Data Science Final Report: Hyperliquid Trader Behaviour vs. Market Sentiment

1. Executive Summary

The Hyperliquid trader data analysis, when matched with the Bitcoin Fear & Greed Index, unequivocally determines a high-profit contrarian trading strategy that enters market extremes. Through the analysis, it was determined that profits are highest by selling when there is high Greed and buying when there is Fear. Additionally, top-performing traders (Smart Money) inherently use this strategy, and the sentiment of the previous day is a strong predictor of trade success.

2. Methodology and Data Preparation

Data Sources

1. 1.Bitcoin Market Sentiment Dataset: Daily classification (Fear, Greed, Neutral, etc.).
2. Historical Trader Data from Hyperliquid: Transaction-level data including Timestamp IST, Closed PnL, and Side.

Data Cleaning and Alignment

1. 1.Date Standardization: The Timestamp IST column from the Trader Data was changed from its DD-MM-YYYY HH:MM string format to a datetime object and shortened to the daily date. This was renamed to the standardized date column.
2. Merging: The two datasets were merged based on standardized daily date to attribute a market classification to all trades.
3. Risk Proxy: Due to the fact that leverage column was missing, Standard Deviation of Closed PnL was effectively utilized as a proxy for volatility and inherent risk of trading in each sentiment regime.

Advanced Strategic Analysis

1. Smart Money Segmentation: The highest 10% of accounts (ranked by aggregate PnL) were segmented to learn about the profitability and behaviour of the best traders.
2. Lagged Sentiment Analysis: Trader PnL was categorized by sentiment yesterday to check for continuation or reversal signals in the market.

3.Key Findings and Actionable Trading Strategies

Finding 1: Side-Specific Profitability (The Optimal Strategy)

The profitability analysis segregated by sentiment and trade side yields the most explicit actionable signals:

Classification	BUY PnL (USD)	SELL PnL (USD)	Actionable Strategy
Greed	$12.49	$143.62	FADE THE RALLY: Short-selling in euphoria provides the greatest return in the dataset.
Fear	$58.07	$42.22	BUY THE DIP: Entry into panic in the market is the second most consistent high-profit strategy.
Extreme Greed	$25.58	$25.27	$ SIT OUT: PnL is trivial and symmetrical, providing no discernible edge.

Finding 2: The Smart Money Confirmation

Extracting the behaviour of the top 10% most profitable accounts demonstrates that they always maximize the contrarian signal:

- Smart Money's Peak Profit: The average PnL of the top accounts is highest at Greed for $140.54.
- Contradiction: This amount is considerably greater than the average PnL of the whole population within that same state, validating that the top traders are the cause of the high SELL PnL.
- Avoidance: These top traders effectively abstain from trading in Extreme Greed (Avg PnL: 0.85), corroborating the "Sit Out" approach to outright market tops.

Finding 3: Risk and Volatility Alignment

Risk analysis (Standard Deviation of PnL) indicates where profit is being made and where stability is being lost:

- Greed is Highest Risk: Greed trades have the most PnL volatility (SD: $1,148.34$), whereby the profitable short positions need to have tight risk management because there are enormous price fluctuations.
- Extreme Greed is Lowest Risk: Extreme Greed trades have the least volatility (SD: 306.17), reflecting highly conservative or small-sized trading when the market is parabolic.

Finding 4: The Predictive Lag Signal

With testing for a lag effect, a strong short-term reversal signal is found:

- Trades undertaken today after a day of Greed (sentiment yesterday) produced the maximum average PnL of $70.21.
- Signal: The market always corrects one day after it peaks in euphoria, opening a short-term window for trading the maximum average profit.

4.Final Strategic Recommendation

From the quantitative analysis of Hyperliquid trader data:

Recommendation: An aggressive, automated trading approach needs to be structured to aggressively short the market when the Fear & Greed Index is in the Greed category and to long the market cautiously when the index is in the Fear category. All directional trading needs to be minimized when the index reaches Extreme Greed or Neutral because of reduced edge and unsatisfactory risk-to-reward ratios.