

# Analysis Report - ds\_shrutishah

## 1 OBJECTIVE

---

The goal of this analysis was to explore the relationship between cryptocurrency trading data and market sentiment as measured by the Fear and Greed Index. Understanding how trader behaviour correlates with market sentiment can provide insights into market dynamics and profitability.

## 2 DATA USED

---

- **historical\_data.csv:**

Contains detailed trading information including execution price, size of trades (in tokens and USD), trade side (Buy/Sell), timestamps, and closed PnL (Profit and Loss).

- **fear\_greed\_index.csv:**

Contains daily values and classifications of the Fear and Greed Index, along with a timestamp and date.

## 3 PROCESS

---

### 3.1 DATA LOADING AND INITIAL INSPECTION

Both datasets were loaded into pandas DataFrames. Initial inspections were performed using `.head()`, `.info()`, and `.describe()` to understand data structure, types, and basic statistics. Missing values were checked using `.isnull().sum()`.

### 3.2 DATA CLEANING AND PREPARATION

- The "Timestamp IST" column in the trading data was converted to datetime format.
- A new "date" column was extracted from "Timestamp IST" for merging purposes.
- Numeric columns in the trading dataset were converted explicitly to numeric types, using `pd.to_numeric()` with `errors='coerce'` to handle non-numeric entries.
- The "date" column in the sentiment data was also converted to datetime format.

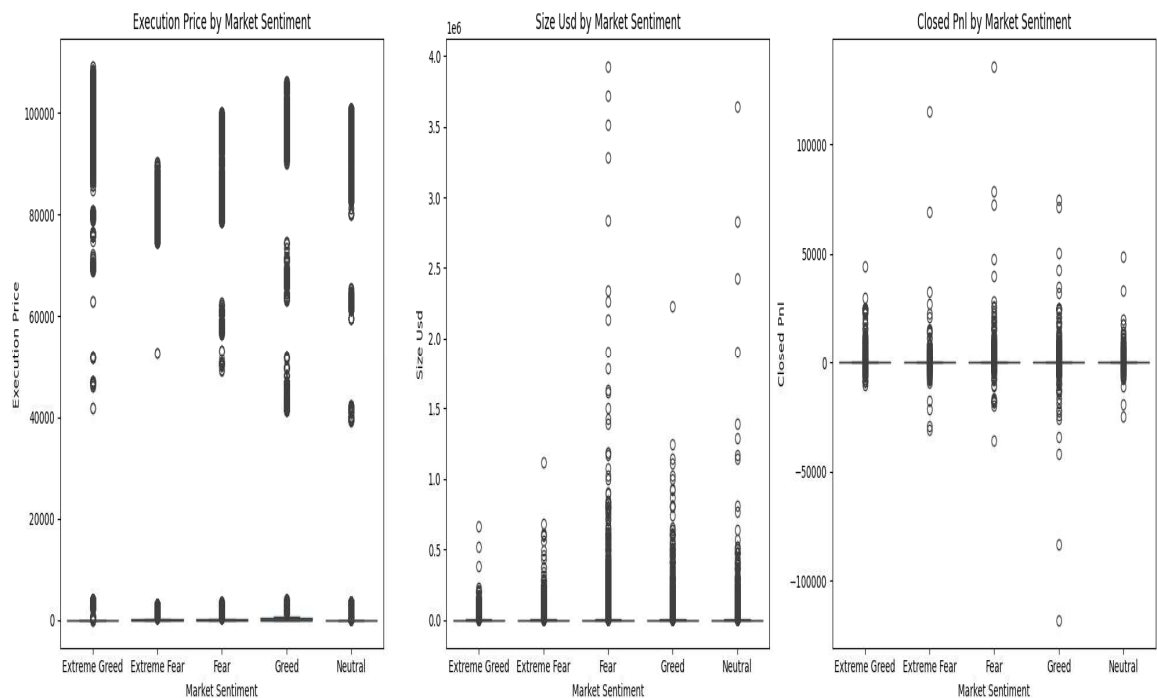
### 3.3 DATA MERGING

The trading data and sentiment data were merged on the "date" column using a left join to ensure all trading records were retained while appending the corresponding daily market sentiment.

