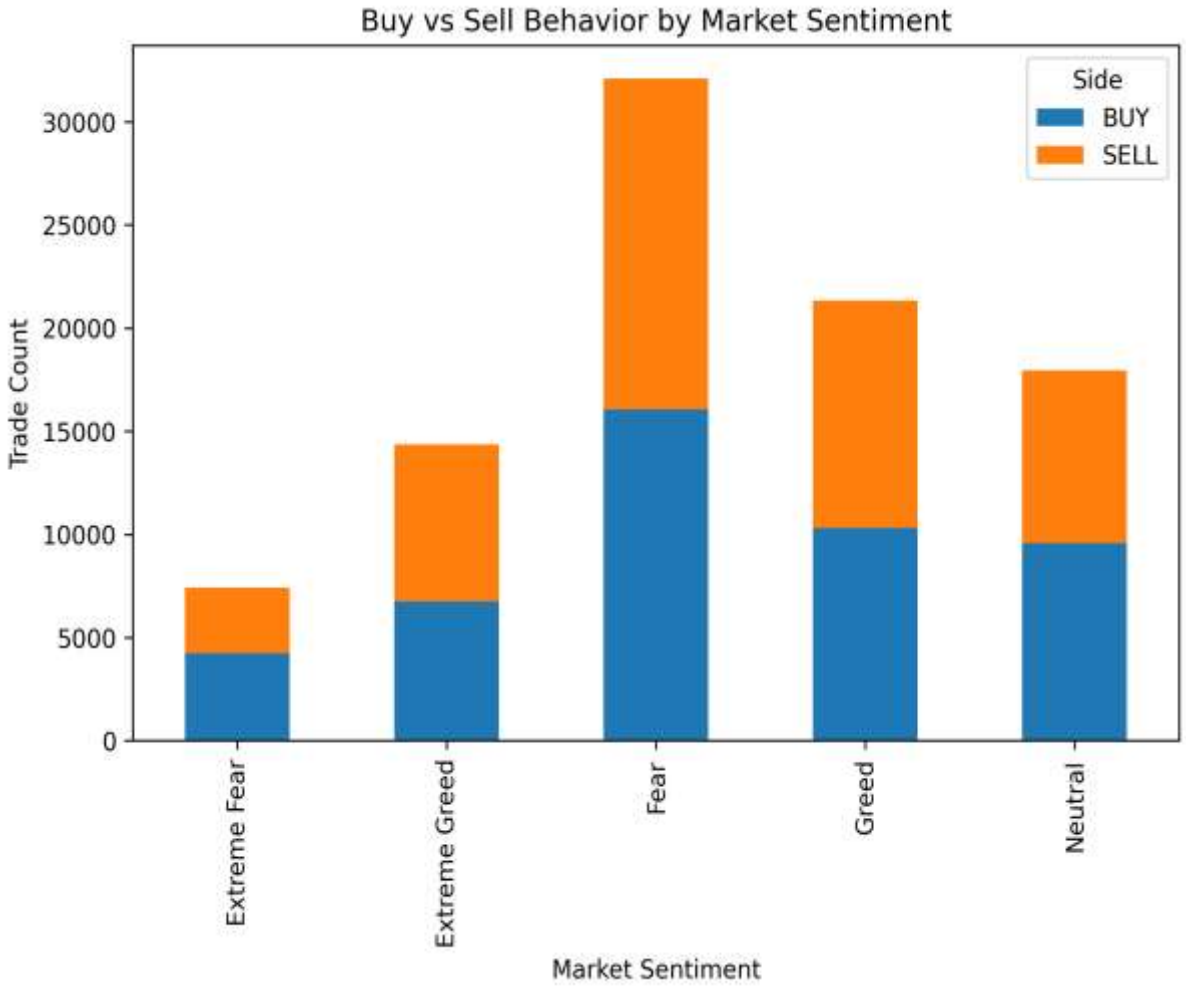
5. Visual Analysis

5.1 Average PnL by Market Sentiment



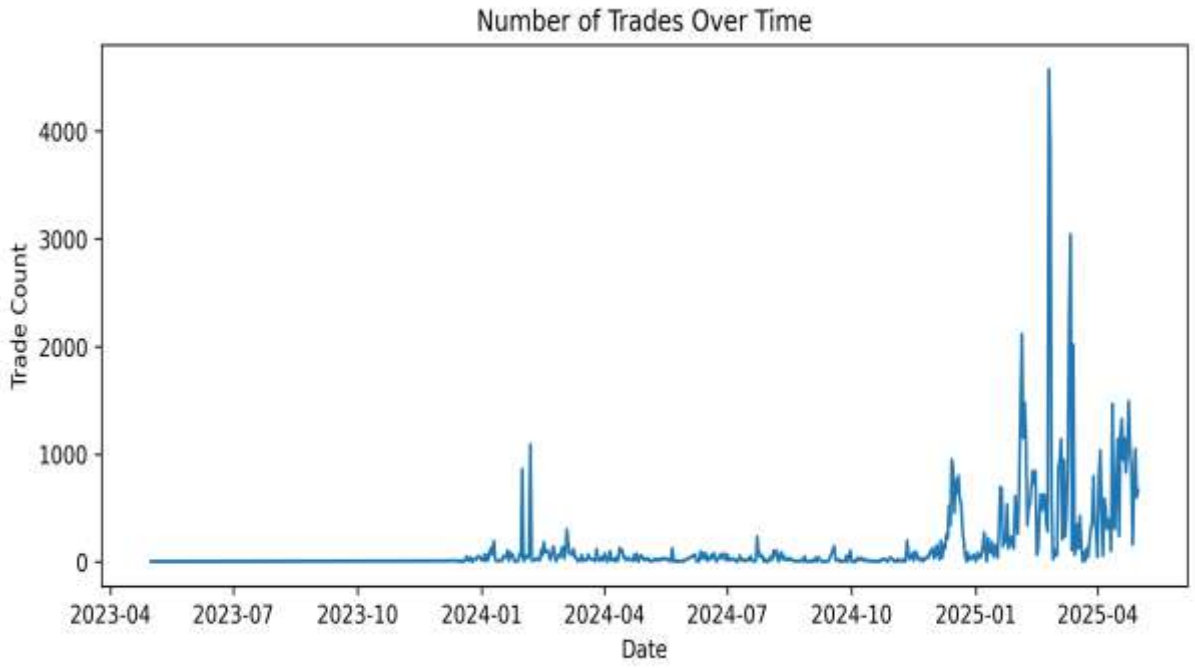
This bar chart compares the average closed profit and loss across different market sentiment categories. The results show that **Extreme Greed** periods generate the highest average PnL, indicating that traders tend to achieve larger profits when market optimism is high. In contrast, **Extreme Fear** and **Fear** periods show comparatively lower average returns, reflecting cautious trading behavior and reduced risk appetite. Neutral sentiment shows moderate profitability, suggesting balanced market participation.

