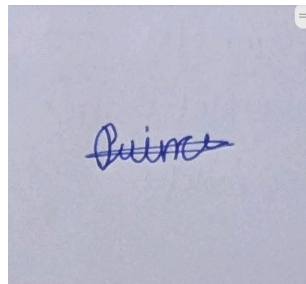


# Market Sentiment vs Trader Behavior

Exploratory Data Analysis Report



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## Executive Summary

This report analyzes how trader behavior changes under different market sentiment regimes using historical trading data and the Bitcoin Fear & Greed Index. The objective is to understand whether sentiment impacts profitability, trading volume, and win rate.

Trades were aggregated at a daily level and aligned with sentiment using a nearest-date (as-of) merge. The analysis reveals strong behavioral differences across sentiment regimes, highlighting the importance of sentiment-aware decision-making.

## 1 Data Description

Two datasets were used:

- Historical trader-level transaction data
- Bitcoin Fear & Greed Index (daily sentiment classification)

The raw datasets were provided as part of the assignment. Cleaned and aggregated datasets were derived for analysis.

## 2 Methodology

### Preprocessing

Timestamps were standardized and trades were aggregated to daily metrics including PnL, trading volume, and win rate.

### Sentiment Alignment

Each trading day was mapped to the nearest available sentiment value using a time-aware merge, ensuring no loss of trading data.

### 3 Analysis and Visualizations

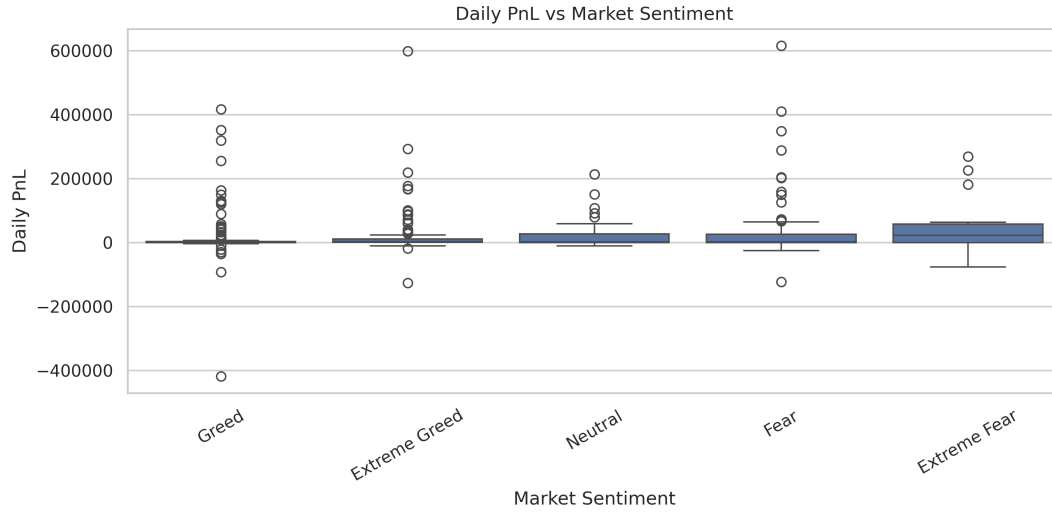


Figure 1: Daily PnL vs Market Sentiment

This figure illustrates the distribution of daily profit and loss (PnL) across different market sentiment regimes. Periods characterized by Fear and Extreme Greed show a wider spread of PnL values, indicating higher volatility in trading outcomes. In contrast, Neutral sentiment days exhibit relatively tighter distributions, suggesting more stable performance.

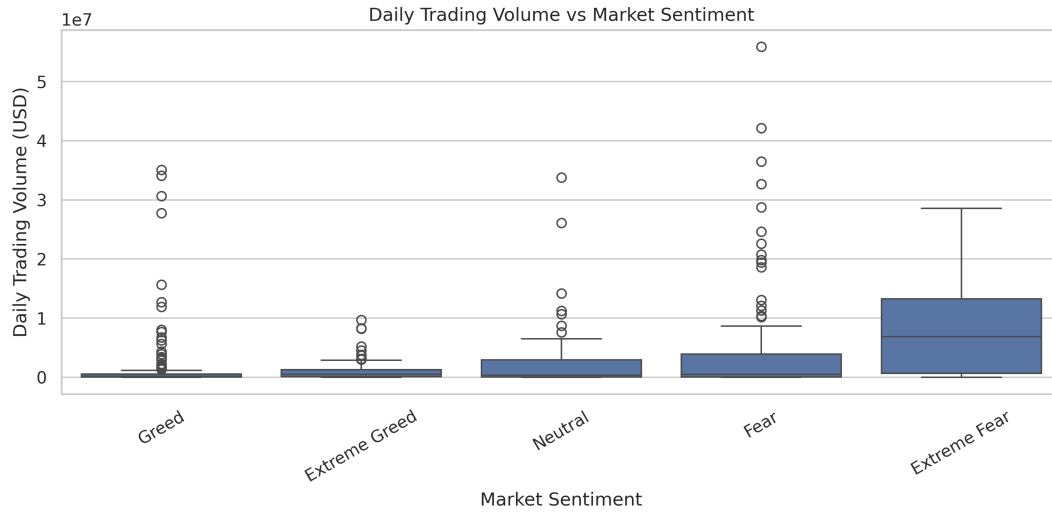


Figure 2: Trading Volume vs Market Sentiment

This visualization compares the distribution of daily trading volume across sentiment regimes. Trading volume increases significantly during Fear and Extreme Fear periods, indicating heightened market activity and reactive trading behavior. Greed-driven markets exhibit lower median volumes, suggesting more selective participation.