---

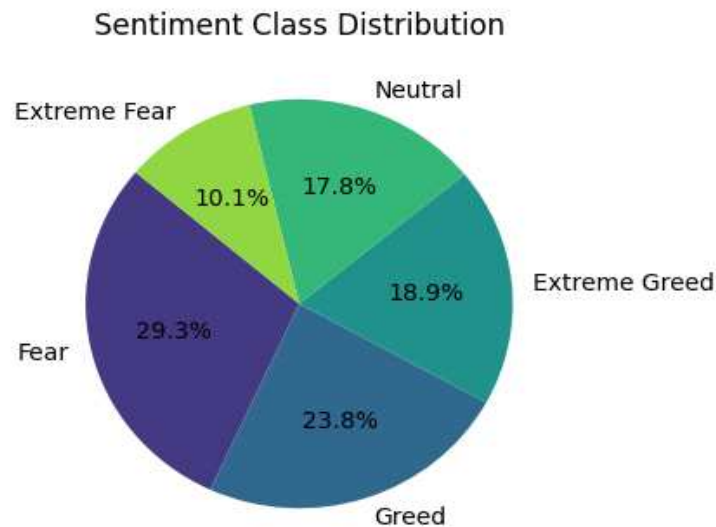
### 3.4 ANALYSIS AND VISUALIZATION

- **Summary Statistics by Sentiment Classification:**  
The merged data was grouped by sentiment categories ("Extreme Fear", "Fear", "Neutral", "Greed", "Extreme Greed") and aggregated to compute the mean of "Execution Price", "Size USD", and the mean and sum of "Closed PnL". This revealed how trading metrics vary with sentiment.
- **Box Plots of Key Metrics by Sentiment:**  
Visualizations of "Execution Price", "Size USD", and "Closed PnL" distributions within each sentiment category highlighted variance and outliers.



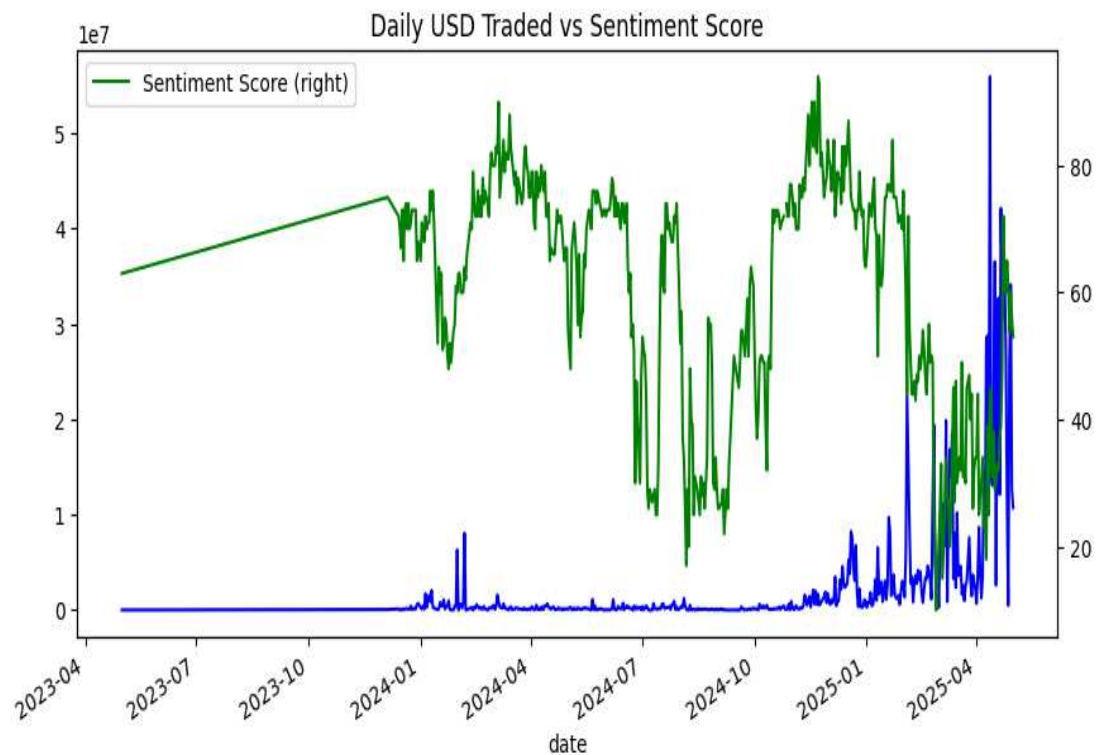
- **Sentiment Class Distribution:**

A pie chart illustrated the proportion of trading data corresponding to each market sentiment, showing the frequency distribution of market states.



