

Title

Traders Behaviour

Analysis

Candidate Name :

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Assignment:

Data Science Assignment – Web3 Trading Team

Date:

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Objective

The objective of this analysis is to explore the relationship between trader behaviour and overall market sentiment (Fear vs Greed).

Specifically, we aim to understand:

1. How profitability (*Closed PnL*) changes across market sentiment.
2. How trading volume and leverage vary during Fear and Greed periods.
3. Whether traders align with or diverge from overall market sentiment.
4. Identify patterns or hidden trends that could inform smarter trading strategies.

Data Description

Datasets Overview:

1. Fear & Greed Dataset:

- Columns:
 - Date – Trading date
 - Classification – Market sentiment (Fear, Extreme Fear, Neutral, Greed, Extreme Greed)

2. Trader Dataset:

- Columns:
 - account – Trader identifier
 - coin – Trading symbol
 - execution_price – Price at which trade executed
 - size_usd – Trade volume in USD
 - side – Trade side (Buy / Sell)
 - direction – Long / Short
 - Timestamp – Trade timestamp
 - closed_pnl – Profit or loss per trade
 - leverage – Trade leverage
 - fee – Transaction fee

3. Initial Data Shape:

- Trader dataset: 211,224 rows \times 16 columns
- Fear & Greed dataset: 2644 \times 4 columns

Data Cleaning & Preprocessing

Data Preprocessing and Cleaning

Before performing any analysis, rigorous data preprocessing and cleaning steps were applied to ensure the quality, consistency, and usability of the datasets. The following steps were undertaken:

1. Selection of Relevant Features:

The raw trader dataset contained numerous columns, many of which were not pertinent to the objectives of this analysis. Irrelevant and redundant columns were carefully removed, retaining only those essential for evaluating trading behavior and market sentiment. The final columns used included: account, coin, execution_price, size_usd, side, direction, Timestamp, closed_pnl, leverage, and fee. This step helped in reducing data complexity and focusing the analysis on meaningful variables.

2. Conversion of Timestamps:

The trader dataset contained timestamps in UNIX format (milliseconds since epoch), which were not directly compatible with the Fear & Greed dataset. These timestamps were converted into standard datetime objects, allowing alignment on a common date field. This conversion ensured

that temporal analyses, aggregations, and dataset merging could be performed accurately.

3. Handling Missing and Null Values:

Both datasets were checked for missing or null entries. Any nulls in critical columns were either handled appropriately or removed to prevent inconsistencies in downstream analysis. This step was crucial to maintain dataset integrity and ensure reliable statistical results.

4. Standardization of Column Names and Data Types:

To ensure consistency and readability, all column names were standardized to lowercase and underscores replaced spaces. Data types were also verified, converting columns to numeric or categorical types as required. This standardization facilitated smooth computation, aggregation, and visualization processes.

5. Outlier Detection and Removal:

Extreme values in key numerical columns such as `closed_pnl` (profit/loss) and leverage were identified using the Interquartile Range (IQR) method. Outliers can disproportionately affect statistical measures such as mean and standard deviation, as well as distort visualizations. Removing these outliers ensured that the resulting dataset reflected typical trading behavior without being skewed by anomalous trades.

6. Merging Datasets:

After cleaning and preprocessing, the trader data was merged with the Fear & Greed dataset on the common date field. This resulted in a comprehensive, clean dataset containing 102,564 rows and 13 columns, integrating both trading behaviour and market sentiment for each trade.

7. Consistency and Integrity Checks:

Post-merge, the dataset underwent multiple integrity checks. These included verifying that date alignments were correct, numeric columns were within expected ranges, and categorical values were consistent with their definitions. Additionally, duplicates and redundant rows were removed to prevent skewed analysis.

8. Exploratory Statistical Analysis:

Preliminary statistics such as mean, median, standard deviation, minimum, maximum, and quartiles were calculated for key numeric fields (`closed_pnl`, `size_usd`, `leverage`). This helped identify any irregularities in distributions and informed further cleaning or transformations.

9. Data Transformation for Analysis:

Certain columns were derived or transformed to facilitate better insights. For example, daily trade volumes were calculated, and classification labels were standardized for better interpretability in visualization. This step prepared the dataset for meaningful EDA and modeling.

