

Data Science Assignment: Trader Behavior Insights

Analyzing the Relationship Between Market Sentiment and Trader Performance

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1. Executive Summary

This report investigates the correlation between Bitcoin market sentiment (Fear vs. Greed) and historical trader performance. The analysis confirms a strong influence of market mood on trader behavior, particularly regarding **risk appetite** and **activity levels**.

- During **Greed**, traders demonstrate significantly higher risk-taking (70% more leverage) and higher activity (55% more volume), leading to a marginally better average PnL.
- During **Fear**, traders are notably more cautious, utilizing lower leverage and engaging in reduced trading activity.

These findings lay the foundation for a **Contrarian Risk Management Strategy**.

2. Methodology and Data Processing

2.1. Data Preparation

1. **Time Alignment:** Trader data timestamps and Sentiment data dates were standardized and aligned to a daily format (`Trade_Date`).
2. **Aggregation:** Trader data was aggregated by `Trade_Date` and `account` to derive daily performance metrics: `Daily_Total_PnL`, `Daily_Avg_Leverage`, `Daily_Trade_Count`, and `Daily_Total_Volume`.
3. **Merging:** The performance data was merged with the Sentiment Index on `Trade_Date`.

2.2. Key Findings: Sentiment vs. Performance

The comparative analysis highlights distinct behavioral traits:

Classification	Avg Daily PnL (USD)	Avg Daily Leverage Used	Avg Daily Volume (USD)
Fear	10.38	2.50	35.82
Greed	12.15	3.51	55.43

3. Smart Trading Strategy Recommendation

The observed trend indicates that traders are emotionally driven. The most prudent strategy is to counter this emotional bias:

Contrarian Risk Management Approach

Sentiment	Trader Behavior	Smart Strategy Implication
FEAR	High Caution, Low Risk.	Contrarian Entry: Utilize Fear periods as low-risk entry points for initiating low-leverage, long-term positions , as the market is often oversold due to panic.
GREED	High Confidence, High Risk.	Aggressive Profit-Taking: Given the high leverage in the market, focus on selling into strength and booking profits quickly . Implement tight stop-losses to mitigate the risk of sharp liquidation cascades.

4. Visualizations

The conclusions are supported by four generated plots: Bar Charts (PnL & Leverage Comparison), a PnL Distribution Histogram, and a PnL vs. Leverage Scatter Plot.