

Data Science Assignment Report: Trader Behavior vs. Market Sentiment

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Date: November 7, 2025----1. Project Objective

This analysis aims to investigate the relationship between cryptocurrency trader behavior and overall market sentiment, specifically focusing on "Fear" versus "Greed." By examining historical trade data in conjunction with the Fear & Greed Index, this report seeks to uncover underlying trends in profitability and trading volume to inform more effective trading strategies.

2. Methodology

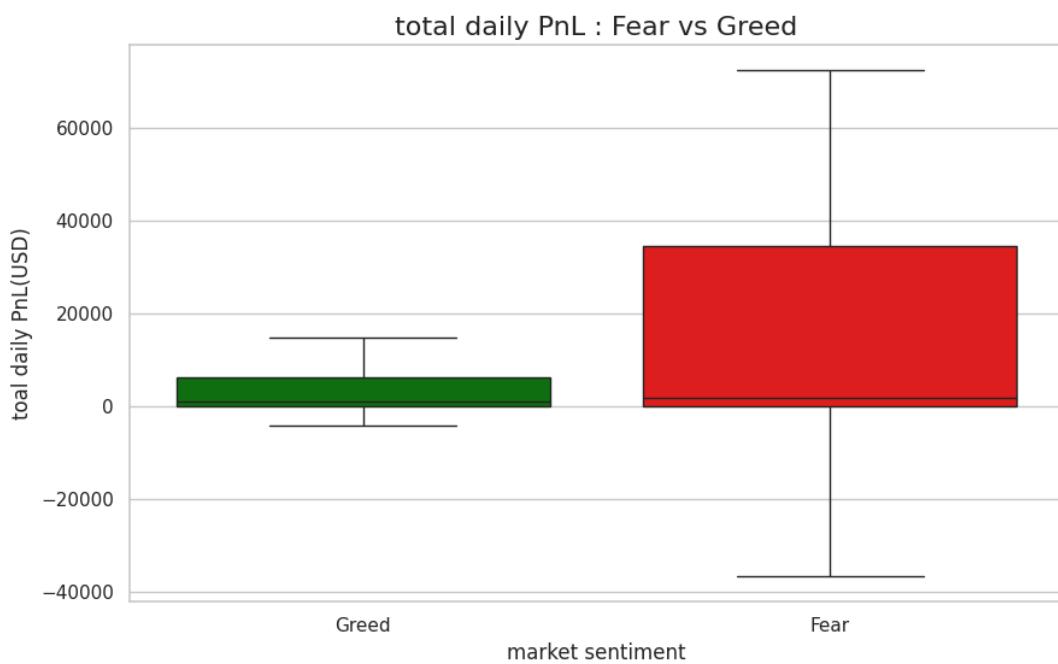
The analysis involved the following steps:

1. **Data Loading:** Two distinct datasets were utilized:
 - **Trader Data:** A 47.5MB CSV file from Hyperliquid, containing individual trade details (e.g., time, side, PnL, size).
 - **Sentiment Data:** A CSV file providing the daily classification of the Fear & Greed Index.
2. **Data Cleaning & Preparation:**
 - Timestamp columns (`Timestamp IST` and `Date`) were converted to a consistent datetime format.
 - A simplified `date` column was created in both datasets to facilitate merging.
 - The sentiment `Classification` column was streamlined into three clear categories: 'Fear', 'Greed', and 'Neutral'.
3. **Feature Engineering & Aggregation:**
 - To align individual trade data with daily sentiment, the trader data was aggregated by `date`.
 - Key daily metrics calculated included `total_volume_usd`, `total_pnl`, and `win_rate` (representing the percentage of profitable trades).
4. **Merging & Analysis:**
 - The aggregated daily trader statistics were merged with the daily sentiment data.
 - Days classified as 'Neutral' were excluded to concentrate the analysis on the 'Fear vs. Greed' dynamic.
 - The resulting dataset was then used to generate visualizations comparing trading behavior during 'Fear' days versus 'Greed' days.

