

Trader Behavior & Market Sentiment Analysis

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Assignment: Junior Data Scientist – Trader Behavior Insights

1. Objective

This analysis investigates the relationship between Bitcoin market sentiment (Fear / Greed) and trader behavior, focusing on profitability, trade size, and trading activity. Insights aim to inform smarter trading strategies by understanding how market sentiment affects trading decisions.

2. Datasets

1. Bitcoin Market Sentiment Dataset

- Columns: Timestamp, Value, Classification (Fear / Greed / Extreme Fear / Extreme Greed / Neutral), Date.
- Source: https://drive.google.com/file/d/1PgQC0tO8XN-wqkNyghWc_-mnrYv_nhSf/view?usp=sharing

2. Historical Trader Data (Hyperliquid)

- Columns include: Account, Coin, Execution Price, Size Tokens, Size USD, Side, Closed PnL, Timestamp, Start Position, Direction, Transaction Hash, Order ID, Crossed, Fee, Trade ID, Timestamp IST.
- Source: <https://drive.google.com/file/d/1IAfLZwu6rJzyWKgBToqwSmmVYU6VbjVs/view?usp=sharing>

3. Methodology

1. Loaded both datasets in Python using Pandas.
2. Standardized timestamp and date columns for merging.
3. Merged trader data with sentiment data based on trade date.
4. Conducted exploratory data analysis (EDA) on:
 - Profitability (Closed PnL)
 - Trade size (Size USD)
 - Number of trades per sentiment
5. Visualized distributions using boxplots and bar charts.

4. Key Insights

4.1 Trader PnL Distribution by Market Sentiment

- Median Closed PnL is fairly stable across all sentiment categories.
- Wider distributions and extreme outliers are seen during Fear, Greed, and Extreme Greed, indicating higher volatility in returns.
- Neutral and Extreme Fear periods show tighter, more consistent outcomes with fewer extreme gains or losses.

Interpretation: Traders experience higher volatility in emotionally charged markets. Neutral or highly fearful periods encourage more conservative trading.



Fig 4.1 Trader PnL Distribution by Market Sentiment

4.2 Trade Size (USD) by Market Sentiment

- Trade sizes are significantly larger during Fear and Greed, with some extreme outliers exceeding 1 million USD.
- Smaller, clustered trade sizes are observed during Neutral, Extreme Fear and Extreme Greed.

Interpretation: Traders increase exposure during emotional market periods, amplifying potential gains or losses. During calmer or extreme fearful periods, risk-taking is reduced.