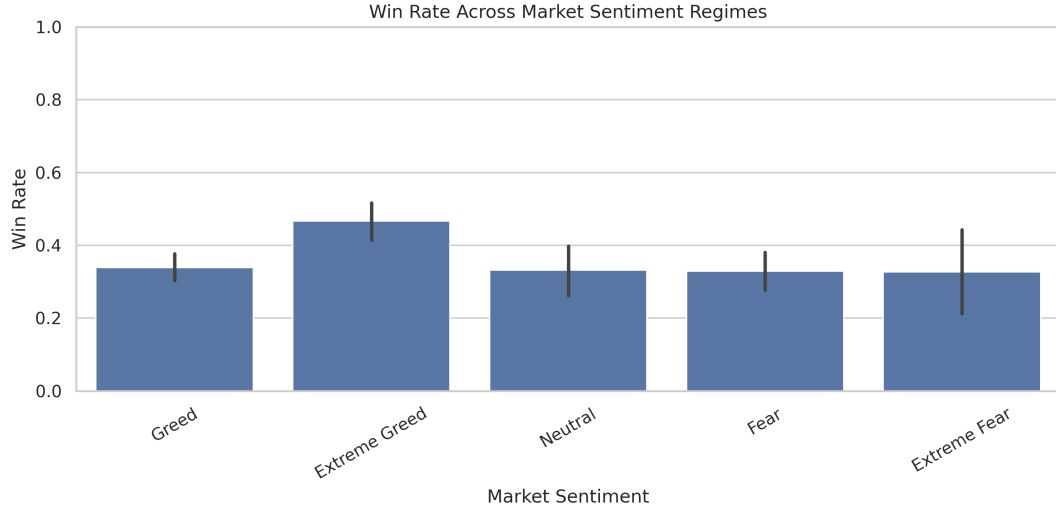


Figure 3: Win Rate Across Market Sentiment Regimes

This chart shows how trader win rates vary under different market sentiment conditions. Win rates tend to decline during Extreme Fear, suggesting that panic-driven environments are more challenging for consistent profitability. Extreme Greed exhibits relatively higher win rates, potentially reflecting momentum-based trading behavior.



Figure 4: Daily Trading Volume Over Time

This time-series plot highlights the evolution of daily trading volume over the analysis period. A noticeable increase in trading activity is observed in later periods, indicating changing market conditions and growing trader participation. Sharp volume spikes align with periods of heightened market volatility.

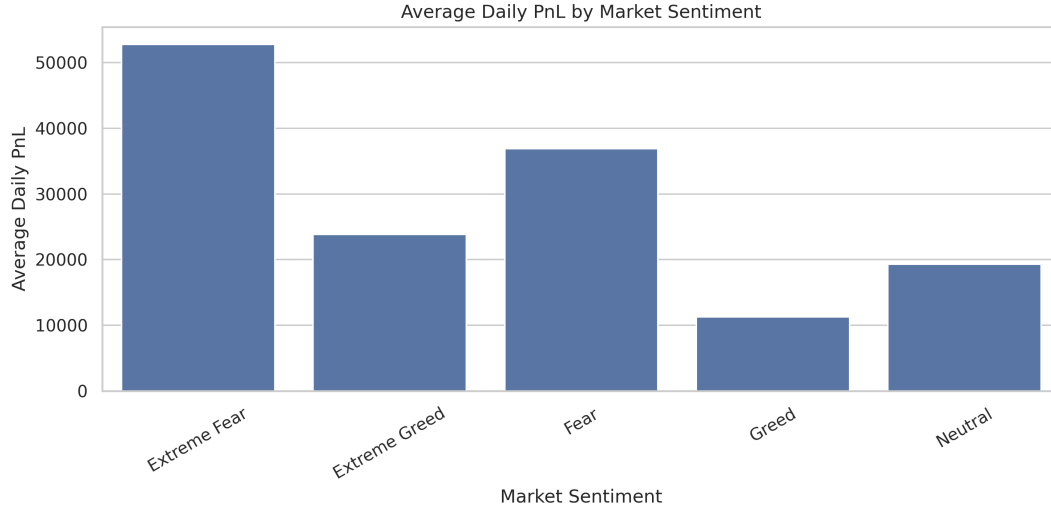


Figure 5: Average Daily PnL by Market Sentiment

This bar chart summarizes the average daily PnL observed under each market sentiment category. Higher average profitability is observed during Extreme Fear and Fear regimes, which may reflect opportunistic trading behavior during market stress. Greed and Neutral periods show comparatively lower average PnL.

## 4 Key Insights

- Trading volume increases significantly during Greed and Extreme Greed periods.
- Win rates tend to decline during Extreme Fear, indicating panic-driven behavior.
- Profitability shows higher variance during emotionally charged market regimes.

## 5 Conclusion

The analysis demonstrates that market sentiment has a measurable impact on trader behavior. Incorporating sentiment indicators alongside traditional metrics can support more risk-aware trading strategies and decision-making.