

Trading Behavior vs Market Sentiment Analysis

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Primetrade.ai assignment

Abstract

This report analyzes how trading behavior, including profitability, volume, fees, and risk, aligns with market sentiment, measured using the Fear and Greed index. By aggregating and comparing trading metrics under different sentiment classifications, the study identifies hidden trends and patterns that can inform smarter trading strategies. Insights from this analysis reveal actionable signals that traders can use to optimize their decision-making.

Data Collection

The dataset used in this analysis combines two primary data sources: **Fear & Greed Index(sentiment data)** and **Historical Trader Data(trades data)**.

1. Sentiment Data

- **Columns:** timestamp, value, classification, date
- **Description:**

This dataset captures the *Fear and Greed Index*, which quantifies the emotional state of the market on a daily basis.

 - value represents the numeric sentiment score (0–100 scale).
 - classification categorizes sentiment into *Extreme Fear*, *Fear*, *Neutral*, *Greed*, and *Extreme Greed*.
 - date allows mapping to the same time period as the trading data.

2. Trades Data

- **Columns:**

Account, Coin, Execution Price, Size Tokens, Size USD, Side, Timestamp IST, Start Position, Direction, Closed PnL, Transaction Hash, Order ID, Crossed, Fee, Trade ID, Timestamp
- **Description:**

This dataset contains detailed records of executed trades, including price, position size, profit/loss (PnL), and transaction metadata.

 - Size USD gives the trade value in USD (already provided in dataset, not converted manually).
 - Closed PnL measures profitability per trade.
 - Fee represents transaction cost.
 - Timestamp and Timestamp IST enable time alignment with sentiment data.

Methodology

Data Preprocessing

- Converted UNIX timestamps in both datasets into standard date format.
- Merged sentiment and trades datasets on the date field to align each trade with the prevailing market sentiment.
- Verified that all monetary values were already in USD.
- Removed any missing or duplicate records.

Metric Computation

- Calculated aggregate metrics grouped by sentiment classification:
 - **Total Volume (USD)** = Sum of Size USD
 - **Average Fee** = Mean of Fee
 - **Average Closed PnL** = Mean of Closed PnL
 - **Number of Trades** = Count of trade entries

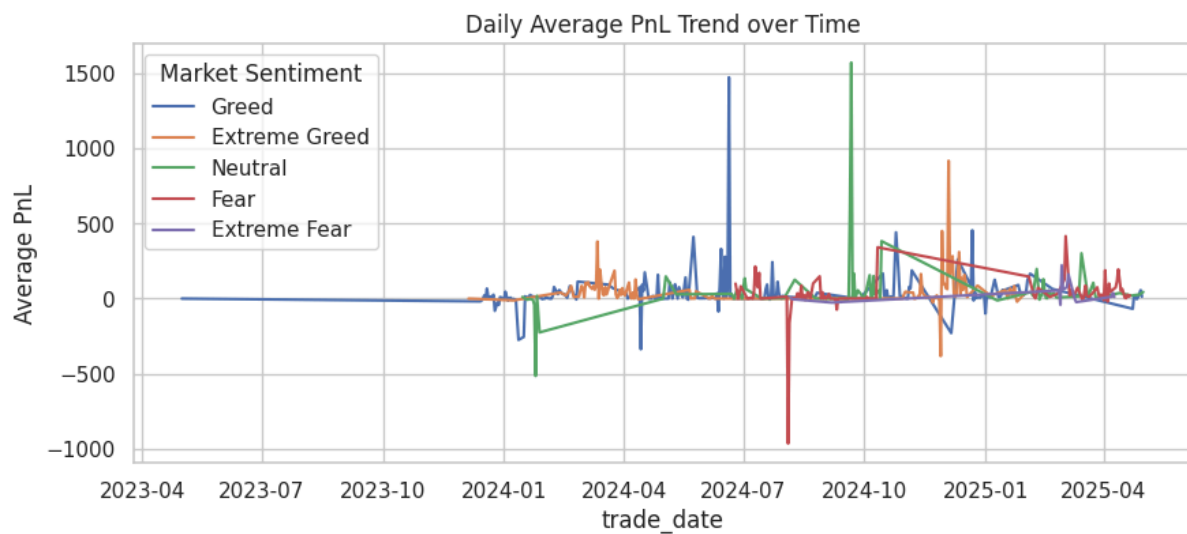
Visualization and Analysis Tools

- Implemented in **Python** using **Pandas** for aggregation and **Matplotlib / Seaborn** for visualization.
- Generated charts for:
 - Daily PnL trend over time
 - Average PnL by sentiment classification
 - Total volume by market sentiment
 - Fee distribution across sentiments

