Data Science Report: Trader Behavior vs Market Sentiment

Candidate: Ankur Jat

July 9, 2025

1 Objective

The objective of this analysis is to investigate how trader behavior — including profitability, volume, and risk — aligns or diverges from overall market sentiment as represented by classifications such as *Fear, Greed, Extreme Fear*, and others. The goal is to uncover hidden patterns and signals that can contribute to smarter, sentiment-aware trading strategies.

2 Datasets Overview

- **Bitcoin Market Sentiment Dataset** - Contains daily sentiment classifications (Fear, Greed, etc.) with associated index scores and dates.

- **Historical Trader Dataset from Hyperliquid** - Includes transaction-level data with fields like execution price, trade size, closed PnL, direction, fee, timestamp, and more.

3 Data Cleaning & Preprocessing

- Converted date columns in both datasets to consistent `datetime64` format.

- Filtered the sentiment dataset to match the date range of the trader dataset.

- Confirmed that both datasets had no missing values.

- Merged on the common `date` column, resulting in over 211,000 matched trades.

4 Exploratory Data Analysis (EDA)

4.1 Key Metrics by Sentiment

- **Extreme Greed** has the highest average profitability (Closed PnL).

- **Fear** shows the highest total volume and average fee paid — indicating increased but costlier activity.

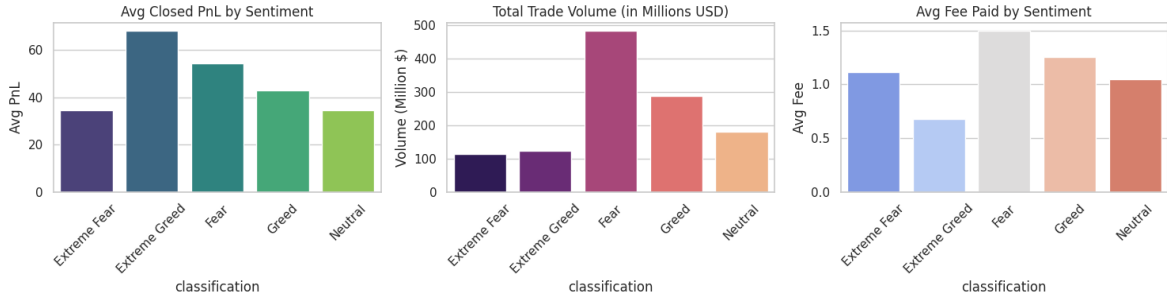- **Extreme Fear** sees the lowest PnL and significant trade variation.

Figure 1: Average PnL, Volume, and Fee by Market Sentiment

4.2 Distribution of Profitability

- Boxplots reveal high variance and outliers across all sentiments.
- Median profit remains near zero, but Greed scenarios offer fewer negative outliers, suggesting more consistent gains.
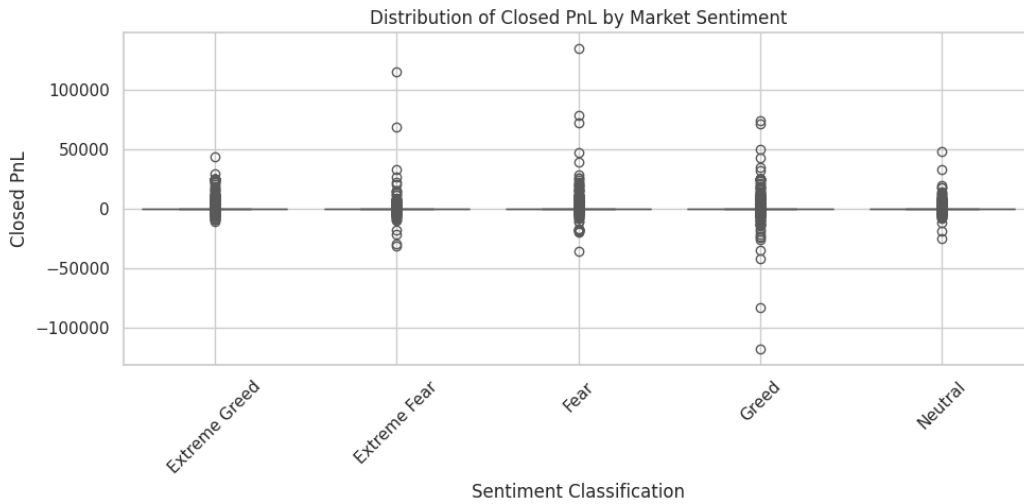

Figure 2: Distribution of Closed PnL by Sentiment

4.3 Trade Side (BUY/SELL) Patterns

- Slight dominance of SELL orders during Fear and Greed.
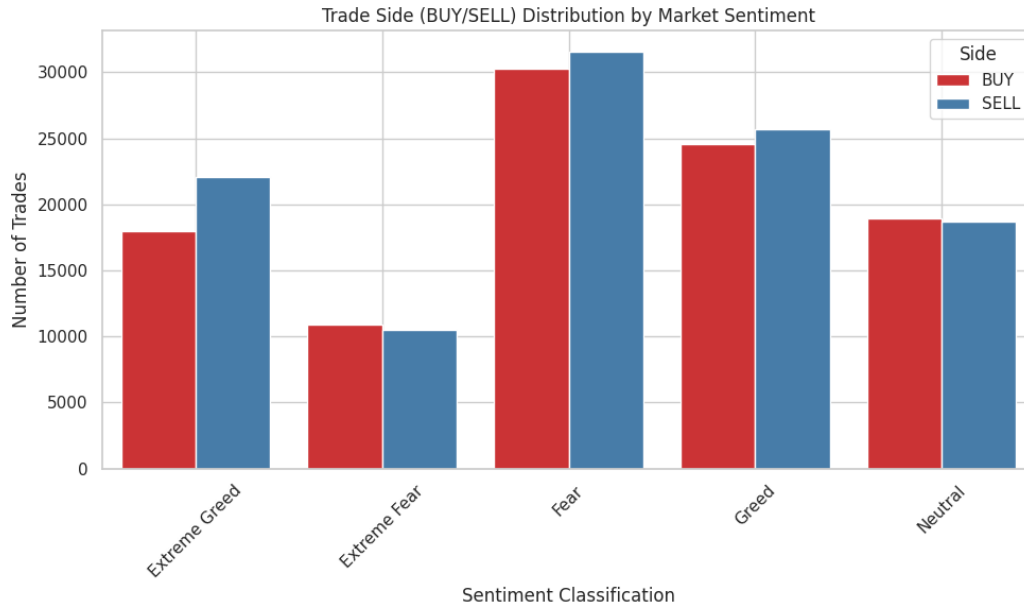- More BUY orders observed during Extreme Greed, hinting at FOMO behavior.

Figure 3: BUY vs SELL Distribution by Sentiment

5 Strategic Insights & Signals

- **Volume spikes during Fear** — may signal volatile trading opportunities.

- **Higher risk during Fear** — due to higher fee activity.

- **Consistent gains in Extreme Greed** — can be capitalized through trend-following strategies.

- **BUY/SELL behavior flips by sentiment** — useful for modeling sentiment-aware direction bias.

6 Conclusion

Sentiment-driven analysis shows clear differences in trader behavior based on emotional market signals. By combining profitability, risk, and behavioral insights, this analysis supports the development of smarter, adaptive trading models. Future models should integrate real-time sentiment data to optimize timing, direction, and risk exposure.

Colab Notebook Link: https://colab.research.google.com/drive/1p4DifwxEGFbfrs24Ah2OM-_FcpMtom7I? usp=sharing