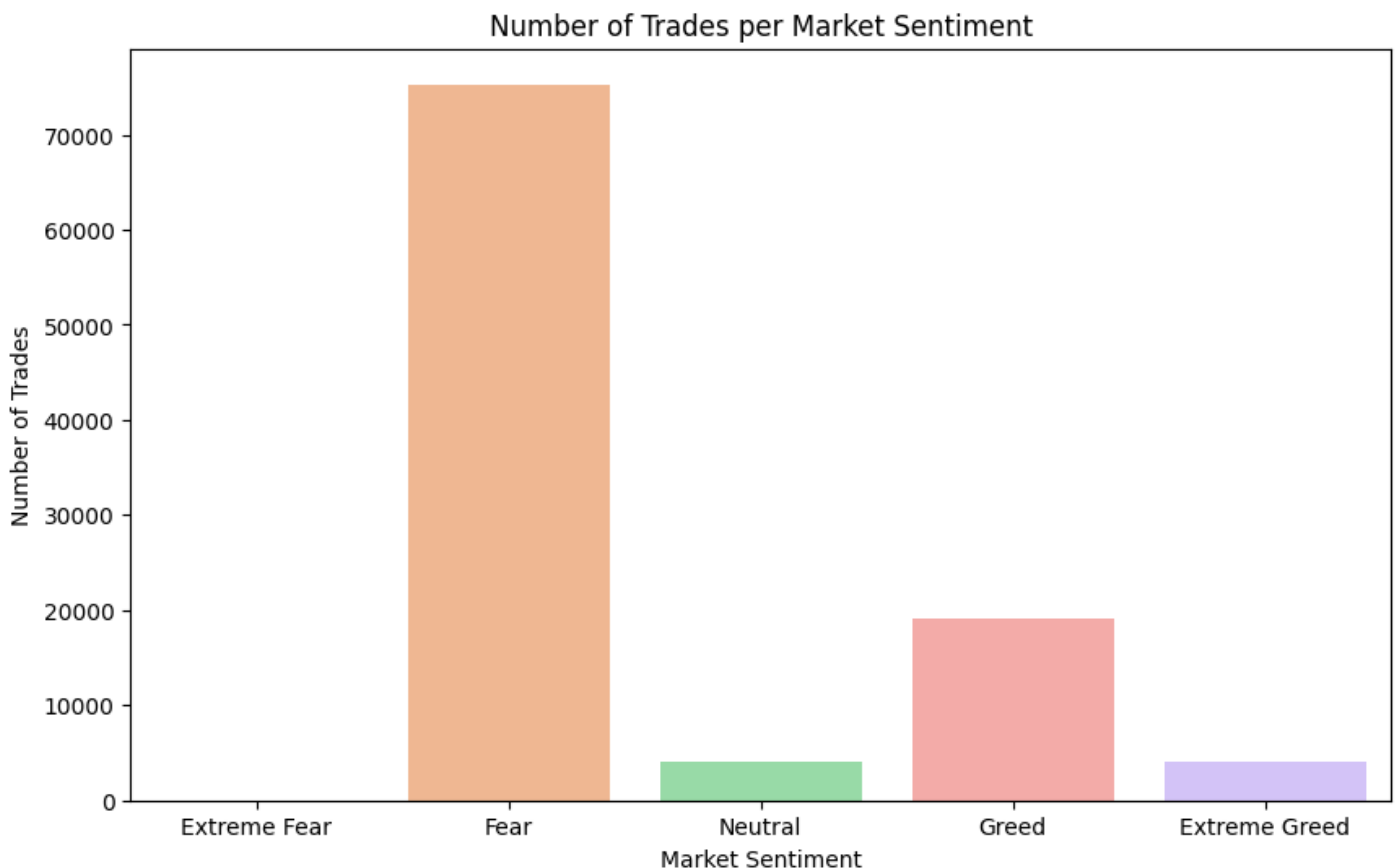
10. Validation of Final Dataset:

The final merged and cleaned dataset was validated to ensure it was ready for analysis. This included confirming the number of rows and columns, checking for missing values, and ensuring that the date range matched the scope of both datasets. These steps guaranteed that the

