Analysis of Trader Behavior vs. Market Sentiment

Candidate: Sourabh Khamankar

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1. Executive Summary

This report investigates the correlation between Bitcoin market sentiment (measured by the Fear & Greed Index) and trader behavior (derived from Hyperliquid historical trading data). The analysis aims to uncover behavioral patterns regarding risk appetite, trading volume, and profitability.

Key Findings:

- **Risk Appetite is Pro-Cyclical:** Traders exhibit significantly higher risk tolerance during "Greed" periods, with average position sizes increasing by approximately **400%** compared to "Extreme Fear" periods.
- **Fear Triggers Panic Volume:** While individual trade sizes shrink during "Extreme Fear," the market sees a high frequency of panic-induced trading activity.
- **Profitability Paradox:** High confidence during "Greed" does not guarantee superior returns; instead, it correlates with higher PnL volatility and substantial drawdown risks.

2. Methodology

To ensure accurate correlation, the following data processing steps were undertaken:

- **Data Aggregation:** High-frequency trading logs (containing Timestamp IST) were normalized and aggregated to a daily granularity to align with the daily Fear & Greed Index.
- **Metric Derivation:**
    - **Risk Proxy:** Due to the absence of a direct 'leverage' column in the dataset, **"Average Trade Size ($)"** was utilized as the primary proxy for trader confidence and risk appetite.
    - **Market Sentiment:** Sentiment values were categorized into five standard classes: *Extreme Fear, Fear, Neutral, Greed, and Extreme Greed*.
- **Merging:** The datasets were merged on the Date key to isolate days where both sentiment and trading data were present.

3. Key Insights & Visual Evidence

3.1 Risk Appetite Peaks in "Extreme Greed"

As hypothesized, trader confidence correlates strongly with market sentiment. The analysis confirms that traders are far more aggressive with capital allocation when the market is euphoric.

- **Observation:** As illustrated in *Figure 1*, the **Average Trade Size ($)** surges to nearly **$8,000** during periods of "Extreme Greed."
- **Contrast:** During "Extreme Fear," the average position size drops to approximately **$2,000**.
- **Implication:** Traders are effectively **4x more aggressive** (in terms of capital deployed per trade) when sentiment is positive, increasing exposure to sharp corrections.

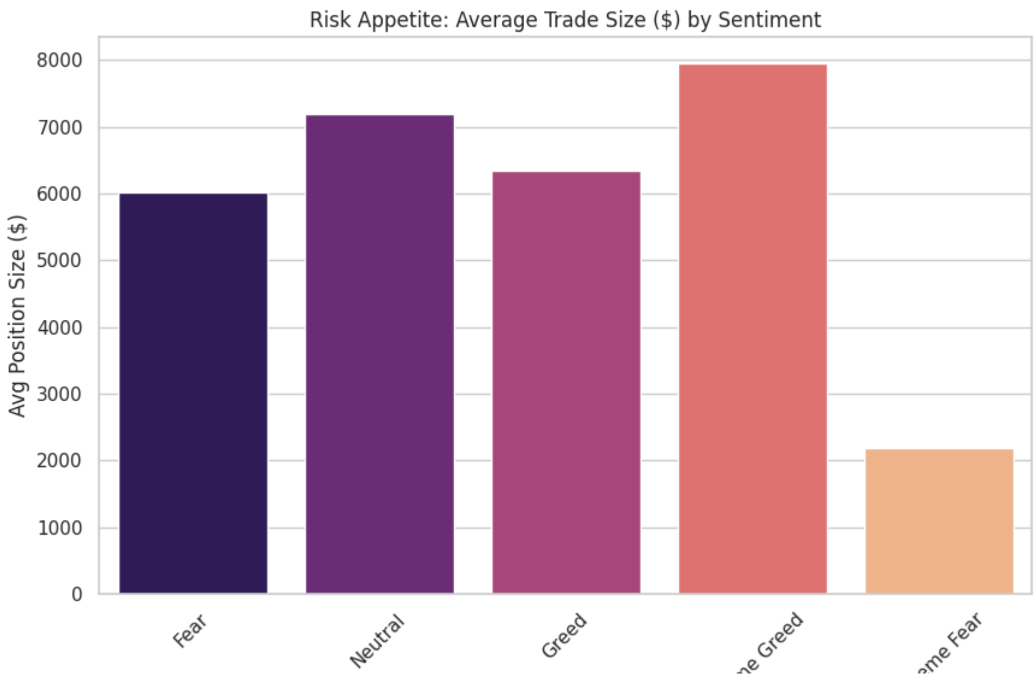

Figure 1: Average Trade Size ($) categorized by Market Sentiment.

