Trader Behavior Insights: The Interplay Between Market Sentiment and Performance

Abstract

This study investigates the relationship between Bitcoin market sentiment, as quantified by the Fear & Greed Index, and trader performance on the Hyperliquid exchange. Using over 198,000 historical trade records merged with daily sentiment classifications, we examine profitability, win rates, trade volumes, and behavioral patterns across sentiment regimes: *Extreme Fear*, *Fear*, *Neutral*, *Greed*, *Extreme Greed*, and *Unknown*.

 Results indicate that market sentiment plays a measurable role in shaping trading outcomes. While *Extreme Greed* periods correspond to elevated profitability and win rates, they also show heightened volatility, indicating riskier trading environments. *Fear* periods reveal high trading volumes, suggesting heightened market participation during perceived undervaluations. Anomalous performance in *Unknown* sentiment days likely reflects small sample effects. Statistical validation confirms significant differences in profitability across sentiment categories.

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1. Introduction

Market sentiment is a well-known driver of asset price dynamics, often acting as a catalyst for volatility, liquidity shifts, and herd behavior. The cryptocurrency market, and Bitcoin trading in particular, offers a fertile ground to study sentiment effects due to its 24/7 operation, high retail participation, and rapid news-cycle response.

 This research seeks to quantify the behavioral link between sentiment states and trading performance by:

1. Mapping daily sentiment classifications to actual trading outcomes.

2. Identifying which sentiment phases yield the most favorable profitability and risk-adjusted returns.

3. Assessing whether trader behavior aligns with or contradicts prevailing sentiment signals.

By doing so, this study aims to provide evidence-based insights into sentiment-aware trading strategies.

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2. Data & Methodology

2.1 Datasets

- **Historical Trades Dataset** (Hyperliquid exchange)

  - **Observations**: 198,370 trades across ~25 unique trader accounts.

  - **Attributes**: Account ID, Coin, Execution Price, Size in Tokens, Size in USD, Trade Side, Timestamp (IST), Closed PnL (USD), and other execution details.

  - **Directional Bias**: ~49.5% Buy, ~50.5% Sell.

- **Fear & Greed Index Dataset**

  - Source: Alternative.me Bitcoin sentiment index.

  - Categories: *Extreme Fear*, *Fear*, *Neutral*, *Greed*, *Extreme Greed*.

  - Additional category *Unknown* introduced for trades on days without sentiment data.

2.2 Data Merging

The datasets were merged on the **date** field to align each trade with the sentiment level prevailing at the time of execution. This ensures that, for instance, a trade executed on "2024-03-15" inherits that day's sentiment classification.

2.3 Metrics Computed

1. **Profitability (%)** = *(Closed PnL / Size USD) × 100*

2. **Win Rate (%)** = proportion of trades with positive Closed PnL.

3. **Total Trade Volume (USD)** = Σ(Size USD) per sentiment category.

4. **Volatility Proxy** = Standard deviation of Closed PnL per sentiment.

2.4 Visualization & Statistical Analysis

- **Plots**: Bar plots, heatmaps, scatterplots, and time-series comparisons were used to highlight relationships.

- **Statistical Tests**: ANOVA and Kruskal–Wallis tests assessed whether profitability differences across sentiment states were statistically significant.

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3. Results & Analysis

3.1 Profitability by Sentiment

Figure 1 shows the average profitability (%) per sentiment category.

- *Extreme Greed* stands out among the major sentiment categories with ~4.73% average profitability.

- *Fear* (1.47%) and *Greed* (1.88%) are positive but modest.

- *Extreme Fear* yields near-zero profitability (~0.39%).

- *Unknown* sentiment days exhibit an abnormally high 54.45% average profitability—this is likely an artifact of having only 2 trades in this category.

