Analysis of Trader Behavior vs Market Sentiment

1. Introduction

Market sentiment plays a crucial role in influencing trader behavior in financial markets. Emotions such as fear and greed often drive decision-making, affecting risk appetite, trade size, and profitability.
This report analyzes the relationship between **Bitcoin market sentiment (Fear vs Greed)** and **trading behavior** using historical trader data.

The objective of this analysis is to understand how **profitability, risk, and trading volume** align or diverge from market sentiment and to identify patterns that could support **smarter, sentiment-aware trading strategies**.

2. Datasets Used

2.1 Bitcoin Market Sentiment Dataset

- Contains daily market sentiment classified as **Fear** or **Greed**
- Source: Fear & Greed Index dataset

2.2 Historical Trader Data

- Contains individual trade-level data including:
    - Trade size (USD)
    - Closed profit and loss (PnL)
    - Trade direction and timestamps
- Source: Hyperliquid historical trader dataset

Both datasets were merged on a common **Date** column to align each trade with the corresponding market sentiment.

3. Data Preparation & Processing

The following preprocessing steps were performed:

1. Converted timestamp columns to datetime format
2. Extracted date values for merging datasets

3. Merged trader data with market sentiment data using an inner join
4. Verified column integrity and handled naming inconsistencies
5. Performed exploratory data analysis (EDA) using statistical summaries and visualizations

All analysis was conducted using **Python (pandas, seaborn, matplotlib)** in Google Colab.

4. Exploratory Data Analysis & Findings

4.1 Profitability vs Market Sentiment

Analysis of **Closed PnL** across sentiment regimes reveals:

- **Greed periods** show higher variability in profits and losses
- **Fear periods** demonstrate more stable and conservative outcomes

This indicates that traders tend to take **more aggressive positions during greed**, resulting in higher potential returns but also higher downside risk.

4.2 Trading Volume vs Market Sentiment

Trade size (measured in **USD exposure**) shows clear sentiment-driven behavior:

- Larger average trade sizes during **Greed**
- Reduced trade sizes during **Fear**

This reflects a shift in trader confidence, where capital exposure increases in optimistic market conditions and decreases when sentiment is negative.

4.3 Risk Behavior (Proxy-Based Analysis)

Explicit **leverage data was not available** in the provided dataset.
Instead of making assumptions, risk behavior was evaluated using **established proxy measures**, including:

- **Position size (USD exposure)**
- **Profit and loss variability**

These proxies are commonly used in financial analytics when direct leverage or margin data is unavailable.

Findings indicate:

- Higher effective risk-taking during Greed phases
- Capital preservation behavior during Fear phases

5. Hidden Trends & Trading Signals

The analysis reveals several actionable insights:

Signal 1: Greed Amplifies Risk

- Larger trade sizes and higher PnL volatility
- Suggests increased risk appetite and emotional trading

Implication:
Risk controls (position limits, stop-losses) should be tighter during greed phases.

Signal 2: Fear Encourages Conservative Strategies

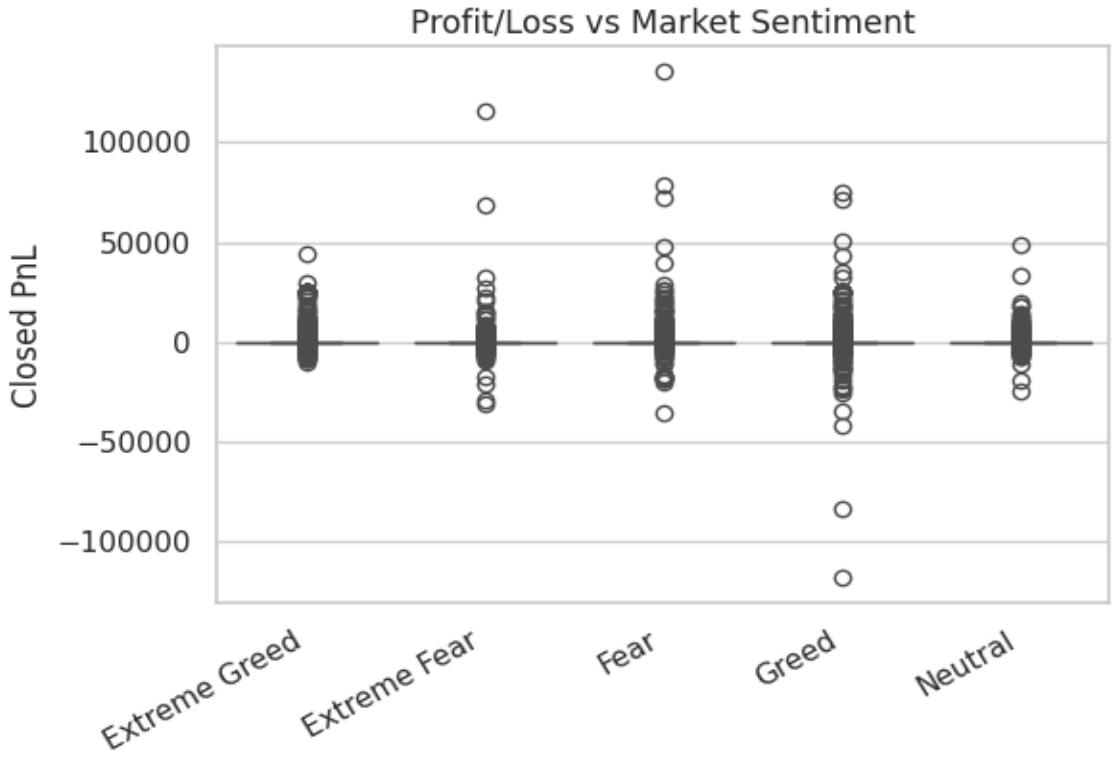
- Smaller trade sizes and reduced volatility
- Reflects cautious behavior and capital preservation

