Trader Behavior vs Market Sentiment

Data Science Assignment Report

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1. Objective

The objective of this analysis is to examine how trader behavior-profitability, trading volume, and risk exposure-varies across different Bitcoin market sentiment conditions. By integrating historical trader data from Hyperliquid with the Bitcoin Fear & Greed Index, the study aims to uncover behavioral patterns and hidden signals that can support smarter, sentiment-aware trading strategies.

2. Datasets Used

Bitcoin Market Sentiment Dataset: Provides daily market sentiment classified into four categories: **Extreme Fear, Fear, Neutral, Greed and Extreme Greed**. Preserving all five categories enables granular analysis of market psychology.

Historical Trader Data (Hyperliquid): Contains trade-level details such as execution price, trade size, direction, timestamps, and closed profit and loss (PnL). Trades are aggregated daily and aligned with market sentiment using trade dates.

3. Methodology

All timestamps were standardized and missing PnL values were treated as zero. Additional features were engineered, including trade volume (price x size) and a profitability flag.

Instead of collapsing sentiment into a binary Fear–Greed classification, the analysis preserves the original **four-class sentiment structure** to capture nuanced behavioral differences. A secondary binary grouping is optionally derived for high-level comparison. Trader data was merged with sentiment data on date, followed by sentiment-wise aggregation of PnL, volume, win rate, and trade frequency.

4. Key Findings

- Trading activity and average volume increase significantly during **Greed**, indicating heightened participation.
- Increased volume during Greed does **not** translate into proportionally higher profitability.
- **Extreme Fear** periods exhibit lower trading volume but improved risk-adjusted outcomes, suggesting more disciplined trading behavior.
- PnL volatility is highest during Greed, particularly for large-volume trades.
- Win rates remain relatively stable across sentiment states, implying that higher risk-taking does not guarantee better performance.

5. Hidden Risk Signals

Analysis of Greed periods shows clustering of large negative PnL values at higher trade volumes. This indicates risk concentration during optimistic market phases, where traders tend to overexpose themselves despite unchanged success rates.

6. Conclusion

The results show that market sentiment strongly influences trader behavior, primarily by affecting risk appetite rather than profitability. Preserving the four-class sentiment structure reveals behavioral nuances that would be obscured under a binary model. Overall, sentiment serves as a powerful **risk indicator**, emphasizing the importance of sentiment-aware position sizing and risk management in trading strategies.

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