

Analysis Summary: Relationship Between Trader Behavior and Bitcoin Market Sentiment

Introduction

This analysis explored the relationship between historical trader behavior data from Hyperliquid and Bitcoin market sentiment, aiming to identify trends and signals that could inform trading strategies. The analysis involved data preprocessing, feature engineering, data merging, exploratory data analysis, relationship analysis, and identification of hidden trends/signals.

Key Findings

1. Sentiment and Market Activity

Exploratory analysis and ANOVA tests revealed a statistically significant relationship between sentiment classification and daily trading volume ('Daily_Total_Size_USD'). There was a tendency for higher average daily total trade sizes during 'Fear' and 'Neutral' periods compared to 'Greed' and 'Extreme Greed', counter to initial intuition. This was supported by box plots showing wider distributions of individual trade sizes and higher median daily total trade sizes during 'Fear' and 'Neutral' sentiment. Correlation analysis showed a weak negative correlation between Sentiment Score and Daily Total Trade Size (-0.16).

2. Sentiment and Profitability

ANOVA tests also indicated a statistically significant difference in average daily closed PnL ('Daily_Average_Closed_PnL') across different sentiment classifications. 'Extreme Greed' showed the highest average daily closed PnL, followed by 'Fear' and 'Greed'. However, the correlation between Sentiment Score and individual trade PnL ('Closed PnL') was very weak (0.008), and scatter plots did not show a clear linear relationship. This suggests that while market sentiment might influence overall average profitability on a given day, it is not a strong predictor of the profitability of individual trades.

3. Trade Type Performance under Different Sentiment Conditions

Analyzing the average Closed PnL by Trade Type under different sentiment classifications revealed significant variations. 'BUY_Close Short' and 'SELL_Close Long' trades generally showed positive average PnL across most sentiment categories. 'BUY_Short > Long' trades, which might represent aggressive shorting in a generally bullish market, showed a substantial negative average PnL during 'Extreme Fear'. 'SELL_Auto-Deleveraging' showed a high average PnL during 'Greed', but this is an involuntary liquidation process rather than a typical trading strategy.

4. Lag Effects of Sentiment

Analysis of 1-day and 2-day lagged sentiment scores showed weak negative correlations with daily total trade size and very weak positive correlations with average daily PnL. This suggests that simple lagged sentiment might not be a strong leading indicator for overall market volume or profitability in this dataset.

5. Account-Level Insights

Analyzing trading metrics at the individual account level across different sentiment classifications highlighted that different traders exhibit varying degrees of profitability and trading activity depending on market sentiment. Identifying accounts that consistently perform well in specific sentiment environments (e.g., accounts with high average PnL during 'Extreme Fear') could potentially inform strategies like following or analyzing their trades during those periods.

6. Trade Characteristics by Sentiment

While Execution Prices were broadly distributed across sentiment classifications, there were indications of potentially larger average trade sizes ('Size USD') during 'Greed' and 'Extreme Greed' periods compared to 'Fear' and 'Extreme Fear', although the box plots showed considerable overlap and outliers.

7. Trends Over Time

Visualizing the trends of daily total trade size, average daily PnL, and average sentiment score over time did not reveal strong, clear cyclical patterns or seasonality within the analyzed period. Market activity and profitability appeared more influenced by specific events or periods of increased volatility.

Potential Trends and Signals for Trading Strategies

The finding that higher trading volume can occur during 'Fear' and 'Neutral' sentiment periods suggests that opportunities might exist to capitalize on increased market activity during these times, perhaps through strategies that focus on liquidity or short-term price movements. Identifying trade types that perform better or worse under specific sentiment conditions can help refine trading strategies by focusing on more profitable trade execution methods based on the prevailing market sentiment. Further analysis into the characteristics of accounts that remain profitable or even thrive during adverse sentiment conditions ('Extreme Fear') could provide valuable insights into robust trading strategies. The observation that 'Extreme Greed' had the highest average daily PnL while 'Fear' and 'Neutral' had higher volume suggests that contrarian approaches during extreme sentiment might be more profitable, although this requires careful risk management.

Limitations and Further Investigation

The analysis relied on a specific period of historical data; the relationships observed may change over time. Sentiment data is a single indicator; incorporating other market indicators (e.g., volatility, on-chain data) could provide a more comprehensive view. The definition of 'profitability' used (Closed PnL) is based on closed trades; accounting for open positions and unrealized PnL could offer a more complete picture of account performance. Further statistical modeling (e.g., regression analysis with multiple variables and time series analysis) could help quantify the relationships more rigorously and build predictive models. Investigating the specific strategies employed by consistently profitable traders during different sentiment phases would be a valuable area for future research.

Conclusion

While the relationship between broad market sentiment and individual trade profitability is not strongly linear, sentiment classification does appear to influence overall daily market volume and average daily profitability. Analyzing trade type performance under varying sentiment and identifying successful traders' behavior during different market conditions offer promising avenues for developing sentiment-aware trading strategies.