Behavior Analysis Under Market Sentiment (Fear vs Greed)

ABSTRACT

Financial markets are strongly influenced by investor psychology. Fear and greed often drive trading decisions, leading to changes in trade size, frequency, and risk-taking behavior. This project analyzes how individual trading behavior aligns with or diverges from overall market sentiment using historical trade execution data combined with the Fear & Greed Index. Through data preprocessing, exploratory analysis, visualization, and a simple machine learning model, the study demonstrates that trading patterns vary significantly across sentiment regimes. The results highlight the importance of sentiment-aware trading strategies and provide a foundation for further predictive modeling.

1. INTRODUCTION

Trading decisions in financial markets are not purely rational; they are heavily influenced by emotions such as fear and greed. During periods of fear, traders may act cautiously or panic, while during greed-driven markets, traders may overtrade due to optimism or fear of missing out (FOMO).

The objective of this project is to study how trading behavior—measured through trade size, frequency, fees, and execution patterns—changes under different market sentiment conditions. By combining trader-level execution data with the Fear & Greed Index, we aim to extract meaningful behavioral insights and demonstrate how even simple analytics and machine learning techniques can reveal sentiment-driven patterns.

2. DATASETS USED

2.1 Trade Execution Dataset

The trade dataset contains detailed execution-level information including: - Execution Price - Trade Size (USD) - Trade Side (BUY/SELL) - Transaction Fee - Timestamp (IST)

This dataset represents real trading behavior at a granular level.

2.2 Fear & Greed Index Dataset

The Fear & Greed Index reflects overall market sentiment on a daily basis. It consists of: - Date - Sentiment Value (0–100) - Sentiment Classification (Extreme Fear, Fear, Neutral, Greed, Extreme Greed)

This dataset represents macro-level market psychology.

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3. DATA PREPROCESSING

Data preprocessing was a critical step to ensure consistency and reliability of analysis.

3.1 Trade Data Cleaning

- Removed unnecessary columns
- Converted timestamps to datetime format
- Extracted date for alignment with sentiment data
- Encoded BUY/SELL direction numerically

3.2 Sentiment Data Cleaning

- Converted date to standard datetime format
- Retained only relevant sentiment columns
- Simplified sentiment categories into three classes:
- Fear (Extreme Fear + Fear)
- Greed (Greed + Extreme Greed)
- Neutral

3.3 Dataset Merging

Both datasets were merged on the date column so that each trade was associated with the prevailing market sentiment on that day.

4. EXPLORATORY DATA ANALYSIS (EDA)

Exploratory analysis was conducted to understand how trading behavior varies across sentiment regimes.

4.1 Sentiment-wise Trade Count

The number of trades was computed for Fear, Greed, and Neutral periods to measure trading activity.

Observation: Trade frequency tends to increase during Greed phases, indicating higher market participation.

4.2 Average Trade Size vs Sentiment

The average trade size (USD) was calculated for each sentiment category.

Observation: Average trade size is higher during Greed, suggesting increased risk-taking, while Fear periods show relatively cautious trading.

4.3 Total Trading Volume

Total traded volume was analyzed across sentiment regimes.

Observation: Greed phases typically attract higher overall capital deployment.

5. VISUALIZATION

The following visualizations were generated: - Bar chart of average trade size vs sentiment - Bar chart of trade frequency vs sentiment

These plots clearly demonstrate behavioral shifts in response to market psychology and help communicate insights in a simple, interpretable manner.

6. MACHINE LEARNING MODEL

6.1 Objective

A simple machine learning model was introduced to demonstrate how trading behavior can be used to classify market sentiment.

ML Task: Binary Classification (Fear vs Greed)

6.2 Feature Selection

Two basic and interpretable features were used: - Trade Size (USD) - Transaction Fee

6.3 Model Choice

Logistic Regression was selected because: - It is simple and interpretable - Suitable for binary classification - Performs well on small datasets

6.4 Model Training and Evaluation

The dataset was split into training and testing sets. The model was evaluated using accuracy and a classification report.

Result: The model achieved reasonable accuracy, indicating that trade size and fee contain information about underlying market sentiment.

6.5 Feature Importance Visualization

Model coefficients were visualized to show the relative importance of each feature in sentiment classification.

7. RESULTS AND INSIGHTS

Key findings from the analysis include: - Trading behavior varies significantly across Fear and Greed regimes - Traders are more active and aggressive during Greed phases - Higher fees and larger trade sizes indicate

emotional or momentum-driven trading - Even simple ML models can detect sentiment-related patterns in trading behavior

8. LIMITATIONS

- Limited dataset size and time coverage
- Absence of complete profit/loss data for all trades
- Simplified sentiment categorization

These limitations restrict the use of advanced predictive models.

9. FUTURE SCOPE

Future enhancements may include: - Incorporating profit and risk-adjusted return metrics - Using advanced ML models (Random Forest, XGBoost) - Time-series modeling of sentiment shifts - Sentiment-aware trading strategy backtesting

10. CONCLUSION

This project demonstrates that market sentiment plays a crucial role in shaping trading behavior. By combining trade execution data with the Fear & Greed Index, we identified clear behavioral patterns associated with fear and greed. The study emphasizes the importance of sentiment-aware analysis and shows that even simple statistical and machine learning techniques can provide valuable insights. This work forms a strong foundation for more advanced behavioral finance and algorithmic trading research.