Yashwith Behara

Report: Analysis of Trader Behavior vs. Market Sentiment

Executive Summary

The objective of the analyzed notebook was to explore the relationship between market sentiment, as measured by the **Bitcoin Fear/Greed Index (FGI)**, and the performance of traders on the Hyperliquid platform. The primary finding from all analytical approaches (exploratory analysis, statistical testing, and predictive modeling) is that **market sentiment has no statistically significant or predictive relationship with trader profitability or win rates.**

The single most dominant factor distinguishing profitable traders from unprofitable ones is their **individual skill**, represented by a high, consistent win rate. Top traders perform well regardless of whether the market is in a state of "Extreme Fear" or "Extreme Greed."

Detailed Findings from Notebook Outputs

Here is a step-by-step breakdown of what each section of the notebook concluded:

1. Data Preprocessing & Initial Observations

- **Datasets:** The analysis merged two datasets: `historical_data.csv` (211,224 trader transactions) and `fear_greed_index.csv` (2,644 daily sentiment readings).
- **Data Cleaning:** The trader data was filtered for 'BTC' transactions, and `Closed PnL` and `Timestamp` fields were converted to the correct numerical and datetime formats for analysis.
- **Sentiment Distribution:** A pie chart of sentiment classifications showed that the market (and thus the trades) were predominantly in a state of **Fear (38.1%)** or **Extreme Fear (28.4%)** during the analyzed period.

2. Exploratory Analysis: Sentiment vs. Aggregate Performance This section tested the core hypothesis on the market as a whole.

- **Daily PnL vs. Sentiment:**
  - A time-series plot of aggregate Daily Closed PnL against the FGI showed no obvious correlation. PnL was highly volatile, while the FGI moved in clearer trends.
  - A boxplot of PnL grouped by sentiment class revealed that the median PnL for all categories (from "Extreme Fear" to "Extreme Greed") was **approximately zero**.
  - Statistical tests comparing PnL in "Extreme Fear" vs. "Extreme Greed" markets found **no significant difference** (T-test p-value: 0.93; Mann-Whitney U p-value: 0.53).
- **Win Rate vs. Sentiment:**
  - A "win" was defined as any trade with `Closed PnL > 0`.
  - A bar chart showed that the aggregate win rate was **nearly identical across all sentiment classes**, hovering between 21% and 22%. "Extreme Greed" had a slightly

higher win rate (22.1%) than "Extreme Fear" (21.0%), but the difference was minimal.

Conclusion 1: On an aggregate level, market sentiment has no discernible impact on daily profitability or the likelihood of a trade being successful.

3. Trader-Level Analysis: What Separates Top & Bottom Traders? This section analyzed performance at the individual trader level, filtering for those with at least 10 trades.

- **Top vs. Bottom Traders:** Traders were ranked by `total_pnl` and segmented into the Top 10% and Bottom 10%. A comparison of their average metrics revealed:
  - **Win Rate:** This was the key differentiator. Top traders had an average win rate of **57.1%**, while bottom traders had a win rate of only **17.3%**.
  - **Average Trade Size:** This was *not* a differentiator. Both groups had a similar average trade size (Top: $103.5k vs. Bottom: $106.3k).
  - **Average Sentiment (FGI):** This was also *not* a differentiator. Both groups traded in nearly identical market conditions (Avg FGI: 44.2 for Top vs. 44.6 for Bottom).
- **Top Trader Consistency:** An analysis of *only* the Top 10% traders showed:
  - Their win rate remained stable in both "Fear" (57.5%) and "Greed" (56.0%) markets.
  - Statistical tests confirmed there was no significant difference in their PnL between "Fear" and "Greed" days (p-values > 0.49).

Conclusion 2: Profitability is driven by **trader skill (win rate)**, not by trade size or market timing based on sentiment. Top-tier traders are profitable *regardless* of the prevailing market sentiment.

4. Predictive Modeling: Can Sentiment Predict a Winning Trade? A Random Forest Classifier was trained to predict if an individual trade would be a win (`is_win = 1`) or a loss (`is_win = 0`).

- **Model Performance:** The model's overall performance was poor, with an **ROC AUC score of 0.65** (little better than a 0.5 coin flip). The classification report showed it was especially bad at identifying wins (Recall: 0.07), likely due to the highly imbalanced dataset (most trades are losses).
- **Feature Importance (SHAP):** A SHAP summary plot was generated to find the most important features for the model's predictions.
  - **Most Important Feature:** The trader's own historical `account_win_rate` was, by a very large margin, the most predictive feature.
  - **Sentiment Features:** All sentiment-related features (`fgi_value`, `fgi_class_Fear`, etc.) were at the bottom of the list with **near-zero importance**.

Conclusion 3: Market sentiment has **no predictive value** for the outcome of an individual trade. A trader's past performance is the strongest predictor of their future success.

5. Flawed Analysis (Leverage) The final section of the notebook attempted to analyze leverage. However, the proxy for leverage was calculated as `leverage = size_usd / pnl`, which is conceptually flawed. Therefore, the scatter plot and any conclusions drawn from this specific section are unreliable and should be disregarded.

Overall Conclusion and Understandings

The analysis in this notebook robustly concludes that the **Fear/Greed Index is not a useful indicator for predicting trader performance**, either on an aggregate market level or for individual trades. The idea that one should "buy the fear" or "sell the greed" is not supported by this data.

Trader profitability is almost entirely a function of **individual skill**, defined as the ability to maintain a high win rate over time. Successful traders demonstrated this skill consistently, and their profitability was not dependent on market sentiment.