Analysis & Visualization

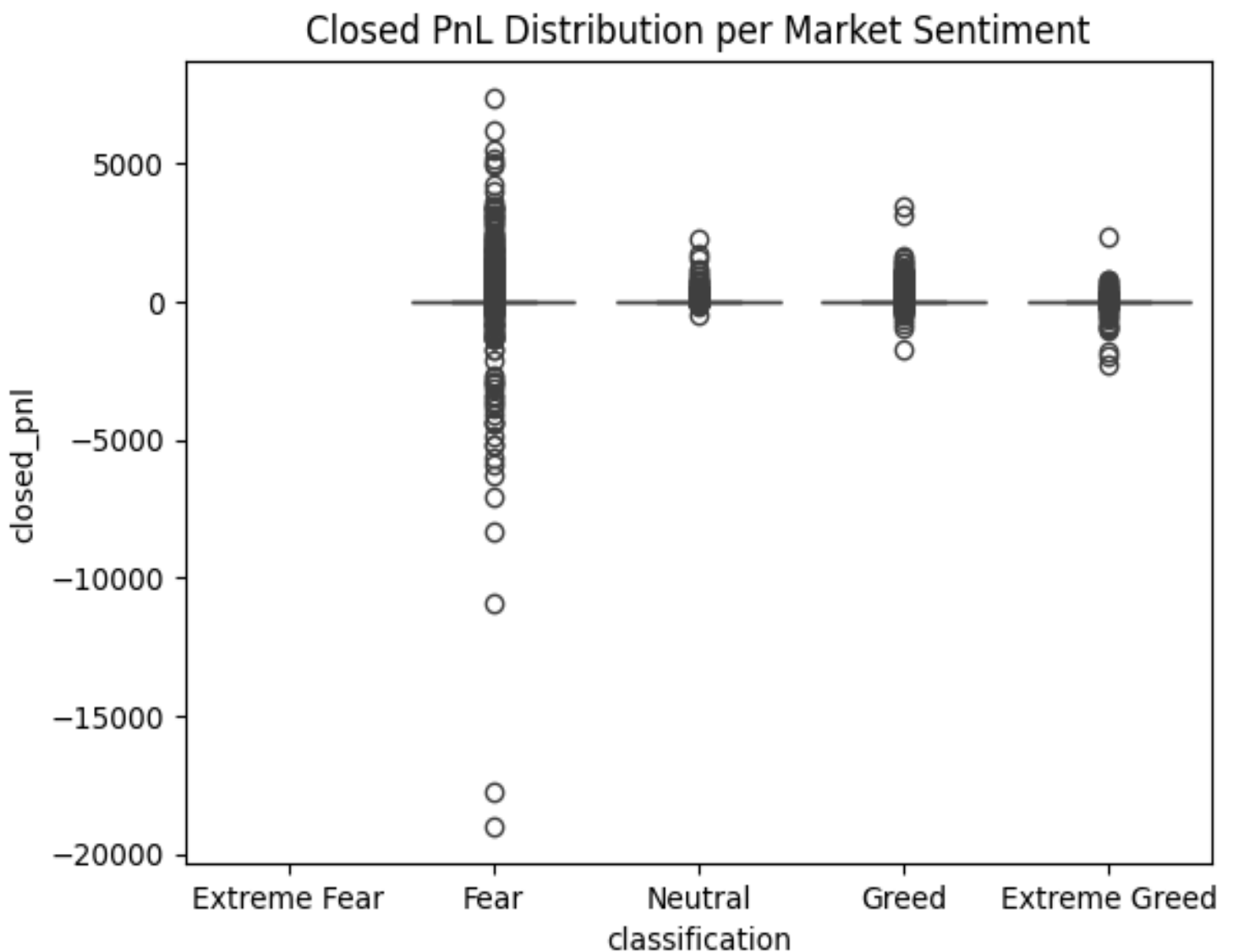
1. Trade Count vs Market Sentiment :