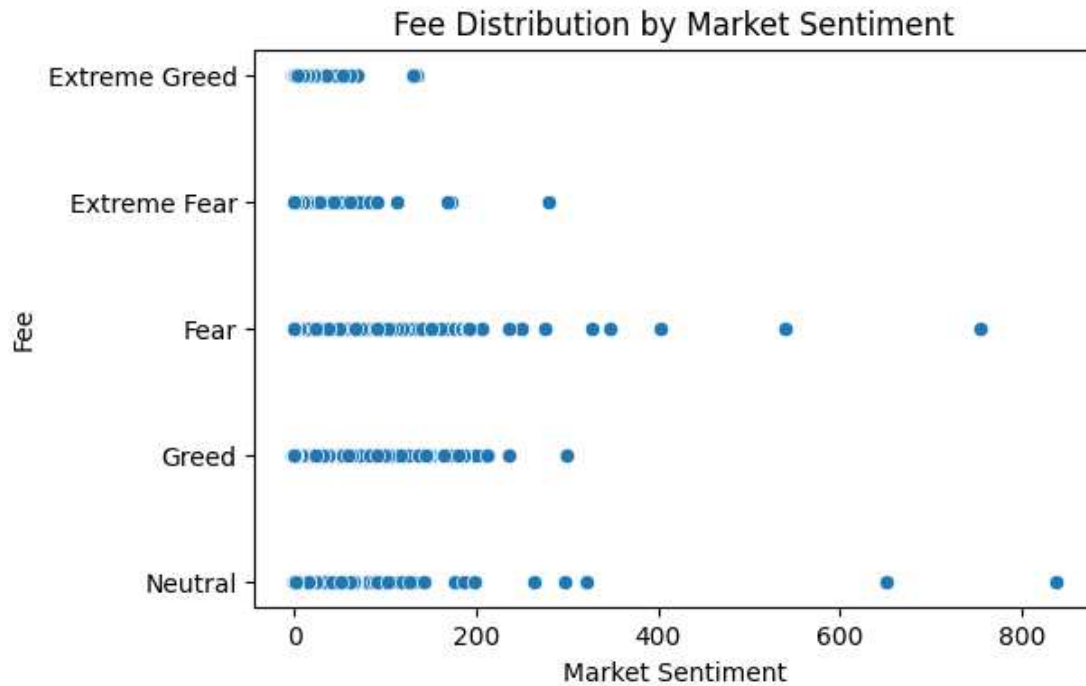
- **Daily USD Traded vs Sentiment Score:**

A time series line plot compared daily traded USD volume with the daily sentiment score, showing potential correlations between trading activity and sentiment.



