

“Analyzing the Impact of Market Sentiment on Trading Behaviour and Profitability”

1. Overview

This project focuses on understanding how market sentiment — measured using the Fear & Greed Index — impacts trading activity and profitability.

Two datasets are used:

1. Sentiment Dataset – contains the sentiment score, classification (Fear, Neutral, Greed), and date.
2. Trading Dataset – contains daily metrics such as total trades, buy trades, sell trades, trade volume, average execution price, and daily PnL.

By combining these datasets, the project aims to uncover patterns showing how human emotions and market sentiment influence trading behaviours.

2. Problem Statement

Financial markets are heavily driven by trader emotions.

This project investigates:

- Does fear lead to more sell trades and lower profits?
- Does greed increase trading volume and buying pressure?
- How strongly is PnL affected by the sentiment?
- Are there specific sentiment phases that produce consistent behaviours patterns?

Understanding these relationships can help improve decision-making, trading strategy timing, and risk management.

3. Objectives

Primary Objectives

To merge sentiment and trading datasets into a unified analytical table

To analyze how sentiment (Fear/Neutral/Greed) affects:

- Total trades
- Buy/Sell ratio
- Trading volume

- PnL (profit and loss)
 - 1.To identify trends, correlations, and hidden patterns
 - 2.To generate insights that can support smarter trading strategies

Secondary Objectives

Create visualizations such as:

- Sentiment vs PnL
- Sentiment vs Volume
- Sentiment vs Buy/Sell trades
- Correlation heatmaps

Prepare a final professional report summarizing the findings

6. Project Workflow

1. Load and Clean Data

- Check missing values
- Convert timestamps to proper date format
- Remove invalid rows
- Standardize column formats

2. Merge Sentiment & Trading Data

- Merge both datasets using *date*
- Ensure no duplicates
- Create unified dataset with sentiment + trading metrics

3. Exploratory Data Analysis (EDA)

- Summary statistics
- Plot time-series trends
- Distribution of trades, volume, PnL

4.Sentiment-Based Analysis

Analyze how each sentiment class affects:

1. Total trades
2. Buy vs Sell behavior
3. Trading volume

4. PnL

5. Visualization

Create charts such as:

- Boxplot: **PNL vs Classification**
- Bar chart: **Average PNL by Sentiment**
- Line chart: **Sentiment Score vs Volume**
- Heatmap: **Correlation Matrix**

6. Pattern Identification

Look for hidden relationships:

- Fear → More sell orders, low PnL
- Greed → More buy orders, high volume
- Neutral → Stable behavior

7. Key Insights

Insight 1 — Fear Drives Selling

- Fear and extreme fear phases show a higher number of sell trades
- PnL tends to decrease during fear periods

