Trader Behaviour & Market Sentiment Analysis

Data Science Assignment – Web3 Trading Team

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1. Introduction

This report presents an analytical exploration of trader behaviour and its relationship with overall market sentiment within the context of cryptocurrency trading. The goal is to understand how profitability, trading volume, and risk exposure change under different sentiment phases — specifically, when the market experiences ‘Fear’ or ‘Greed’. The analysis forms part of the Web3 Trading Team’s Data Science Assignment and leverages historical trading data alongside the Bitcoin Fear & Greed Index.

2. Dataset Overview

Two datasets were used for this study: (1) Historical Trader Data from the Hyperliquid exchange, and (2) the Bitcoin Market Sentiment dataset (Fear & Greed Index). The trader dataset includes attributes such as execution price, size, leverage, side, and closed profit/loss. The sentiment dataset provides daily classifications of market emotions (‘Fear’ or ‘Greed’) along with a numerical sentiment value ranging from 0 to 100.

3. Methodology

Data preprocessing involved standard cleaning tasks such as handling missing values, ensuring correct data types, and normalising column names. Time-based fields were converted to datetime format to align trade events with market sentiment dates. A merged dataset was then created on a daily basis, enabling a unified view of trader performance relative to sentiment levels.

Exploratory Data Analysis (EDA) techniques were applied to examine how profit/loss, leverage, and trading volume varied under Fear versus Greed conditions. Correlation, aggregation, and visual analytics (boxplots, line charts, and bar charts) were used to identify significant behavioural differences.

4. Analysis Summary

Figure 1: Trader Profitability vs Market Sentiment – Traders generally achieved higher Closed PnL during Greed phases, indicating a tendency to take more successful positions when market optimism prevails.

Figure 2: Leverage Distribution – The analysis revealed higher average leverage in Greed phases, suggesting increased risk appetite when confidence is high.

Figure 3: Trading Volume by Sentiment – Trade volumes were consistently higher during Greed, implying stronger participation and liquidity in positive sentiment markets.

Figure 4: Correlation Analysis – A mild positive correlation (~0.3) was observed between the Fear & Greed Index value and trader profitability, confirming that sentiment modestly influences performance outcomes.

5. Key Findings

1. Profitability tends to rise during market Greed phases, as traders take on larger and more confident positions. 2. Losses and reduced volume are more frequent during Fear phases, reflecting risk aversion and uncertainty. 3. Leverage usage increases significantly when sentiment is positive, amplifying both potential gains and risks. 4. Despite optimistic conditions, some traders still incur losses, highlighting behavioural overconfidence. 5. Overall, trading outcomes demonstrate partial alignment with sentiment, but individual strategy discipline remains a major factor.

6. Recommendations

Based on the analysis, several data-driven recommendations are proposed: • Implement a dynamic risk-control mechanism that adjusts leverage exposure according to sentiment intensity. • Use the Fear & Greed Index as a supplementary signal in trading algorithms to identify optimal entry and exit points. • Enhance trader awareness training on behavioural biases, particularly overconfidence during Greed phases. • Develop monitoring dashboards that integrate real-time sentiment and performance metrics.

7. Conclusion

The findings underscore that trader behaviour is influenced, though not fully dictated, by prevailing market sentiment. Greed phases tend to promote risk-taking and profitability, while Fear phases correspond with defensive strategies and reduced trading activity. By integrating sentiment-aware analytics into trading models, teams can make more balanced and informed decisions, improving performance consistency across varying market moods.