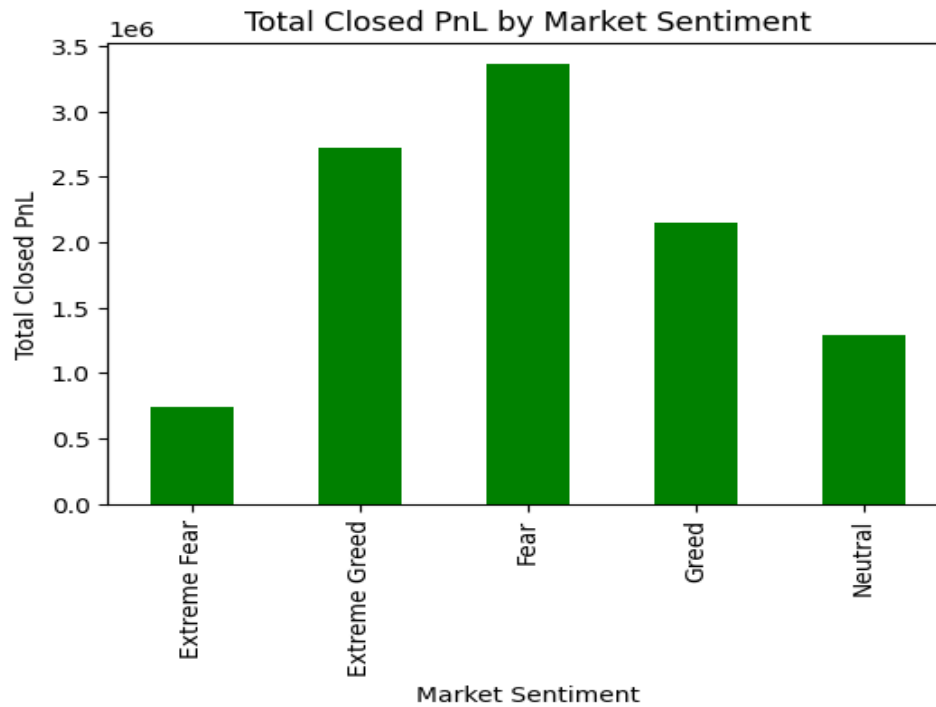
- **Fee Distribution by Sentiment:**

A scatter plot showed how transaction fees vary across sentiment classifications.



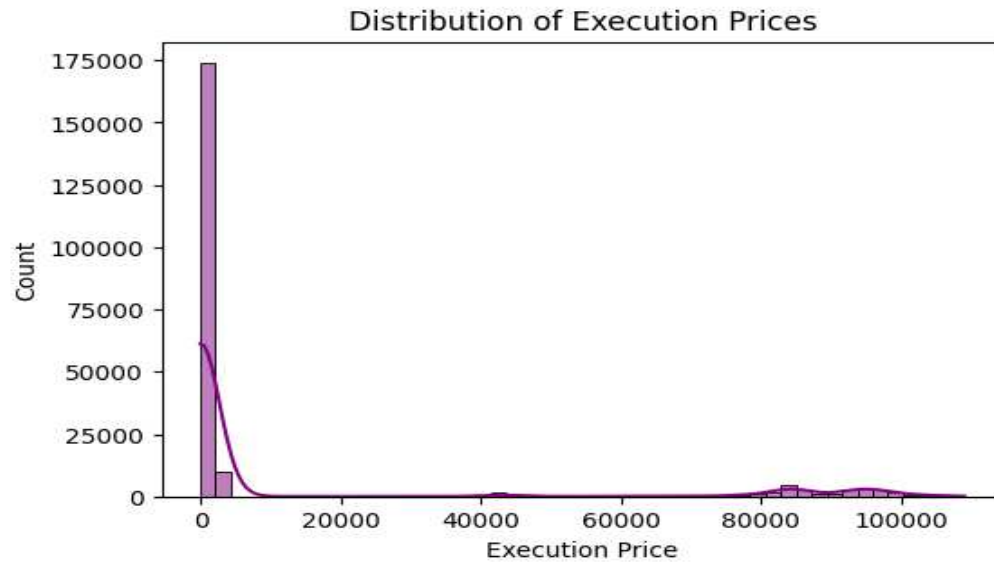
- **Total Closed PnL by Sentiment:**

A bar plot aggregated the total profit and loss by sentiment, indicating which market phases were most profitable.



