

Analysis of Trader Behavior vs Market Sentiment

1. Introduction

The purpose of this project is to analyze how trader behavior changes with overall Bitcoin market sentiment. Market sentiment is classified as **Fear** or **Greed**, and it represents the emotional state of the market. Trader performance, risk level, trade size, and activity may vary depending on these conditions.

Two datasets were used:

- **Bitcoin Market Sentiment Dataset** — Contains Date and market classification (Fear/Greed).
- **Historical Trader Dataset** — Contains trade details such as execution price, trade size, side (buy/sell), leverage, and closed profit/loss (closedPnL).

The goal is to understand whether trading behavior aligns with or differs from market sentiment.

2. Data Preparation

The following steps were performed:

- Converted date columns into proper datetime format.
- Cleaned numerical columns like execution price, size, and closedPnL.
- Removed unnecessary columns.
- Handled missing values.
- Extracted day, month, and year from dates.
- Merged trader data with sentiment data using the date column.

This produced a final dataset where each trade is linked to the market sentiment of that day.

3. Graph-wise Analysis

1. Trade Count by Market Sentiment

This graph shows how many trades happened during Fear and Greed periods.

Observation: Trade activity is different under the two sentiments.

Meaning: Market emotion affects how active traders are. Some sentiments encourage more participation.

2. Average Closed PnL vs Market Sentiment

This graph compares the average profit or loss made during Fear and Greed.

Observation: Average profit differs between sentiments.

Meaning: Trader performance is influenced by overall market mood.

3. PnL Distribution by Market Sentiment

This boxplot shows the spread of profits and losses.

Observation: One sentiment shows more variation and extreme values.

Meaning: Risk and profit uncertainty change depending on sentiment.

4. Win Rate Vs Sentiment

This graph compares the percentage of profitable trades.

Observation: Win rate changes between Fear and Greed.

Meaning: The chance of making a profitable trade depends on market condition.

5. Win Distribution by Sentiment

This shows how winning trades are distributed.

Observation: The consistency of profits is not the same in both sentiments.

Meaning: Some market conditions give more stable profits.

6. Trade Size Vs Sentiment

This graph compares average trade size.

Observation: Trade sizes differ across sentiments.

Meaning: Traders adjust risk depending on market emotion.

7. Trade Size Distribution by Sentiment

This boxplot shows variation in trade sizes.

Observation: Some traders take much larger positions in certain sentiments.

Meaning: Risk-taking behavior is influenced by market mood.

8. Buy Vs Sell Distribution Across Sentiment

This graph shows buying vs selling behavior.

Observation: Traders change direction (buy/sell) based on sentiment.

Meaning: Market emotion influences decision-making.

9. Correlation Heatmap

This heatmap shows relationships between numerical variables.

Observation: Some trading features are related, while others are independent.

Meaning: It helps understand which factors influence performance together.

4. Key Findings

- Trader profitability varies with market sentiment.
 - Risk behavior (trade size) changes between Fear and Greed.
 - Win rate and consistency are influenced by sentiment.
 - Trader activity is not constant; it follows market mood.
 - Sentiment acts as an external factor affecting trading decisions.
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5. Conclusion

This project shows that trader behavior is strongly linked to market sentiment. Understanding Fear and Greed levels can help traders manage risk and make better decisions. Sentiment data can be a useful input for improving trading strategies.