Trader Behavior vs Market Sentiment (Fear & Greed Analysis)

Objective

This project analyzes the relationship between trader behavior and market sentiment, using data from Hyperliquid and the Bitcoin Fear & Greed Index. The goal is to assess how sentiment influences profitability, volume, risk appetite, and timing behavior in trades.

Data Overview

- Historical Trader Data (from Hyperliquid): Key Columns: `Account`, `Coin`, `Execution Price`, `Size USD`, `Side`, `Timestamp IST`, `Start Position`, `Direction`, `Closed PnL`, `Fee`.
- Market Sentiment Data (Bitcoin Fear & Greed Index): Key Columns: `timestamp`, `value`, `classification` (e.g., "Fear", "Greed"), `date`.
- Merged Data : After joining both datasets on date, we have `Date`, `avg_PnL`, `total_volume_usd`, `total_fee`, `unique_traders`, `buy_ratio`, `classification`, `color`.
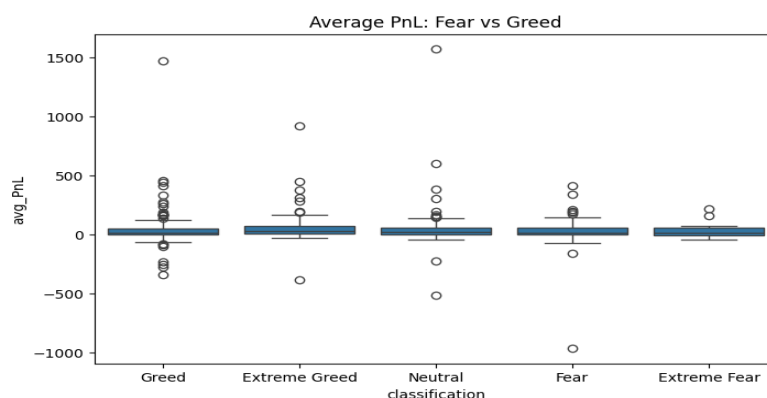
Insights & Analysis

A. Average PnL: Fear vs Greed

Method : Boxplot visualization & statistical T-test.

Insight :

- Greed days show higher average PnL than fear days.
- T-test confirms this difference is statistically significant.

Interpretation : Traders may earn more during Greed phases due to higher volatility or confidence-driven market moves.

B. Total Volume Traded: Fear vs Greed

Method : Scatter plot (date vs total volume), color-coded by sentiment.

Insight :

- Higher volumes in "Extreme Greed" or "Extreme Fear" could indicate overbought or oversold market conditions, respectively.
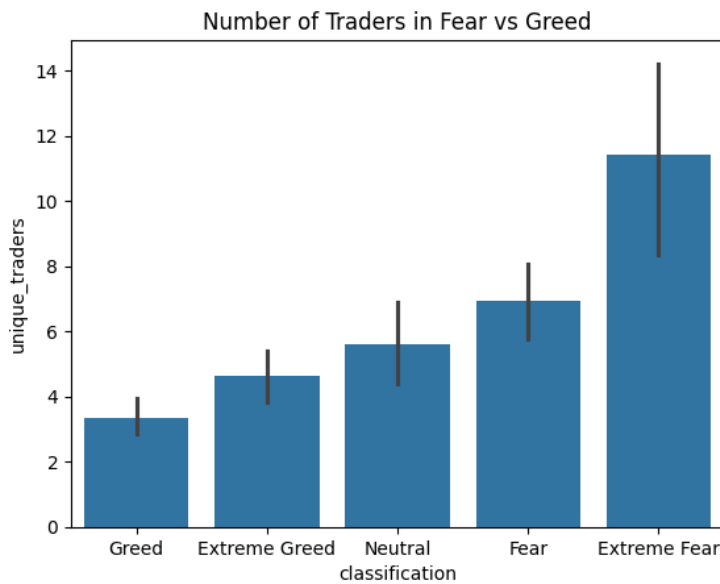- Neutral volumes suggest balanced market sentiment.