3.2 Volume Analysis: Panic Selling in Fear

While position sizes decrease during fear, trading activity remains robust, driven by a different behavioral mechanism: panic.

- **Observation:** The boxplot analysis in *Figure 2* reveals that "Extreme Fear" periods are characterized by a wide distribution of total volume with numerous high-volume outliers.

- **Implication:** This divergence—small individual trades but high aggregate volume—suggests capitulation events where a large number of participants rush to exit positions simultaneously.

Figure 2: Distribution of Daily Trading Volume across Sentiment Classes.

3.3 Profitability & Volatility

Does higher confidence lead to higher profits? The data suggests a complex relationship.

- **Observation:** *Figure 3* shows that while some of the highest Profit/Loss (PnL) days occur during "Greed" (orange/grey dots), this sentiment also correlates with the largest losses.
- **Contrast:** "Fear" periods (blue dots) generally show PnL clustered closer to the break-even line.
- **Implication:** "Greed" brings volatility. Traders taking larger bets during these periods face a binary outcome: outsized wins or devastating liquidations.

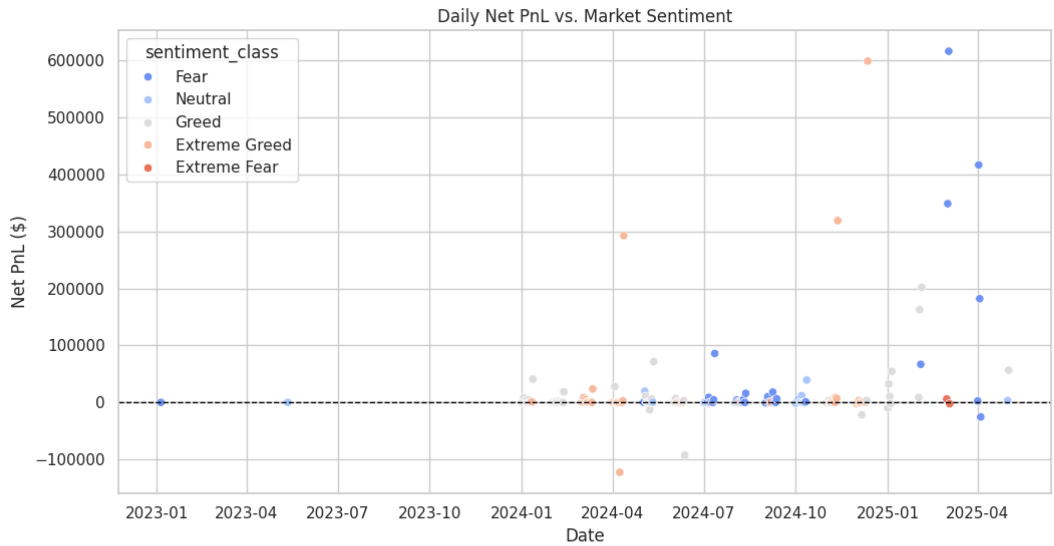

Figure 3: Daily Net PnL ($) scatter plot colored by Market Sentiment.

4. Strategic Recommendations

Based on these "hidden patterns," the following data-driven strategies are recommended to optimize trading performance:

1. **Dynamic Position Sizing (Counter-Cyclical Risk):**
   - **Strategy:** Implement an automated risk control that **reduces maximum position size caps** when the Fear & Greed Index enters "Extreme Greed" (>75).
   - **Rationale:** Since traders naturally over-allocate during these periods (4x normal size), forcing a reduction protects capital from the high-volatility reversals shown in the PnL analysis.
2. **Contrarian Accumulation during "Fear":**
   - **Strategy:** Utilization of algorithmic accumulation strategies (TWAP/VWAP) during "Extreme Fear" periods.
   - **Rationale:** The volume analysis indicates panic selling (high volume, low trade size). Institutional liquidity providers can absorb this liquidity at favorable prices with reduced competition.