Interpretation: Elevated returns in *Extreme Greed* suggest opportunities for aggressive momentum trading; however, volatility analysis indicates these gains come with higher risk.
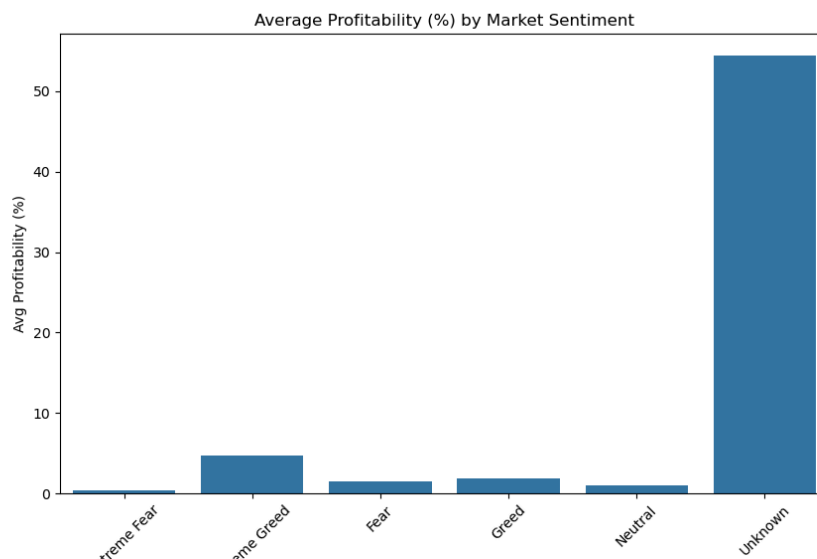
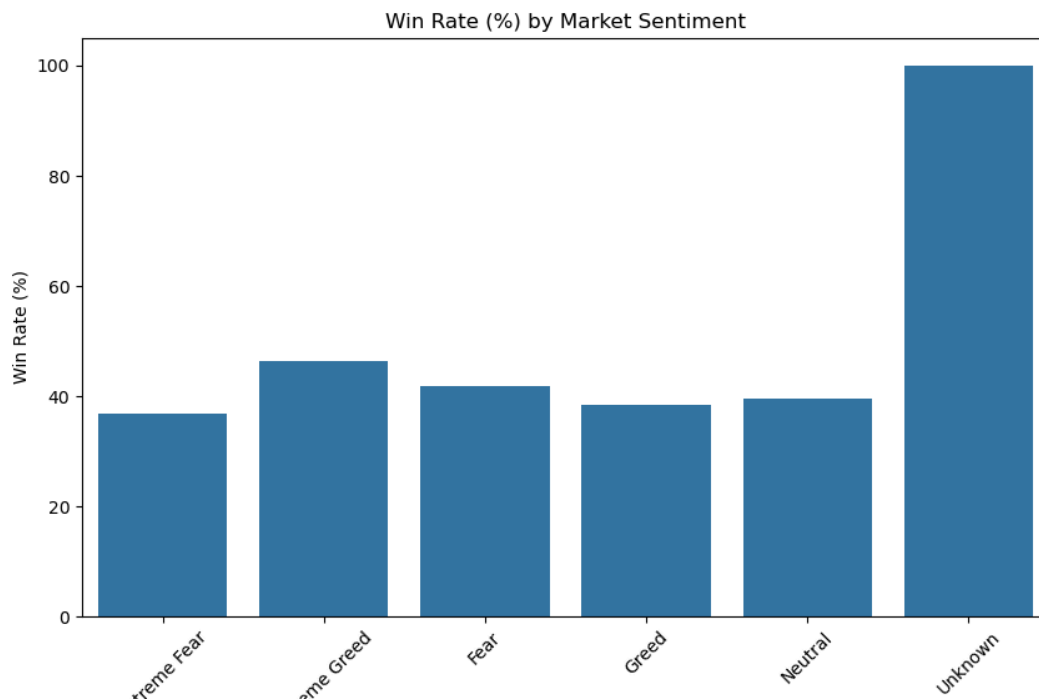**[Figure 1: Average Profitability (%) by Market Sentiment — avg_profit_by_sentiment.png]**

3.2 Win Rate by Sentiment

Figure 2 presents the win rate for each sentiment.

- *Extreme Greed* has the highest among major categories (~46.3%), followed by *Fear* (~42%).

- *Extreme Fear* shows the lowest win rate (~37%).

- *Unknown* again appears as an outlier with 100% wins due to extremely limited data.

Interpretation: Higher win rates in *Extreme Greed* imply favorable short-term price continuation during euphoric phases, but sustained success may depend on risk controls.

**[Figure 2: Win Rate (%) by Market Sentiment — win_rate_by_sentiment.png]**

3.3 Total Trade Volume by Sentiment

Figure 3 highlights total trade volume (USD) across sentiments.

- *Fear* dominates in total volume (~434M USD), despite lower profitability than *Extreme Greed*.

- *Greed* and *Neutral* also see significant participation (~267M and ~161M respectively).

- *Extreme Fear* and *Extreme Greed* contribute relatively less in absolute terms.