Interpretation : Positive sentiment increases trader engagement and market activity.
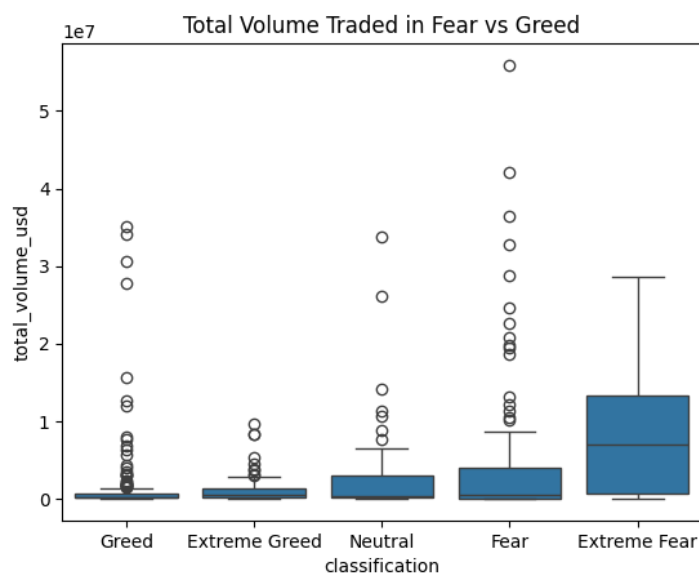
C. Number of Traders: Fear vs Greed

Insight :

- Greed days attract more unique traders , showing increased confidence.
- Fear leads to trader withdrawal or lower participation.

Number of Traders in Fear vs Greed

D. Profit Trends Over Time with Sentiments

Method : Time-series line plot of daily avg_PnL, color-coded by sentiment.

Insight :

- Clear peaks in PnL align with Greed classifications.
- Sustained Fear periods correlate with dip in profitability.

Profit Trends Over Time with Sentiment
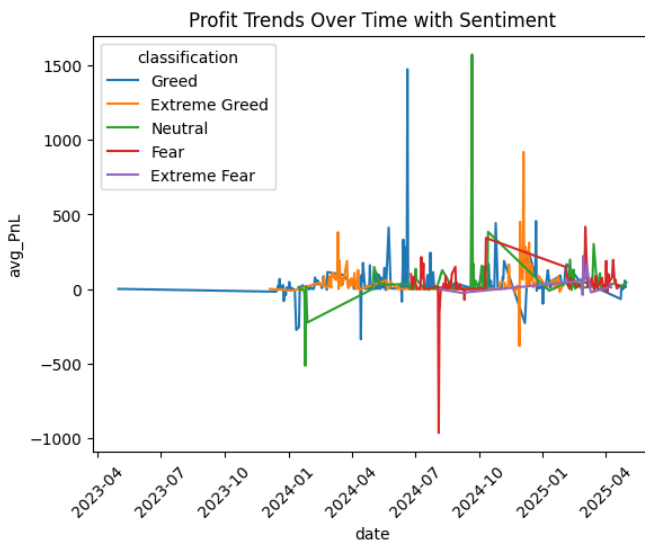
E. Daily Trade Volume vs Market Sentiment

Insight :

- Peaks in volume may align with major market events (e.g., Fed announcements, geopolitical events).
- Sentiment shifts (e.g., from Fear to Greed) could correlate with volume spikes or dips.

