Trader Behavior vs Market Sentiment

Data Science Assignment – Web3 Trading Team

Candidate Name: Tanisha Rathi
Role Applied: Junior Data Scientist – Trader Behavior Insights

1. Objective

The objective of this analysis is to explore the relationship between trader behavior and Bitcoin market sentiment (Fear vs Greed).
The study aims to understand how profitability, risk-taking, and trade size vary across different sentiment regimes and to identify behavioral patterns that could inform smarter trading strategies in Web3 markets.

2. Datasets

2.1 Bitcoin Market Sentiment Dataset

- Source: Fear & Greed Index
- Columns used:
    - Date
    - Classification (Fear, Extreme Fear, Neutral, Greed, Extreme Greed)
- Purpose:
    - To capture overall market psychology on a daily basis

2.2 Historical Trader Data (Hyperliquid)

- Source: Hyperliquid historical trade records
- Key columns used:
    - Account
    - Coin
    - Execution Price
    - Size USD
    - Side
    - Timestamp
    - Closed PnL
- Purpose:
    - To analyze trader performance, risk exposure, and profitability

3. Methodology

1. **Data Cleaning & Preprocessing**
    - Converted timestamp columns to datetime format
    - Cleaned numeric fields such as Closed PnL and trade size
    - Removed invalid or missing sentiment mappings
2. **Sentiment Alignment**
    - Aligned intraday trade data with daily market sentiment using date mapping
    - Normalized sentiment into three regimes:
        - Fear
        - Greed
        - Neutral
3. **Feature Engineering**
    - Created a binary profitability indicator (is_profit)
    - Aggregated metrics by sentiment group:
        - Average Closed PnL
        - Trade size (USD)
        - Win rate
4. **Exploratory Data Analysis**
    - Used boxplots to analyze the distribution of PnL across sentiment regimes
    - Examined volatility, outliers, and median performance

4. Key Insights

- **Greed periods exhibit the highest risk-taking behavior**, with large trade sizes and extreme profit and loss outcomes.
- **Fear phases show comparatively conservative behavior**, with reduced volatility but continued opportunities for profitability.
- **Neutral sentiment corresponds to low activity and minimal exposure**, indicating cautious trader behavior.
- Profitability dispersion is significantly wider during Greed than Fear, highlighting sentiment-driven risk appetite.

5. Conclusion

The analysis demonstrates that Bitcoin market sentiment has a strong influence on trader behavior and performance.
Greed periods encourage aggressive trading with high volatility, while Fear periods promote controlled risk exposure.

Incorporating sentiment indicators into trading strategies can enhance risk management and decision-making in crypto markets.

6. Google Colab Notebook Link

Notebook 1: https://github.com/Tanisha610/ds_tanisha_rathi.git

7. Notes on Dataset Size

Due to GitHub's file size limitations, a representative sampled version of the historical trader dataset has been included in the repository.
The complete dataset can be accessed using the official links provided in the assignment instructions.