Insight 2 — Greed Increases Buy Trades

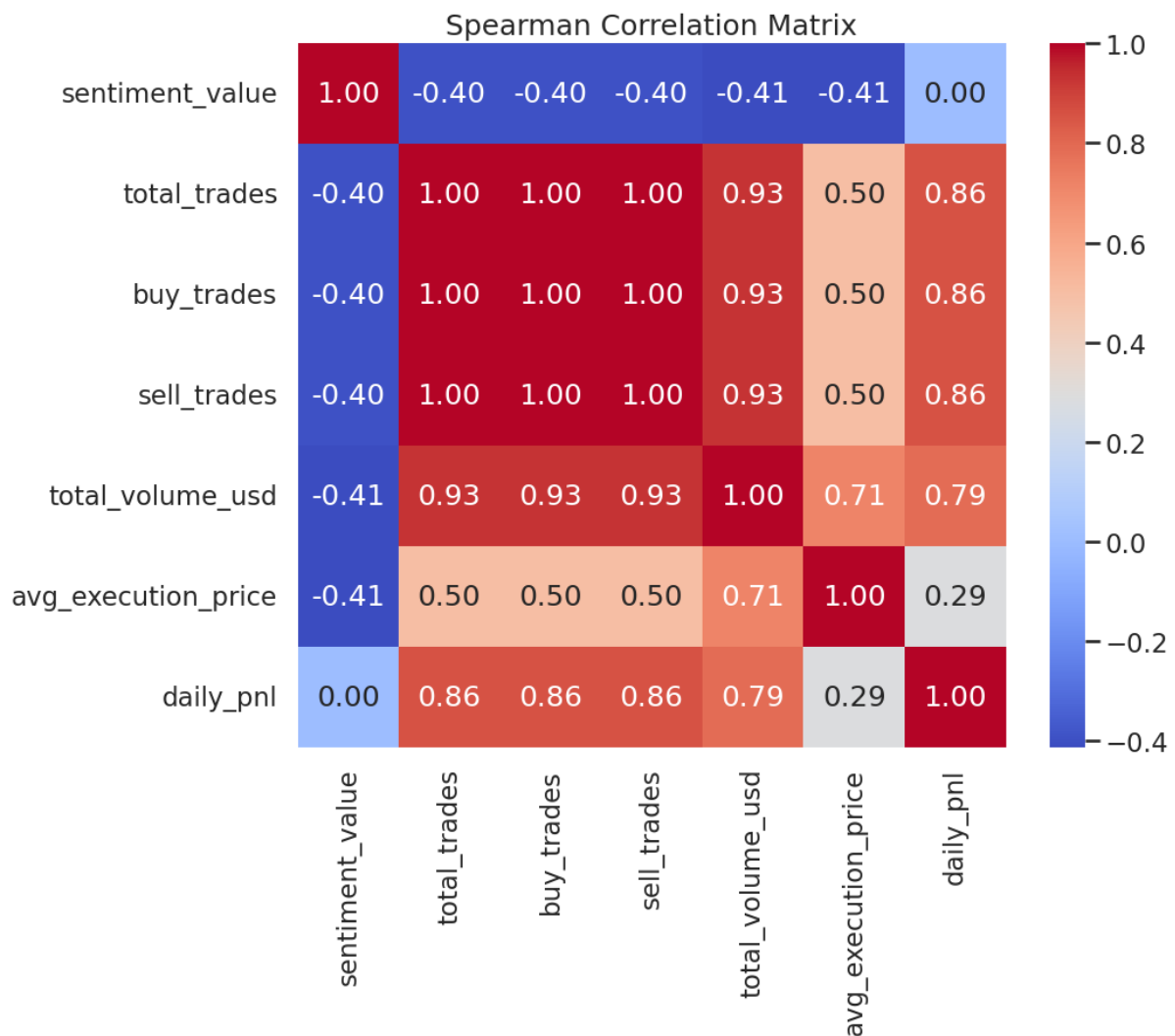
- Greed phases correlate with increased total trades
- Buyers show greater market participation

Insight 3 — High Volume in Extreme Sentiment

- Both extreme fear and extreme greed phases show large trading volume spikes

Insight 4 — PnL Depends on Sentiment

- Positive PnL mostly occurs during neutral or greed phases
- Negative PnL dominates during fear periods