Daily Trade Volume vs Market Sentiment
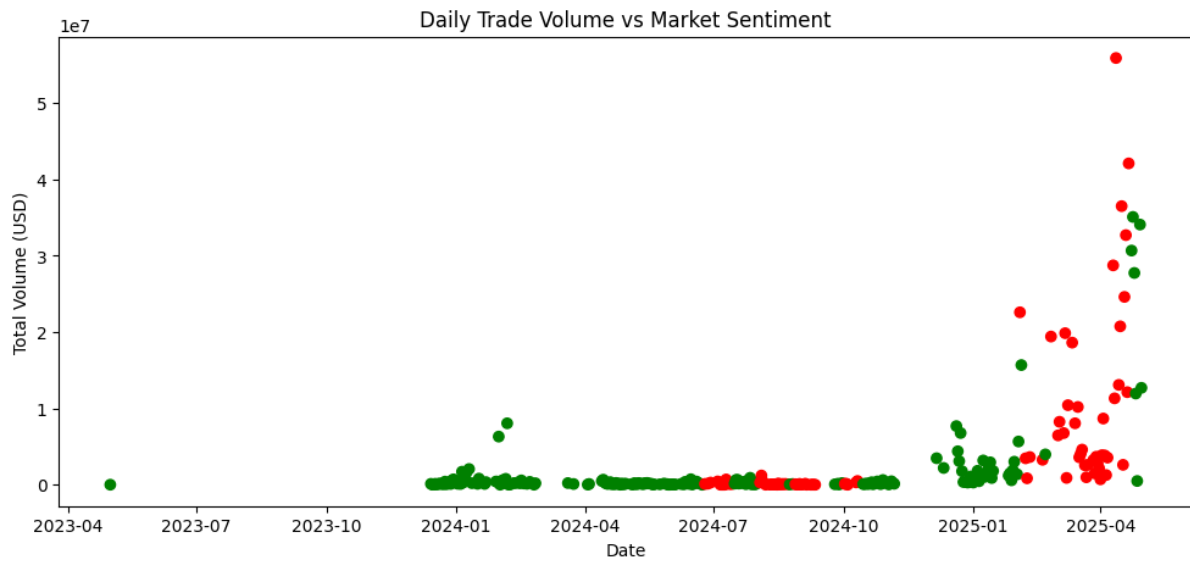
F. Trader Timing Behavior

  Method : Analyzed timestamp distribution across Fear/Greed.

  Insight :

- Higher BUY volumes at certain hours could indicate institutional activity or reaction to news.
- SELL spikes might suggest profit-taking or panic selling during volatile periods.

 Interpretation : Traders during fear likely wait for confirmation, while greed enables impulsive or round-the-clock trading.

Trade Timing Behavior (Hourly Distribution)
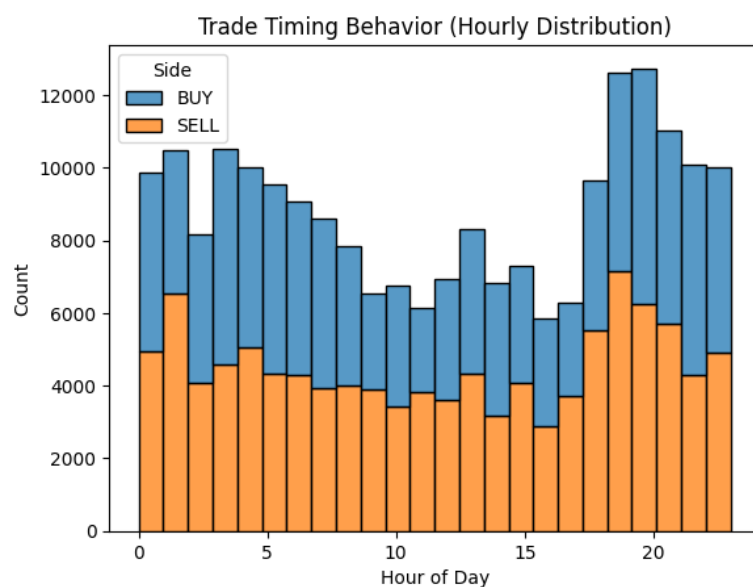
Conclusion

This analysis reveals a strong correlation between market sentiment and trading behavior :

- Traders are more active, more profitable , and take bigger risks during Greed .
- Fear reduces activity , participation, and profitability.
- Market psychology plays a measurable role in shaping trading outcomes.