- **Objective:** Identify which sentiment days have more trading activity



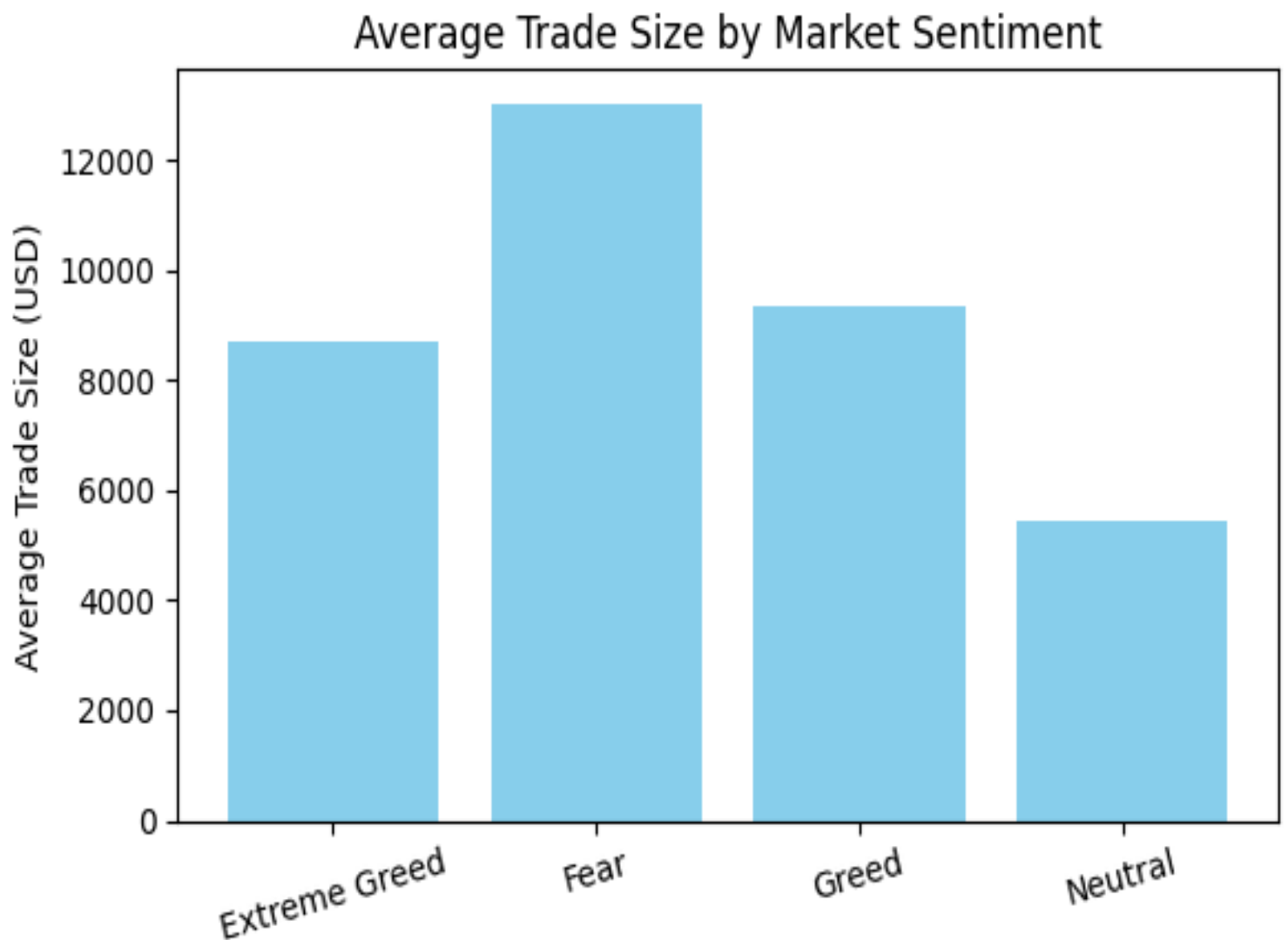
2. Profit / Loss vs Sentiment:

- **Objective:** Find average profitability per market sentiment.