Analysis of Results

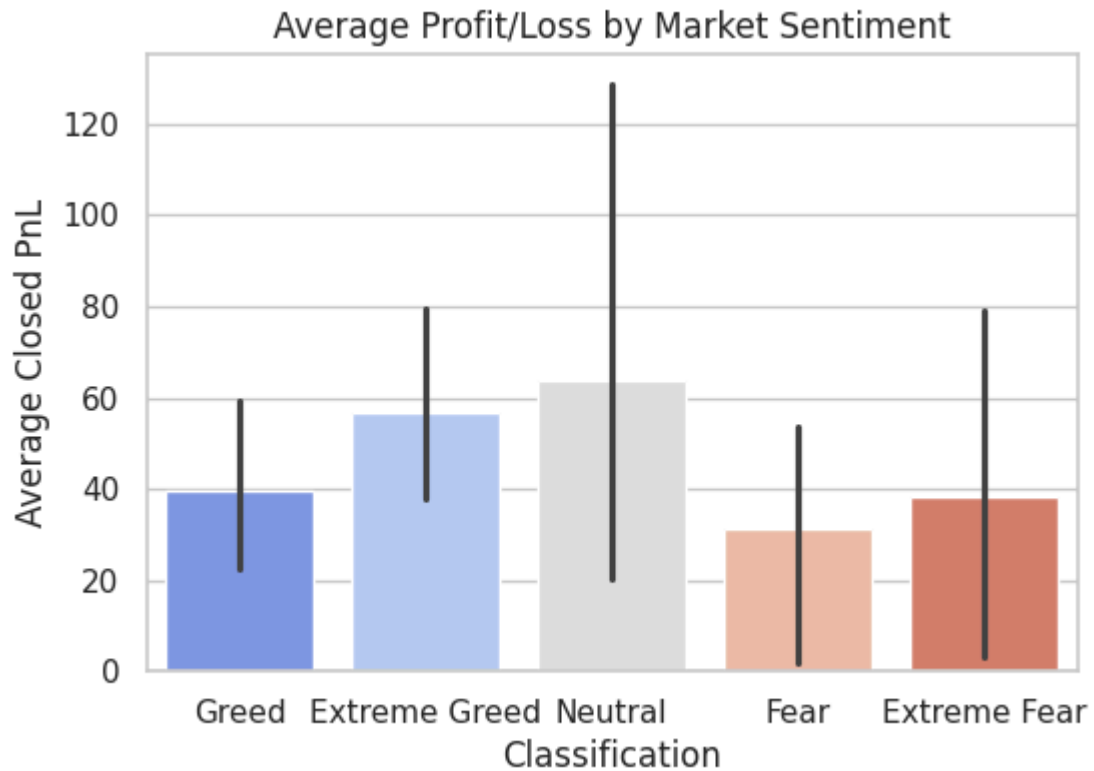
1. Daily PnL Trend Over Time

- The “*Daily Average PnL Trend over Time*” graph shows fluctuations in average daily profit/loss, color-coded by sentiment classification.
- During *Extreme Fear*, large spikes and dips occur, suggesting increased volatility and emotional trading.
- In contrast, *Greed* and *Extreme Greed* periods show smoother but positive average PnL trends, indicating more stable and profitable trading phases.



