**Bitcoin Sentiment & Trader Performance Analysis**

### Objective

To explore the relationship between Bitcoin market sentiment (Fear/Greed Index) and real-world trader performance using historical trade data from Hyperliquid. The goal is to uncover actionable insights and recommend sentiment-aware trading strategies.

### Datasets Used

1. **Bitcoin Fear & Greed Index**
   * Columns: timestamp, value (0-100 score), classification (e.g., Fear, Greed), date
2. **Hyperliquid Trader Data**
   * Columns: account, execution\_price, size\_usd, side, timestamp\_ist, closed\_pnl, etc.

### Data Preparation Steps

1. **Preprocessing**
   * Standardized column names
   * Converted timestamps to datetime objects
   * Extracted date from timestamp\_ist to merge both datasets
2. **Merging Datasets**
   * Inner join on date to combine trade data with sentiment classification for the same day
3. **Feature Engineering**
   * is\_profitable: Boolean for closed\_pnl > 0
   * normalized\_pnl: closed\_pnl / size\_usd
   * pnl\_category: Categorical labels - High Loss, Loss, Breakeven, Profit, High Profit
   * sentiment\_score: Mapped values (0 to 4) from classification

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### Exploratory Data Analysis (EDA)

#### Profitability by Sentiment

* Trades during **Greed** and **Extreme Greed** had the **highest profit rate**
* Trades during **Fear** and especially **Extreme Fear** had lower profitability

#### Normalized PnL by Sentiment

* **Normalized returns** (PnL per USD invested) are significantly higher during **Greed**
* Suggests better risk-reward during optimistic market conditions

#### PnL Category Distributions

* **Breakeven** trades dominate across all sentiments
* **High Profit** more common in **Greed/Extreme Greed**
* **High Loss** spikes in **Extreme Fear**, indicating higher risk exposure

#### Sentiment Over Time

* Visualizing sentiment trends reveals clear sentiment cycles that align with Bitcoin market trends (bull/bear)

## Insights

1. **Sentiment and Profitability Correlation** - Trades during *Greed* and *Extreme Greed* sentiment phases show higher average profitability. - *Fear* and *Extreme Fear* phases are associated with increased loss frequency.
2. **PnL Behavior Patterns** - **Normalized PnL** is consistently higher during *Greed* phases, indicating that traders make more per dollar invested. - *Value-weighted PnL* peaks during high sentiment values, suggesting traders invest larger amounts when confident.
3. **Volatility Exposure** - Execution prices are more volatile during high sentiment, highlighting riskier but potentially higher-reward trading conditions.
4. **Sentiment as a Predictor** - Sentiment score shows moderate correlation with profitability metrics, making it a viable feature for predictive modeling. - Traders seem to reduce positions during fear phases, potentially missing reversal opportunities.
5. **Trade Behavior Metrics** - Metrics like **PnL per token** and **log execution price** provide granular insight into trade efficiency. - Breakeven trades tend to cluster around neutral sentiment phases.

### Strategy Recommendations

#### Sentiment-Based Execution

* **Prioritize trades during “Greed” or “Extreme Greed”** for better average returns
* **Avoid aggressive trades during “Extreme Fear”**; reduce position size or use strict risk management
* **Aggressive strategy**: Trigger during *Greed* and *Extreme Greed*, prioritizing high-value trades.
* **Defensive strategy**: Deploy during *Fear* and *Extreme Fear*, focusing on smaller, quick-exit positions

#### Sentiment-Aware Signal Filtering

* Combine technical setups with **Greed sentiment filters** to confirm high-probability trades

#### Trade Efficiency Optimization

* Encourage analysis of **pnl\_per\_token** and **normalized\_pnl** post-trade to continuously optimize execution strategies.

#### Position Sizing & Leverage Adjustments

* Increase leverage conservatively during Greed
* Use tighter stops or lower exposure during Fear

#### Fee Optimization

* Many breakeven trades imply opportunity to reduce slippage and fees
* Bundle small trades or use lower-fee environments

#### Backtest & Automate

* Build backtests for strategies like:
  + Enter long during “Greed”, exit on “Neutral”
  + Avoid trades during “Extreme Fear”
* Automate strategy testing and use historical sentiment to simulate outcomes

#### Forecasting Model Development

* Use engineered features (e.g., **log execution price**, **sentiment\_score**, **value\_weighted\_pnl**) to train machine learning models that predict trade outcomes or optimal entry points.

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## Actionable Implementation Ideas

#### a. Dashboard Development -

* Visualize live sentiment index overlayed with real-time trading metrics. - Include PnL heatmaps, trade clustering by sentiment, and risk levels.

#### b. Trader Alerts System -

* Sentiment triggers to alert traders when extreme conditions are detected.

#### c. Strategy Backtesting by Sentiment Phase -

* Simulate historical performance of different strategies segmented by sentiment.

#### d. Portfolio Allocation Shift -

* Recommend portfolio rebalancing strategies based on rolling sentiment average.

## Suggested Next Steps

* Integrate real-time sentiment feeds into the trading platform.
* Implement ML-based trade scoring model.
* Establish continuous performance review dashboards.
* Run A/B tests on sentiment-reactive strategies.

## Conclusion

* The Fear & Greed Index is a valuable signal for understanding trader behavior and optimizing strategy.
* Combining engineered trade metrics with sentiment-driven insights offers a roadmap to smarter, more adaptable trading strategies.
* Through continuous learning and strategic alignment, traders can improve both profitability and risk management.