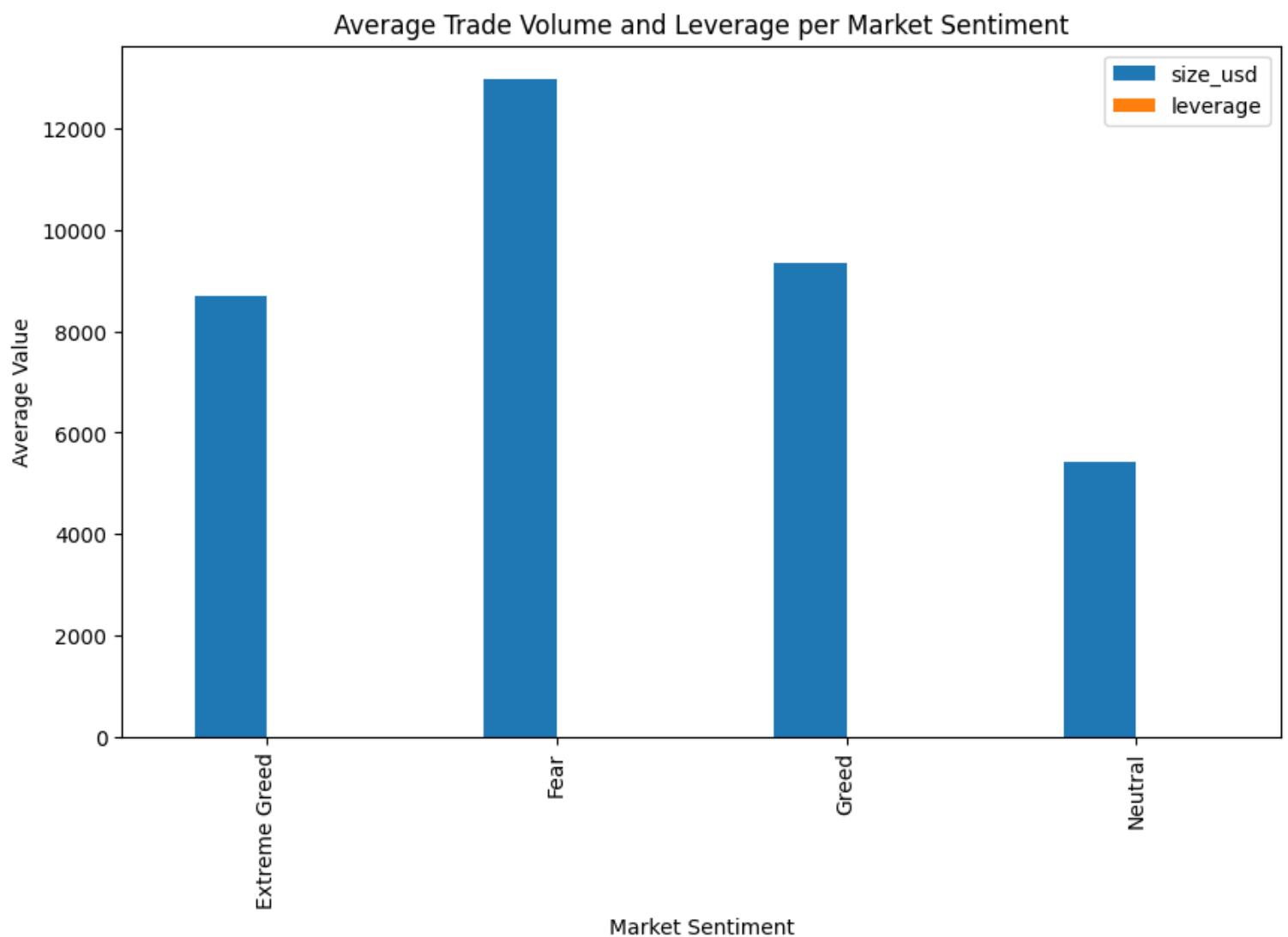
3. Trade Volume vs Sentiment:

- **Objective:** Determine trade size trends across market sentiment.



4. Leverage vs Sentiment:

- **Objective:** Check if traders take higher leverage on Fear / Greed days.



5. Side / Direction vs Sentiment

- **Objective:** Determine if traders' positions align with market sentiment.



Final Insights & Key Findings

1. **Trade Count:** Fear days have the highest trading activity.
2. **Profit/Loss:** Both highest profits and largest losses occur on Fear days.
3. **Trade Volume:** Largest average trade sizes happen during Greed periods.
4. **Leverage:** Traders take higher leverage on Fear days.
5. **Market Alignment:** Traders generally follow sentiment, aligning trades with Fear / Greed periods.
6. **Risk Patterns:** Fear periods are high-risk, high-reward scenarios for traders.

CONCLUSION

This analysis confirms that market sentiment strongly influences trading behaviour. Fear periods drive higher trading activity, leverage, and volatility, creating both significant profit opportunities and substantial loss risks.

Greed periods see larger trade sizes but comparatively balanced outcomes. Understanding these patterns can help traders optimize risk management and decision-making strategies