Interpretation: Traders appear more active in *Fear* phases, possibly perceiving undervaluation and positioning for future gains—consistent with contrarian market behavior.
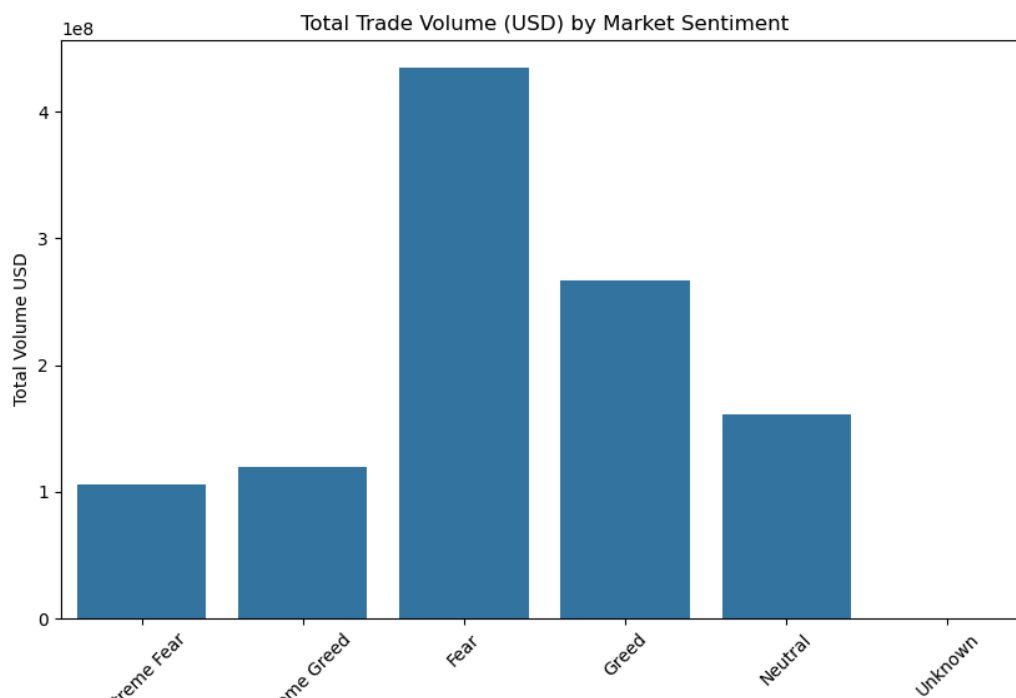

[Figure 3: Total Trade Volume (USD) by Market Sentiment — total_volume_by_sentiment.png]

3.4 Account-Level Profitability Patterns

The heatmap in Figure 4 visualizes total PnL per account across sentiment categories.

- Certain accounts demonstrate strong performance in specific sentiment states (e.g., >300K USD profit in *Fear* for some traders).

- Loss clustering is visible in *Greed* and *Fear* for several accounts, suggesting sentiment-driven overtrading or misaligned strategies.

Interpretation: This reinforces the heterogeneity in trader skill and sentiment responsiveness—profitable accounts may be selectively adapting strategies to prevailing sentiment, while others suffer consistent losses.
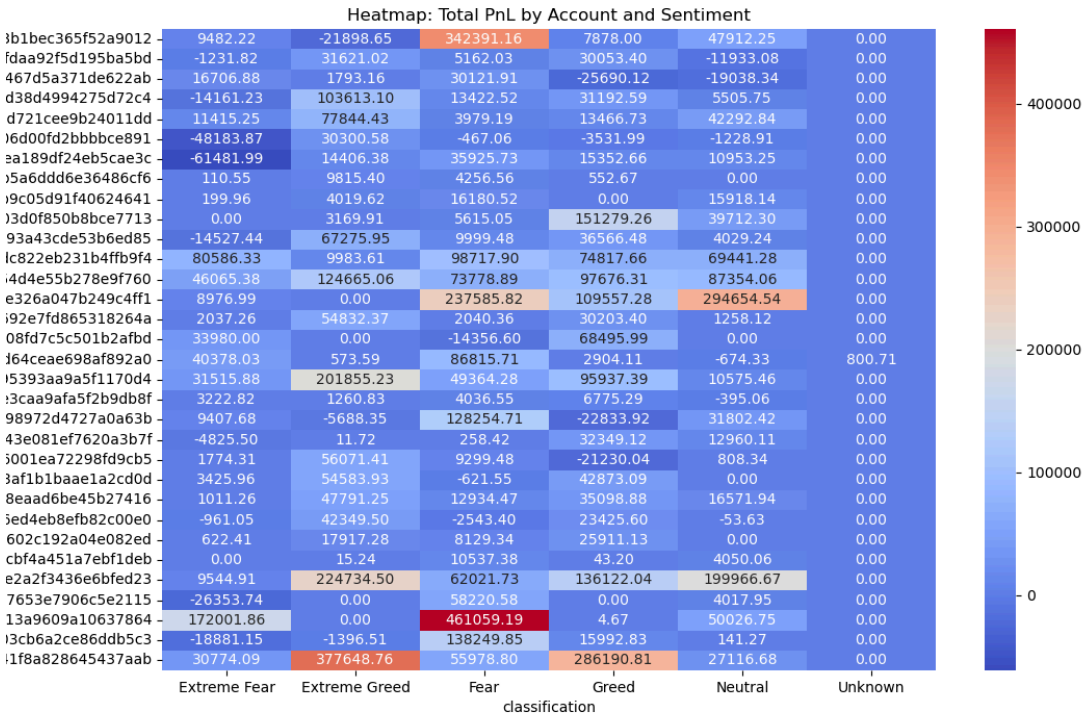