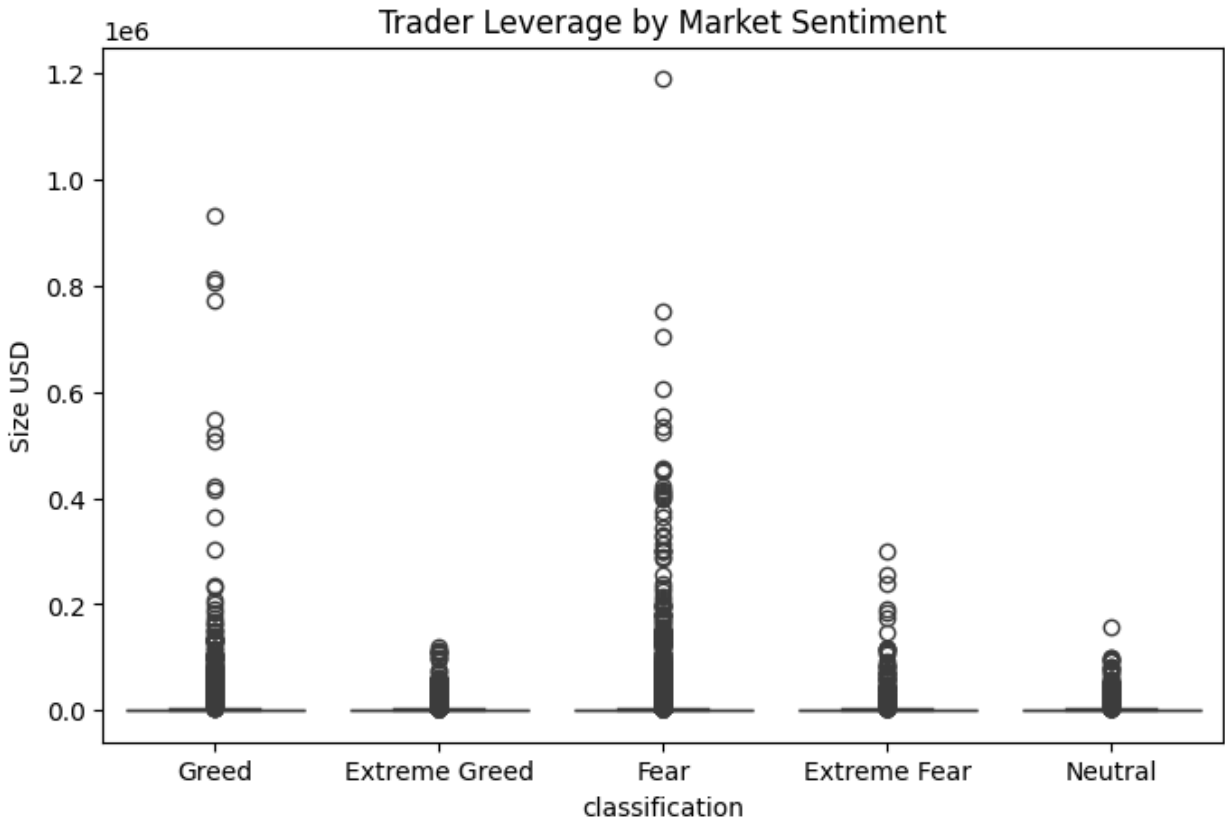


Fig 4.2 Trade Size by Market Sentiment

4.3 Number of Trades per Sentiment

- Fear dominates trading activity (~14,000 trades), followed by Greed (~11,000).
- Activity drops for Extreme Greed, Neutral, and Extreme Fear.

Interpretation: Traders are most active in emotionally charged markets. Fearful conditions drive more trading than Greed, while extreme or neutral sentiment suppresses activity.

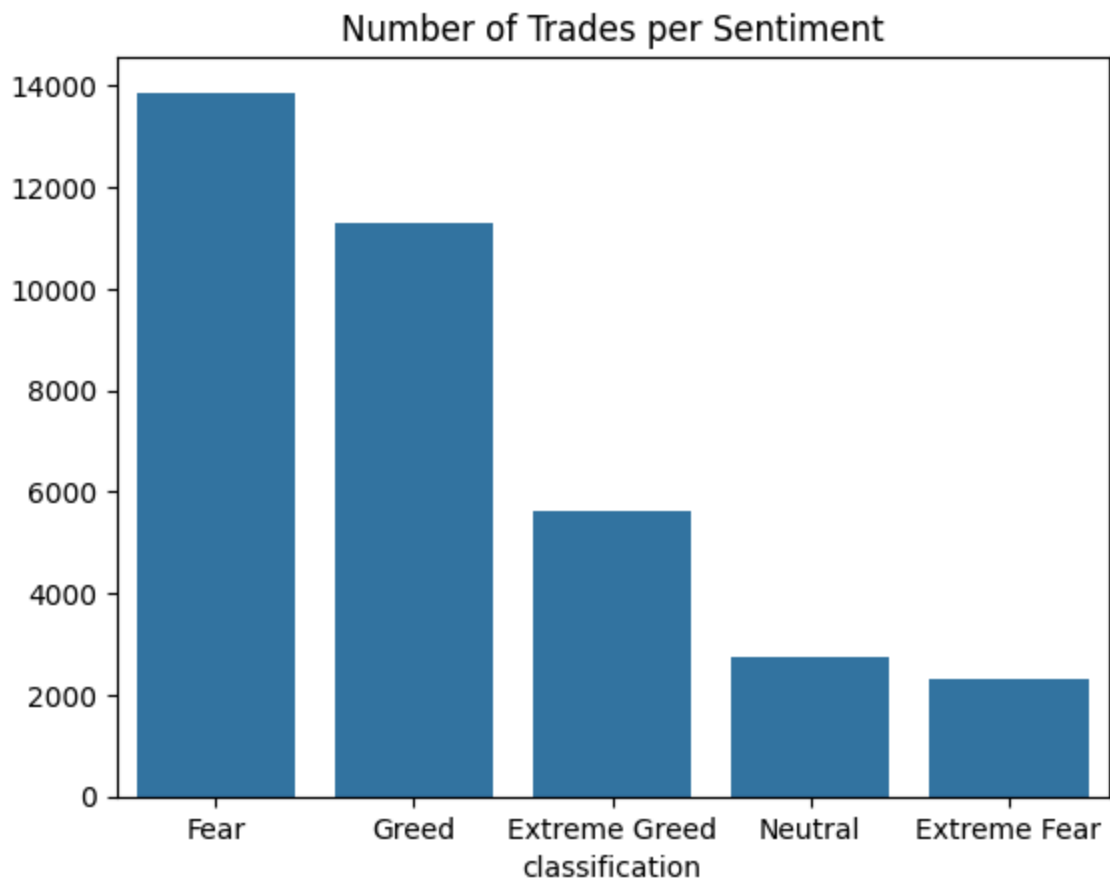


Fig 4.3 Number of trades per Sentiment

5. Overall Conclusion

- Emotional market sentiment drives both trading volume and volatility.
- Fear periods produce the highest activity and widest PnL swings.
- Greed periods show elevated risk-taking and volatility, but slightly fewer trades.

- Neutral and Extreme Fear phases see reduced exposure and lower trading activity.
- These patterns suggest that market sentiment can be used to anticipate trader behavior and inform smarter trading strategies.