5.2 Buy vs Sell Behavior by Market Sentiment



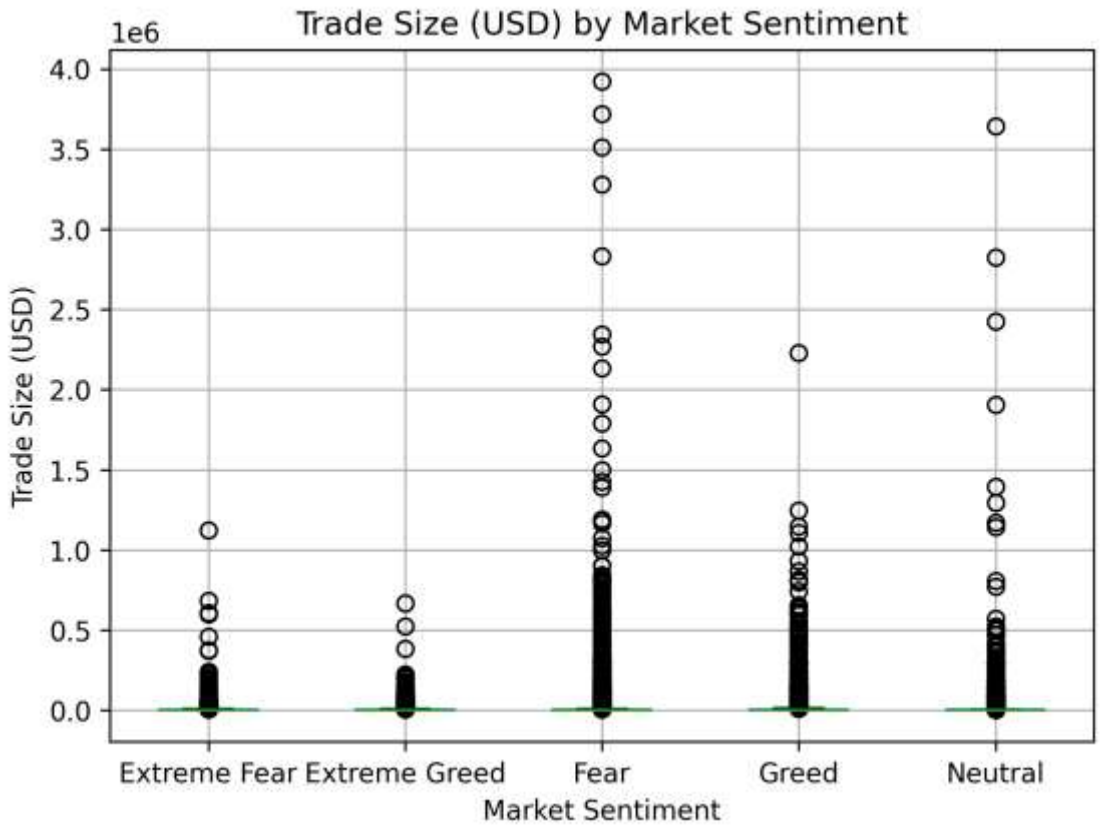
The stacked bar chart illustrates the distribution of buy and sell trades under different sentiment conditions. During **Fear** and **Extreme Fear**, selling activity is relatively higher, indicating defensive behavior and risk-off sentiment among traders. In **Greed** and **Extreme Greed** phases, buy-side activity increases significantly, suggesting that traders are more willing to take long positions in optimistic market conditions. This confirms a strong alignment between trader direction bias and overall market sentiment.