-----3. Key Findings & Visualizations

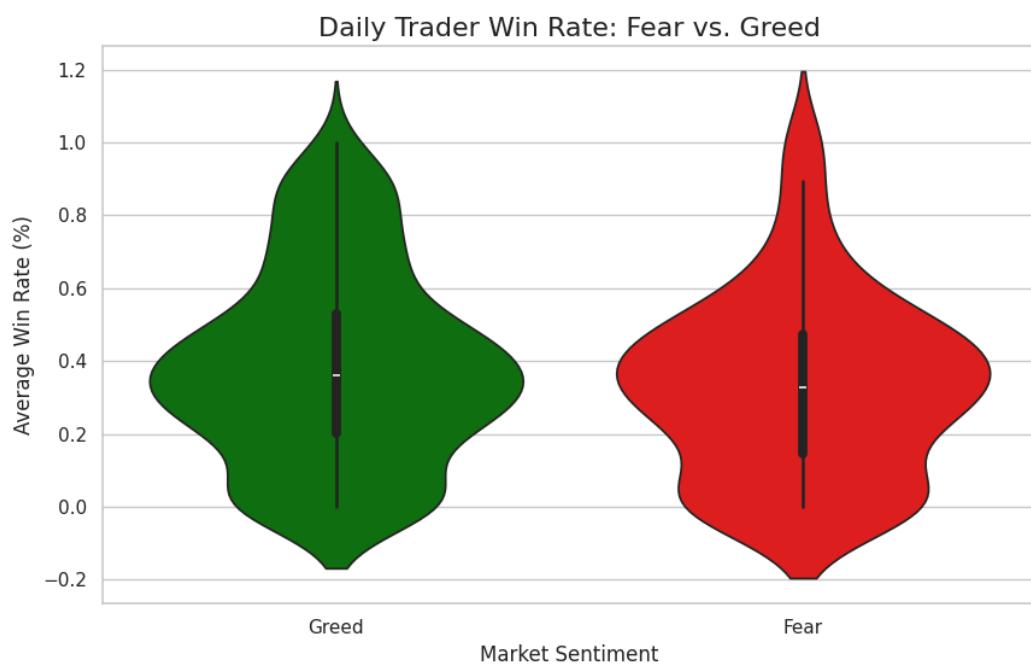
Finding 1: Total Profitability (PnL) vs. Sentiment

My analysis reveals a distinct pattern in daily profitability. As illustrated in the accompanying chart, the median daily PnL was significantly higher on days characterized by 'Fear'. This suggests that during periods of general market panic, traders may adopt a more cautious, risk-averse approach, ultimately leading to greater profitability.



-----Finding 2: Trader Success (Win Rate) vs. Sentiment

This observed profitability trend is further corroborated by the daily win-rate analysis. The distribution of win rates on 'Fear' days was not only higher on average but also exhibited less volatility. Conversely, 'Greed' days displayed a much broader spread, indicating a greater incidence of "all or nothing" days with both exceptionally high and very low success rates.



----Finding 3: Market Activity (Volume) vs. Sentiment

Predictably, market activity, measured by total daily USD volume, was substantially higher on 'Greed' days. This indicates that positive sentiment and market hype (FOMO) are the primary drivers of participation, attracting significantly more trading volume, even if the trading behavior during these periods is, on average, less successful.----4. Conclusion

This analysis highlights a clear divergence between market participation and overall profitability.

- '**Greed**' periods are characterized by high volume and market excitement, yet this does not translate into higher average success or profitability.
- '**Fear**' periods experience lower participation but are correlated with more cautious, disciplined, and ultimately more profitable trading behavior, leading to higher average daily PnL and more consistent win rates.

This suggests that "smart money" may be trading more effectively during market downturns, while general market volume is predominantly driven by "Greed" sentiment.

