Data Science Report : Market Sentiment vs Trading Behaviour

Project Title: *Impact of Fear & Greed Index on Trading Activity*

**Candidate Name: Aryan G Gaddadavara**

1. Introduction

This report examines the effects of market sentiment (Fear, Greed, Neutral, Extreme Fear, Extreme Greed) on trader actions and outcomes. By merging trade data with sentiment classification, the analysis compares differences in trade size, trade volume, trade execution price and trading profitability in the context of the sentiment. The goal is to find patterns in the data to inform better trading decisions from a psychological perspective of market sentiment.

2. Data Preparation

- Merge trades with Fear & Greed index by date
- Standardize column names
- Convert timestamps to proper datetime format
- Forward-fill missing sentiment values
- Generate the final dataset consisting of only trades

3. Exploratory Data Analysis

**3.1 Average Position Size (Tokens) by Sentiment**
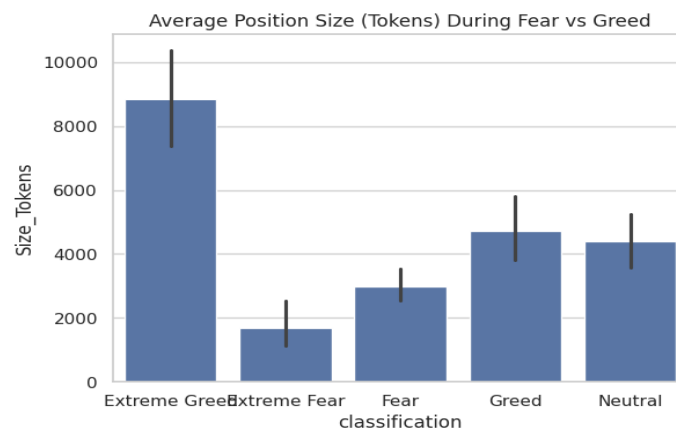
This chart reveals major ups and downs in the number of tokens traded with various emotions and market stages:

- Extreme Greed has the largest position size, which reflects that traders return to more aggressive trading, and bigger size, when the market exuberance is extreme.
- Extreme Fear has the smallest position size, which reflects that traders minimize their token exposure during these panic conditions.
- Neutral and Greed have reasonably sized, and stable token sizes.

Insight: Traders take larger token positions in extreme greed, and least exposure during extreme fear. This indicates a high-risk appetite during extreme greed.

### 3.2 Average Trade Volume (USD) by Sentiment
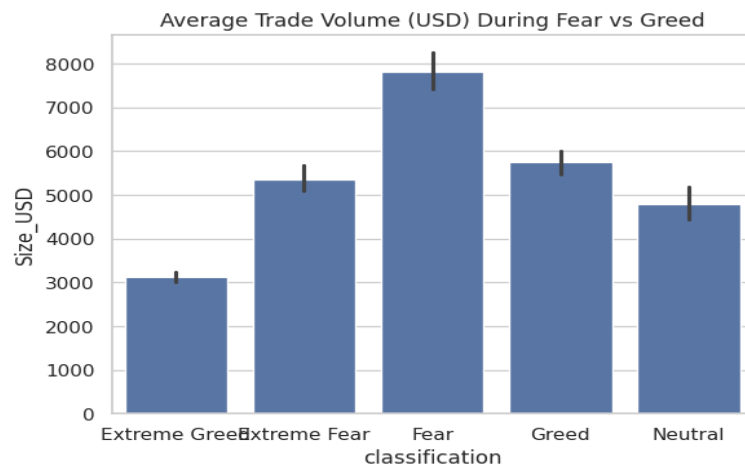
The chart shows the USD value of trades:

- Fear sentiment has the highest USD value of trade. This suggests that traders invest more dollars in states where the market value of the underlying asset is lower.
- Extreme Greed shows a lower value in USD compared to trades in the number of tokens. This indicates lower prices ⇒ more tokens ⇒ lower dollars.
- Neutral and Greed have moderate value of trades in USD.

Insight: Traders view periods of Fear as a chance to invest, producing higher USD trade value during times of discounted prices.

### 3.3 Buy vs Sell Behavior Under Different Sentiments
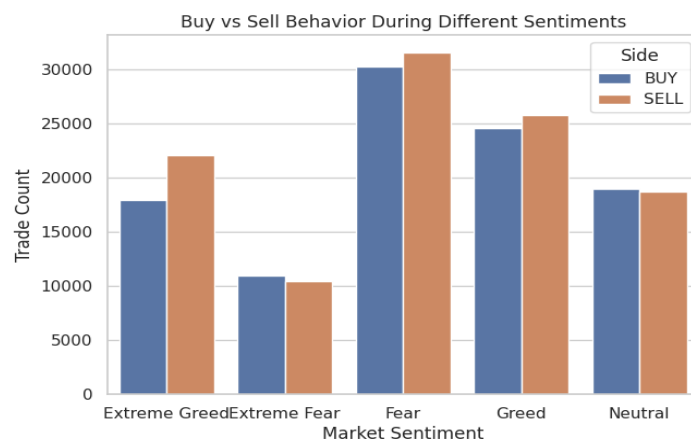
This graph compares the counts of Buy and Sell orders:

- SELL orders are marginally higher in all sentiments except Extreme Fear, indicating profits are being booked.
- Fear has the most activity of buy or sell counts - there is no activity without buy/sell activity.
- Extreme Fear is the only other sentiment that has equally low both buy/sell counts as traders have decided to stay out of the market.