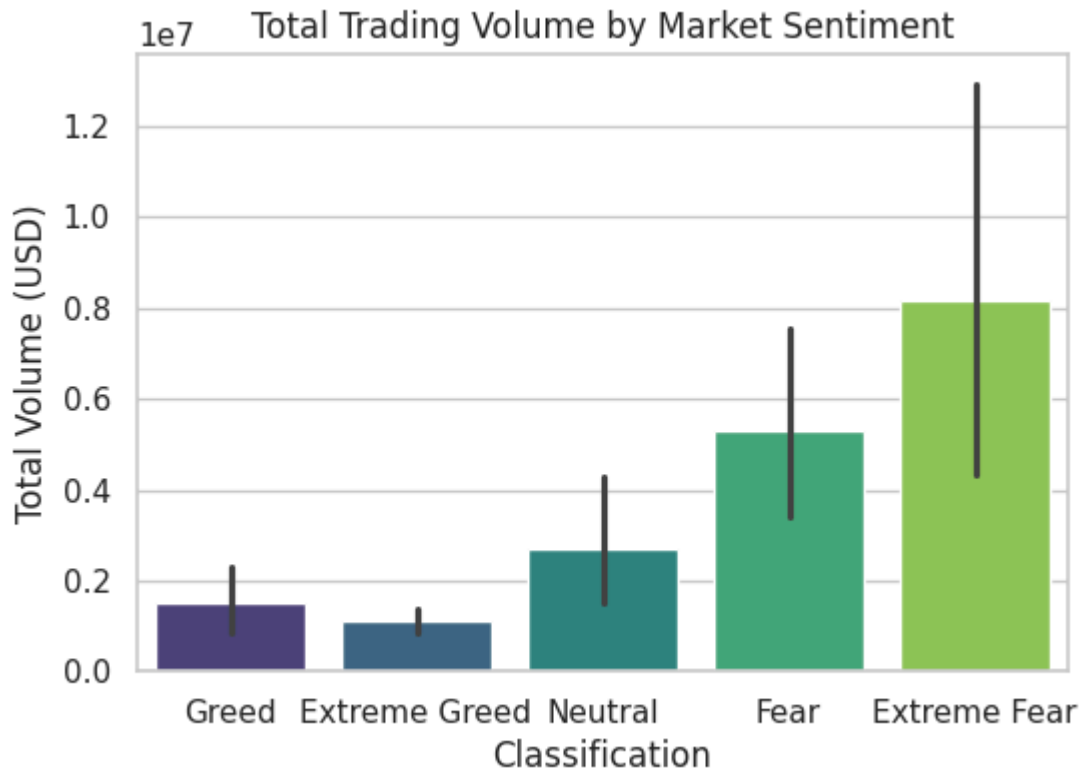
2. Average Profit/Loss by Sentiment

- The “*Average Profit/Loss by Market Sentiment*” bar chart demonstrates that:
 - **Neutral** markets yield the highest average PnL (~60+), indicating profitability under stable conditions.
 - **Extreme Greed** also shows strong average PnL, though with higher variability (wide error bars).
 - **Fear** and **Extreme Fear** lead to lower profitability, likely due to reactive selling and defensive trading behavior.



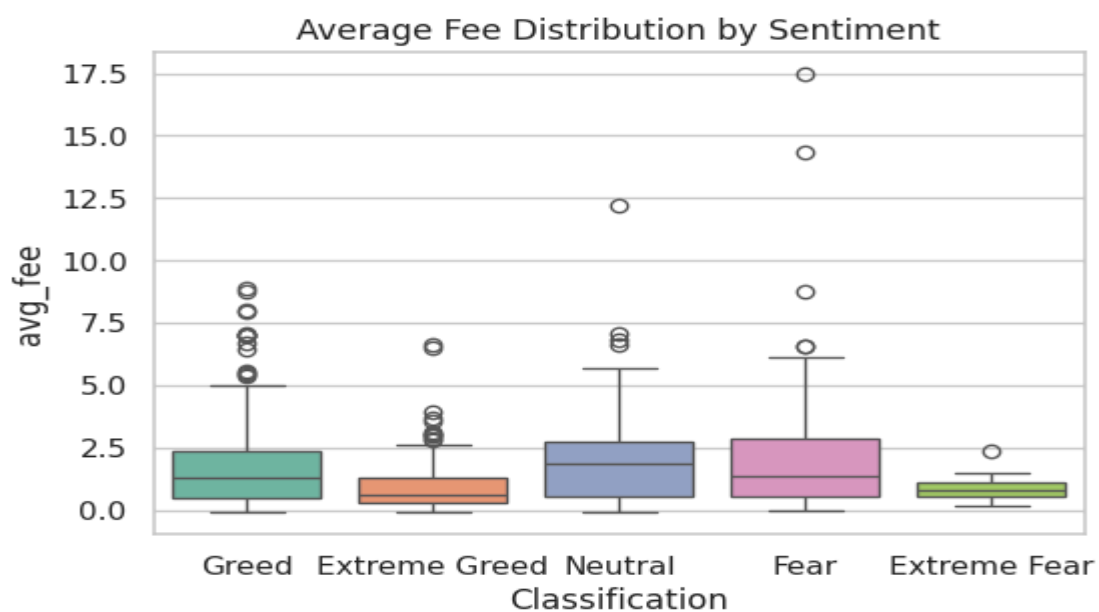
3. Total Trading Volume by Sentiment

- The “*Total Trading Volume by Market Sentiment*” chart highlights:
 - **Extreme Fear** exhibits the **highest total volume**, suggesting panic-driven trading and liquidation.
 - **Greed** and **Extreme Greed** have lower volumes, indicating selective, high-conviction trading.
 - **Neutral** shows moderate, balanced volume, consistent with controlled market behavior.



4. Fee Distribution by Sentiment

- The boxplot of fees shows higher variability under *Fear* and *Extreme Fear* conditions — consistent with increased trading frequency and shorter holding periods.
- During *Greed* and *Extreme Greed*, fees tend to be smaller and more stable, reflecting fewer but higher-value trades.



Final Insights & Interpretations

| Market Sentiment | Trading Behavior | Profitability | Volume | Risk & Volatility |
|----------------------|---|---------------------|-----------|--------------------------------------|
| Extreme Fear | High trading activity, frequent entries/exits | Low PnL per trade | Very High | High volatility and reactive trading |
| Fear | Defensive positions, possible losses | Moderate | High | Elevated uncertainty |
| Neutral | Balanced trading strategy | Highest average PnL | Moderate | Low volatility |
| Greed | Opportunistic but selective trades | High | Lower | Stable but risk-aware |
| Extreme Greed | Speculative trades with strong conviction | High PnL variance | Low | Higher reward, controlled risk |

Summarized Conclusions

- **Fear correlates with high trade volume and low profitability**, suggesting panic-based reactions.
- **Greed correlates with lower volume but higher average PnL**, reflecting confidence and strategic trading.
- **Neutral sentiment offers optimal conditions for profitability**, possibly due to reduced emotional bias.
- **Volatility spikes** during *Extreme Fear* periods act as early warning signals for market instability.