Analyzing Trader Behavior and Market Sentiment in Bitcoin Trading

Introduction

This study examines how trader behavior, profitability, volume, and risk align with Bitcoin market sentiment ranging from Fear to Greed. Using historical order data from Hyperliquid and the Fear & Greed sentiment index, we reveal behavioral patterns influencing smarter Web3 trading strategies.

Data Overview

- Sentiment Dataset: Daily Fear & Greed index classifications and values from 2018 to 2025.
- Trader Dataset: Transaction level data from 32 traders and 246 trading symbols during 2024, including metrics like trade size, profit/loss, and timestamps.

Methodology

- Date and time fields were standardized to datetime types across datasets.
- Missing data verification confirmed dataset integrity.
- Trader data is aggregated daily for key metrics: total trades, unique traders, average closed profit/loss, and total volume.
- Daily sentiment classifications merged with aggregated trader metrics.
- Visual explorations and statistical tests compared trader behavior during different sentiment regimes.
- Risk proxies, trade size variability (standard deviation), and maximum trade size were computed and analyzed by sentiment.
- Correlation coefficients quantified associations between continuous sentiment scores and trading activity.

Key Findings

- **Profitability and Volume**: Average trader profitability and total trading volume increase significantly during **Greed** phases compared to **Fear**, as confirmed by *t-tests ($p < 0.05$)*.
- **Risk Appetite**: Trade size variability and maximum trade size rise in Greed phases, indicating that traders adopt **riskier positions** when sentiment is optimistic.
- **Correlations**:
    - Sentiment value shows a **weak negative correlation** with total trading volume (**r = -0.157**).
    - Average closed PnL also shows a **weak negative correlation** with sentiment (**r = -0.116**).
    - The total number of trades exhibits a **weak negative correlation** with sentiment (**r = -0.182**).

Note: These correlation values are **weak in magnitude**, so while statistically relevant, they do not indicate strong linear relationships. The **regime-based comparisons (Fear vs. Greed)** provide clearer behavioral differences.

Conclusions and Recommendations

Market emotions impact trading behaviors and outcomes significantly. Integrating Fear & Greed sentiment into trading strategies can enable dynamic adjustments in aggressiveness and risk management, thereby optimizing returns relative to prevailing market emotions.

Further research is recommended to:

- Investigate intraday sentiment effects on trading behavior,
- Incorporate leverage and other risk metrics if data becomes available,
- Develop and test automated trading models responsive to real-time sentiment shifts.

Appendix

- Visualizations illustrating trader metrics across sentiment categories
- Results of statistical tests comparing Fear and Greed regimes
- Correlation coefficient tables for quantitative relationships
- Processed data files used in the analysis:
    - Daily aggregated trader data:

      `csv_files/daily_trader_metrics.csv`

    - Merged trader data with sentiment labels:

      `csv_files/merged_trader_sentiment.csv`