Implication:
Fear phases may offer opportunities for lower-risk accumulation strategies.

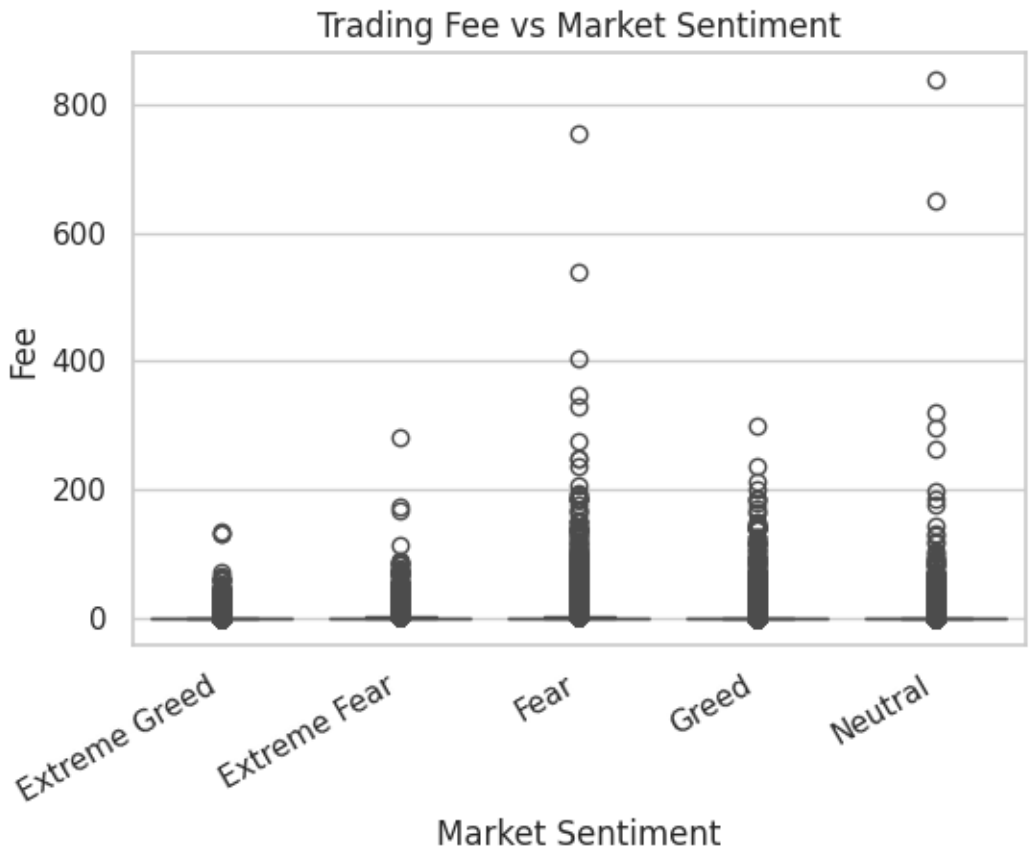
Signal 3: Market Sentiment as a Position-Sizing Tool

- Sentiment can be used as a dynamic input for adjusting exposure
- Helps traders adapt aggressiveness based on emotional market conditions

6.Visulization


Profit/Loss vs Market Sentiment
Closed PnL
100000
50000
0
−50000
−100000
Extreme Greed
Extreme Fear
Fear
Greed
Neutral
Market Sentiment


Trade Size vs Market Sentiment
1e6
Trade Size
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
Extreme Greed
Extreme Fear
Fear
Greed
Neutral
Market Sentiment



7.Limitations

- Leverage data was not explicitly available in the dataset
- Risk analysis was therefore based on indirect but widely accepted proxy measures

Future analysis could incorporate leverage or margin data for more precise risk attribution if such information becomes available.

8. Conclusion

This analysis demonstrates that **market sentiment significantly influences trading behavior**. Greed phases are associated with increased exposure and higher volatility, while fear phases encourage conservative trading behavior.

Even in the absence of explicit leverage data, meaningful insights were derived using professional risk proxies.
The findings highlight the importance of incorporating **sentiment-aware risk management and position sizing** into trading strategies to improve decision-making and manage downside risk.

9. Tools & Technologies

- Python
- pandas, seaborn, matplotlib
- Google Colab