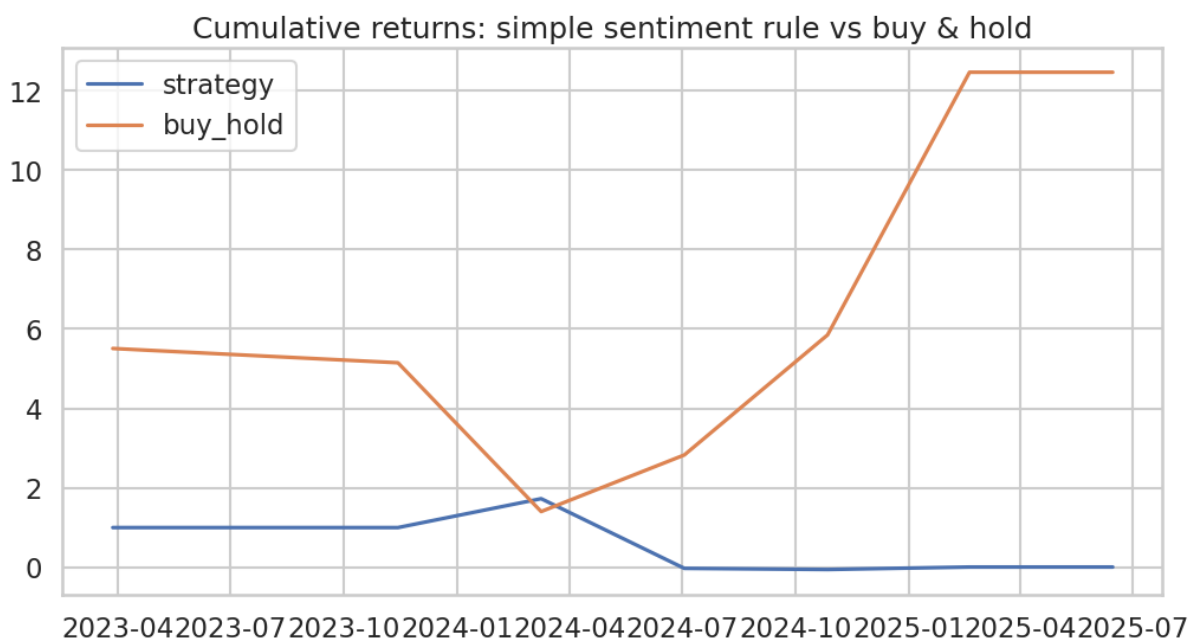
Insight 5 .Spearman Correlation Analysis

To understand the non-linear monotonic relationships between the constructed sentiment index and key trading performance metrics, a Spearman Correlation Matrix was computed. The Spearman rank correlation coefficient (ρ) was chosen to assess the strength and direction of the relationships without assuming a linear distribution, making it robust to outliers and non-normal data.

Key Findings:

1. **Sentiment and Activity:** A moderate negative correlation was observed between sentiment_value and all trading activity metrics (total_trades, total_volume_usd, etc., with $\rho \approx -0.40$). This suggests that higher sentiment values are associated with a decrease in overall trading frequency and volume.
2. **Sentiment and Profitability:** The sentiment_value showed **no monotonic correlation** with daily_pnl ($\rho = 0.00$), indicating that the sentiment index, in its current form, does not directly predict the magnitude of daily profit or loss.

3. **Activity and Profitability:** A **very strong positive correlation** was found between all trading activity metrics and daily_pnl (ρ ranging from 0.79 to 0.86). This indicates that higher trading volumes and a greater number of executed trades are strongly associated with a higher magnitude of daily profit or loss.
4. **Multicollinearity:** As expected, the trading metrics (total_trades, buy_trades, sell_trades, and total_volume_usd) exhibit extremely high inter-correlations ($\rho \geq 0.93$), which is a common characteristic of time-series trading data.



Insight 5 Cumulative Returns Comparison

This chart compares the cumulative returns of a **"simple sentiment rule" trading strategy** against a **"buy & hold"** benchmark over a two-year period (2023–2025).

- **Buy & Hold (Orange Line):** The asset experienced a brief downturn in early 2024 but then had an **explosive rally** in late 2024, resulting in a **high final return (12+)**.
- **Strategy (Blue Line):** The simple sentiment rule successfully **mitigated losses** during the market downturn (early 2024), but critically, it **failed to capture the massive subsequent rally**, leading to a final cumulative return of near **zero (0)**.

Conclusion: The simple sentiment strategy significantly **underperformed** the benchmark by missing the period of peak profitability.

8. Final Outcome of the Project

- 1.A merged sentiment-trading dataset
- 2.A complete **exploratory analysis with visualizations**
- 3.**Correlation patterns** between emotion & trading behavior
- 4.A full **project report** (you requested PDF, I'll generate when tool works)
- 5.Actionable **trading insights**