5.3 Number of Trades Over Time



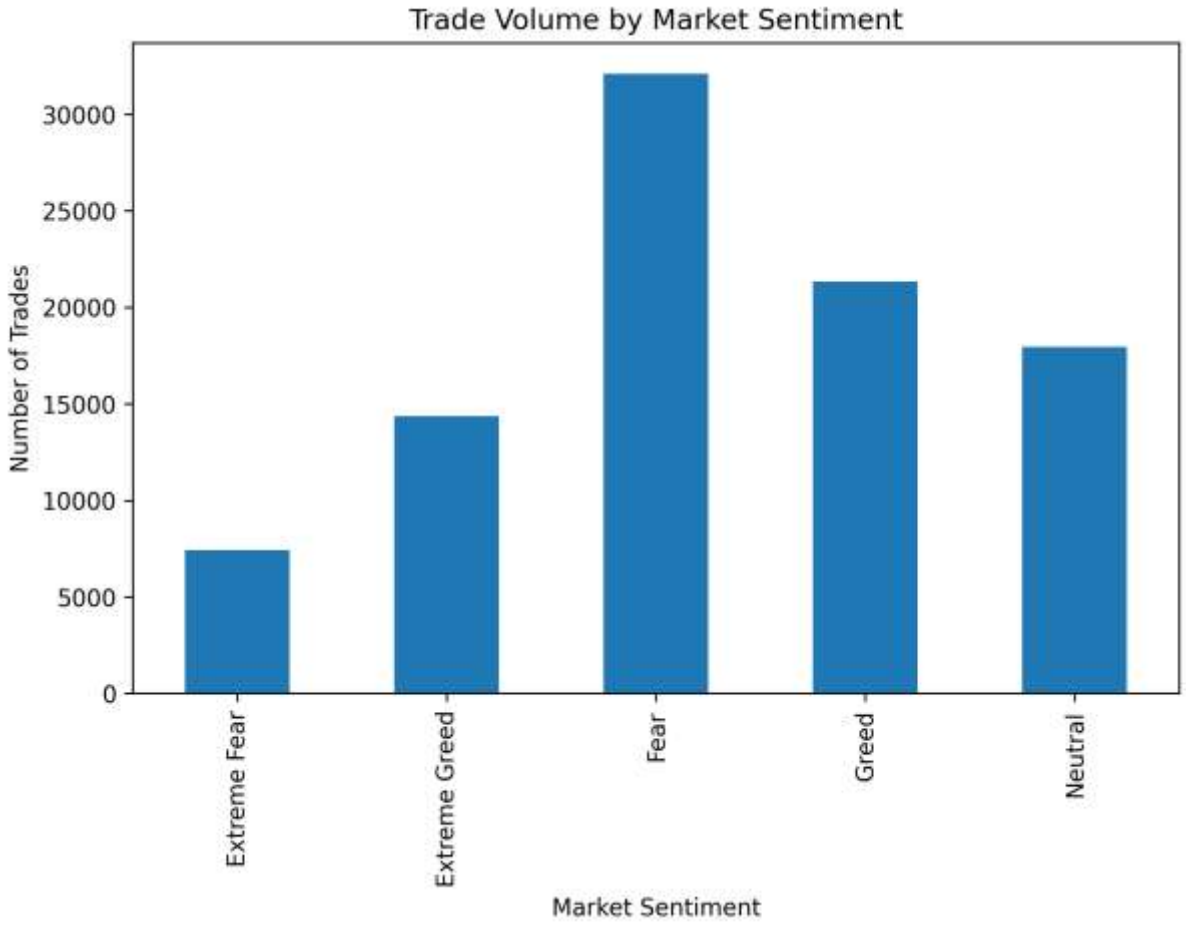
This time-series visualization highlights trading activity across the observed period. Trade counts remain relatively low and stable during earlier periods but increase sharply during later phases, indicating heightened market participation. The spikes in trade count correspond to periods of strong market movement, reflecting increased trader engagement during volatile or sentiment-driven market conditions.

5.4 Trade Size (USD) by Market Sentiment



This boxplot compares trade size in USD across sentiment categories and serves as a proxy for risk exposure. The results show that **Greed** and **Extreme Greed** periods exhibit larger trade sizes and higher variability, indicating increased risk-taking behavior. In contrast, **Fear** and **Extreme Fear** phases display smaller and more controlled trade sizes, suggesting cautious position sizing during uncertain market conditions.

5.5 Trade Volume by Market Sentiment



This bar chart shows the total number of trades executed under each sentiment category. Trade volume is highest during **Fear** and **Greed** phases, indicating strong market participation during emotionally charged conditions. Extreme sentiment states have comparatively lower trade counts, suggesting that only a subset of traders remain active during extreme uncertainty or excessive optimism.

6. **Conclusion**

This analysis demonstrates a strong relationship between market sentiment and trader behavior. Periods of **Greed and Extreme Greed** are associated with higher average profitability, increased trade sizes, and a stronger inclination toward buy-side positions, indicating elevated risk-taking behavior. Conversely, **Fear and Extreme Fear** phases reflect more conservative trading patterns, characterized by smaller trade sizes, increased selling activity, and reduced profitability.

The findings suggest that trader psychology closely mirrors overall market sentiment, with emotional extremes significantly influencing risk appetite and trading decisions. Since explicit leverage data was unavailable, **trade size in USD was effectively used as a proxy for risk exposure**, providing meaningful insights into trader behavior under varying sentiment conditions.

Overall, these insights can support smarter trading strategies by encouraging risk management during greed-driven markets and identifying potential opportunity windows during fear-driven conditions.