Insight: Market conditions that induce stress (Fear) stimulate the most trading activity.Extreme Fear presented difficulty in prompts participation as traders seemed to favor uncertainty.

3.4 Execution Price Distribution by Sentiment



Execution Price Distribution During Fear vs Greed
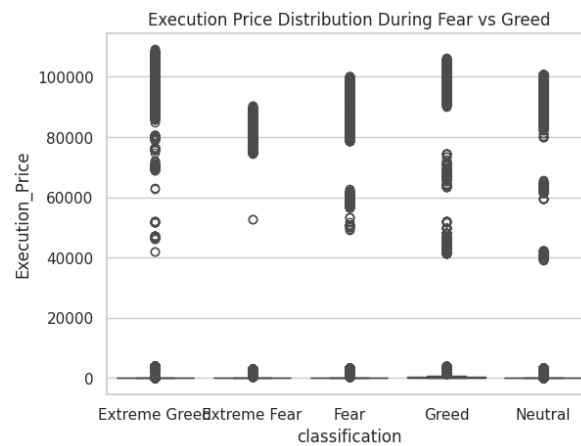
This dot-plot depicts price dispersal:

- Extreme Greed and Greed have a greater execution price, which is what is expected in bull markets.
- Fear and Extreme Fear show lower price ranges
- Neutral has moderately balanced prices

Insight: market sentiment is highly correlated with price levels, Greed phases occur in price rallies, and Fear phases occur in sell-offs and dips.

3.5 Profitability Distribution Across Sentiments

Profitability Distribution During Fear vs Greed
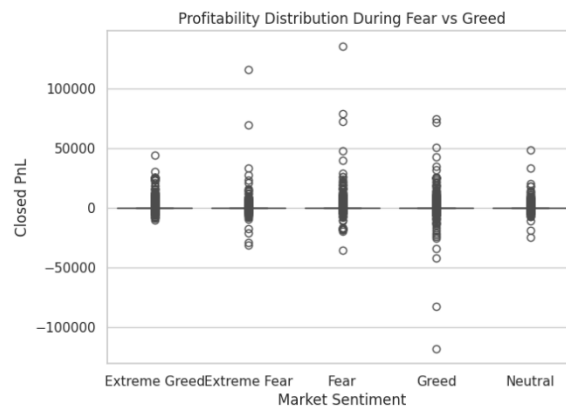
This distribution graph represents gains and losses:

- Every sentiment categorization reflects gains and losses (high dispersion).
- Greed and Fear have a bit more high profit outliers, suggesting potential for profits in the presence of strong trends.
- Extreme Fear shows a tighter clustering of results lower on the profit scale.

Insight: The potential for profits is higher during periods of strong sentiment (Greed/Fear), although this comes with increased volatility. Under Extreme Fear, there is less potential for profits through trading.

3.6 Sentiments Distribution in dataset

Sentiment Distribution in Dataset
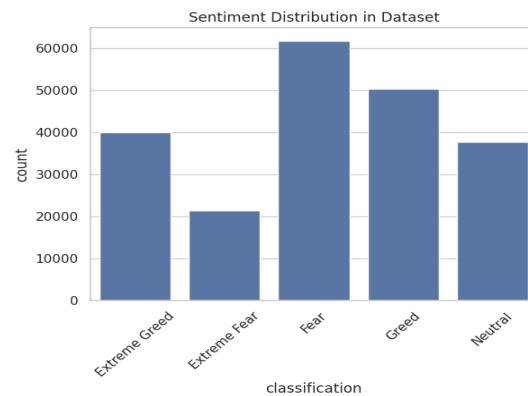
This graph shows the count of each classification of the sentiment distribution

Insights: Fear has the highest count among all whereas Extreme fear has the least count.

4. Conclusion

This analysis gives concrete evidence of how trader behavior shifts based on market sentiment, demonstrating that the dataset is substantially influenced by fear-driven phases, while greed-driven phases encourage traders to hold larger and more aggressive positions. The visualizations illustrated that position sizes peak during Extreme Greed, trading volumes reach their apex during Fear, and the friction of buy–sell activity significantly increases during Fear and Greed. Execution prices and profitability are also shown to vary greatly in these emotional states, providing additional evidence of the volatility in the unique context of market sentiment. Lastly, this study illustrates that sentiment is a significant driver of trading decisions, market participation, and risk-taking decisions. Future research can build on this research agenda to develop real-time sentiment modeling techniques, predictive algorithms for forecasting trader behavior and risk-taking, and more involved models utilizing machine learning to identify patterns that drive trading strategy improvement or risk management methodology.