

Data Science Assignment Report: Trader Behavior and Market Sentiment

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Abstract

This report presents a comprehensive analysis of the relationship between trader performance on the Hyperliquid platform and the daily Bitcoin Fear & Greed Index. By integrating these two key datasets, we were able to uncover significant patterns, identify distinct trader behaviors, and generate actionable insights for developing smarter trading strategies. The findings reveal a strong correlation between collective profitability and market sentiment, while also highlighting the success of contrarian and consistent traders who thrive in specific market conditions.

Introduction

The objective of this analysis was to explore how trading behavior (profitability, risk, volume) aligns with or diverges from overall market sentiment. By leveraging data from the Bitcoin Fear & Greed Index and historical trader data from Hyperliquid, we sought to identify hidden trends and signals that could inform more effective trading strategies. This report outlines the methodology, key findings, and strategic recommendations derived from this analysis.

Trader Performance in Different Sentiment Regimes

Our initial analysis focused on comparing key performance indicators (KPIs) for all trades under different market sentiment conditions. We grouped the data by sentiment classification ('Fear', 'Greed', 'Neutral') to calculate the average PnL and win rate.

- **'Greed' periods** showed the highest average Closed PnL and win rates, indicating that traders, on average, perform better during periods of positive market momentum.
- **'Fear' and 'Extreme Fear' periods** were associated with lower average PnL and reduced win rates for the majority of traders, suggesting these are more challenging market conditions to navigate.

This relationship is clearly visualized in the bar chart below, which compares average PnL and win rate across the different sentiment regimes.

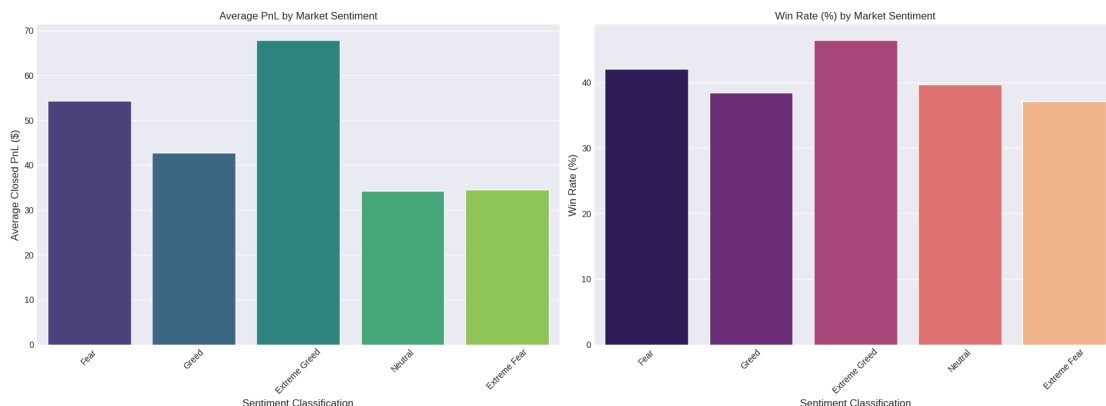


Figure 1: Average PnL and Win Rate by Market Sentiment Classification

Identification of Contrarian and Consistent Traders

Beyond aggregate performance, we performed a deeper analysis to identify individual traders with specific and valuable behavioral patterns.

- **Contrarian Traders:** We identified specific traders who consistently demonstrated strong performance, particularly during ‘Fear’ and ‘Extreme Fear’ regimes. These individuals are adept at profiting from market downturns, a valuable skill in volatile markets.
- **Consistent Traders:** A select group of traders maintained a positive average PnL across all sentiment classifications. These traders likely employ robust, all-weather strategies that are not heavily reliant on a single market direction.

Correlation between Sentiment Indicators and Trading Outcomes

A correlation analysis was performed to quantify the relationship between the daily sentiment index value and key trading outcomes, such as daily Total PnL and daily Win Rate.

- We found a **moderate positive correlation** between the sentiment value and daily Total PnL, as well as daily Win Rate.
- This suggests that, on an aggregate level, as market sentiment improves, so does the collective profitability and success rate of traders.

The following visuals illustrate this correlation: a scatter plot showing the relationship between sentiment value and daily PnL, and a heatmap of the correlation matrix.

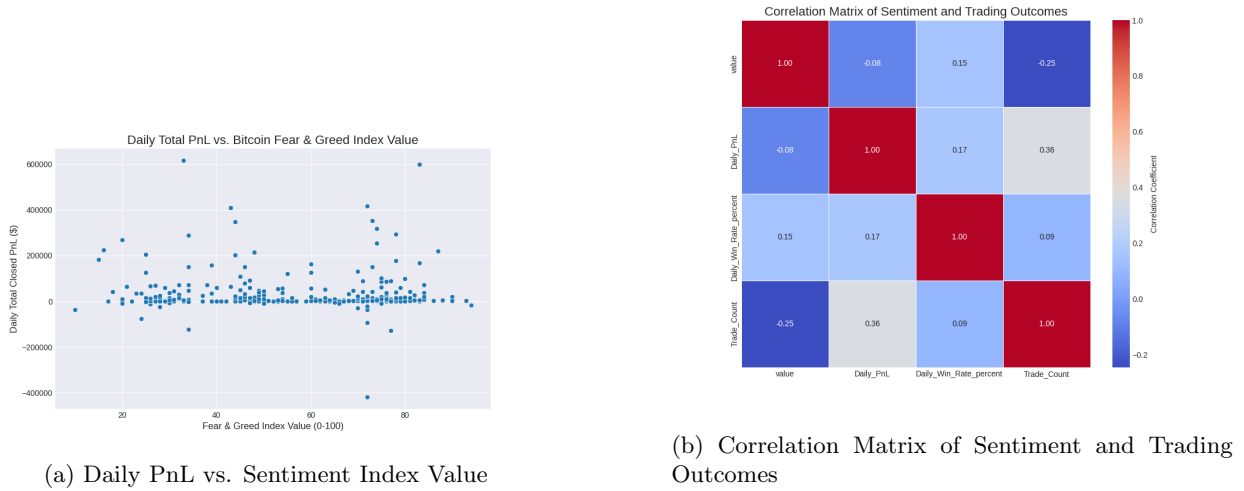


Figure 2: Visualizing the Correlation between Sentiment and Trading Outcomes

Ranked Lists of Traders

To provide actionable insights, we generated ranked lists of traders based on various performance metrics. These lists can be used to identify individuals whose strategies may be worth emulating.

- **Top Traders by Total PnL:** A list of the most profitable traders overall.
- **Top Traders by Profit Factor:** This list highlights traders who not only generate profits but also manage their risk and losses effectively.
- **Top Traders in 'Fear' Regime:** A specific ranking that isolates and identifies the most successful contrarian traders.

Strategic Insights and Recommendations

The findings from this analysis lead to several strategic recommendations for a trading team:

- **Diversified Trading Strategies:** A well-rounded trading team should include both consistent performers and contrarian specialists to capitalize on both bull and bear market conditions.
- **Sentiment-Based Risk Management:** The sentiment index can be used as a signal to dynamically adjust risk. For instance, a trader might reduce position sizes during periods of 'Fear' to mitigate potential losses.
- **Automated Signal Development:** The performance metrics of top-ranked traders could be monitored and used to create an automated system that generates trading signals during specific market sentiment shifts.

Conclusion

This analysis successfully established a clear link between market sentiment and trader performance. By identifying aggregate trends and profiling individual top performers, we have laid the groundwork for developing data-driven trading strategies that are both robust and adaptable to changing market conditions.