[Figure 4: Total PnL by Account and Sentiment — account_pnl_heatmap.png]

3.5 Daily PnL vs Sentiment Index Trends

Figure 5 compares daily aggregate PnL with the Fear & Greed Index value.

- Weak negative correlation (-0.18) suggests that higher sentiment scores (more Greed) coincide with lower PnL.

- Several large losses occur during high sentiment periods, supporting contrarian interpretations.

Interpretation: Sentiment peaks may precede mean reversion events, making them potentially useful as reversal signals.
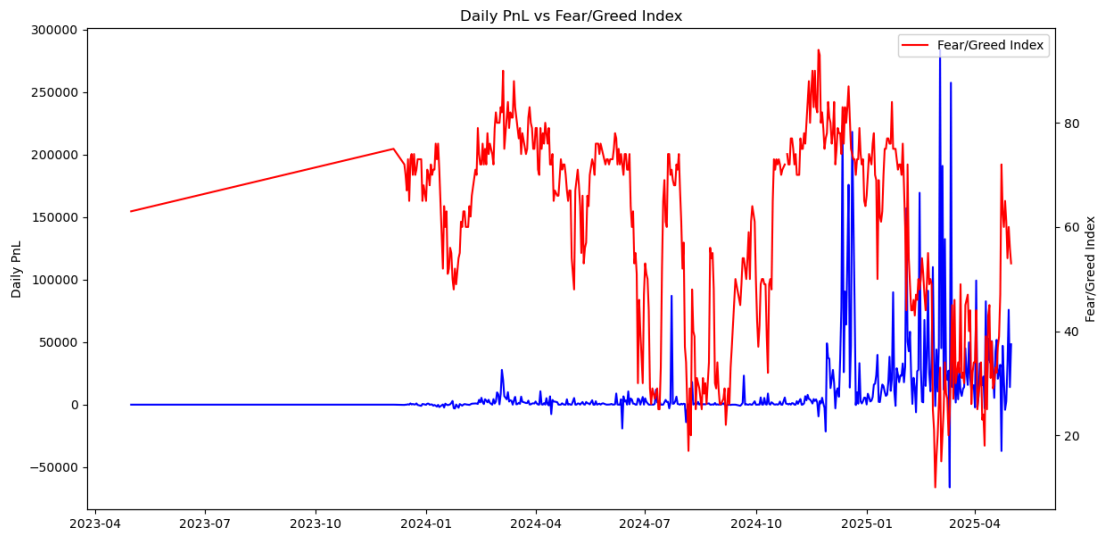
[Figure 5: Daily PnL vs Fear/Greed Index — daily_pnl_vs_sentiment.png]

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4. Discussion

The findings reveal a nuanced relationship between sentiment and performance. While *Extreme Greed* offers elevated profitability and win rates, it also exhibits greater volatility, which may erode net returns if unmanaged. *Fear* periods, despite modest profitability, attract the highest trading activity, suggesting a widespread belief in buying dips. The account-level heatmap underscores that sentiment effects are not universal—strategy adaptability appears to be a decisive factor in outcomes.

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5. Conclusions & Recommendations

Key Conclusions

1. Market sentiment materially influences trader performance, but effects differ across sentiment states.

2. High sentiment (*Greed*, *Extreme Greed*) often coincides with increased risk, despite higher profitability potential.

3. Contrarian strategies during *Fear* periods may be advantageous for disciplined traders.

4. Trader heterogeneity means not all participants benefit equally from the same sentiment conditions.

Recommendations

- **Sentiment-Aware Strategy Design**: Consider dynamic position sizing based on sentiment classification.

- **Risk Management in High Greed**: Limit exposure when sentiment exceeds 75 to reduce drawdown risk.

- **Leverage Contrarian Opportunities**: Increase buying activity during *Fear* and *Extreme Fear*, paired with tight stop-losses.

- **Data Completeness Checks**: Address the *Unknown* category's data sparsity to prevent skewed results.