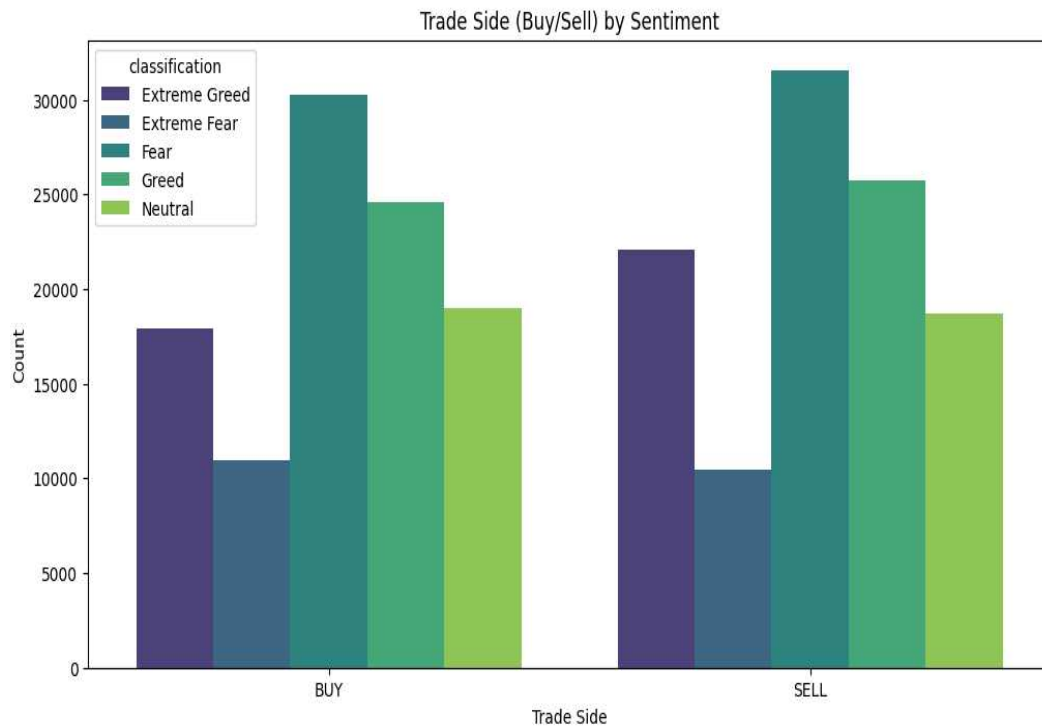
- **Execution Price Distribution:**

A histogram with KDE showed the distribution of trade prices, revealing common price ranges.



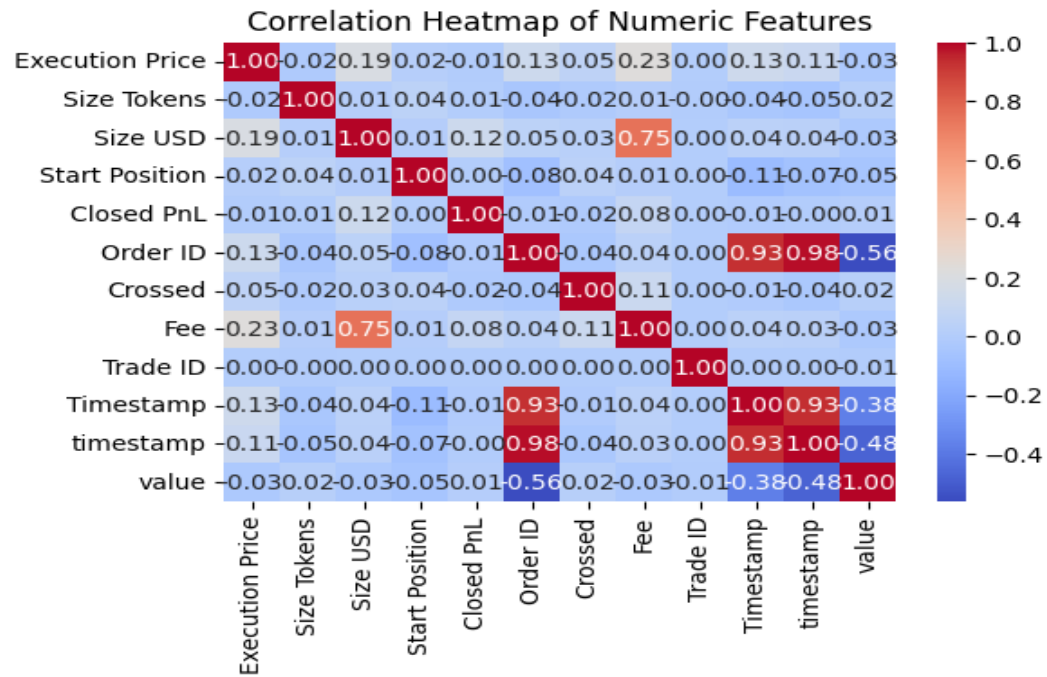
- **Trade Side Counts by Sentiment:**

Count plots indicated the frequency of Buy and Sell trades within each sentiment category.



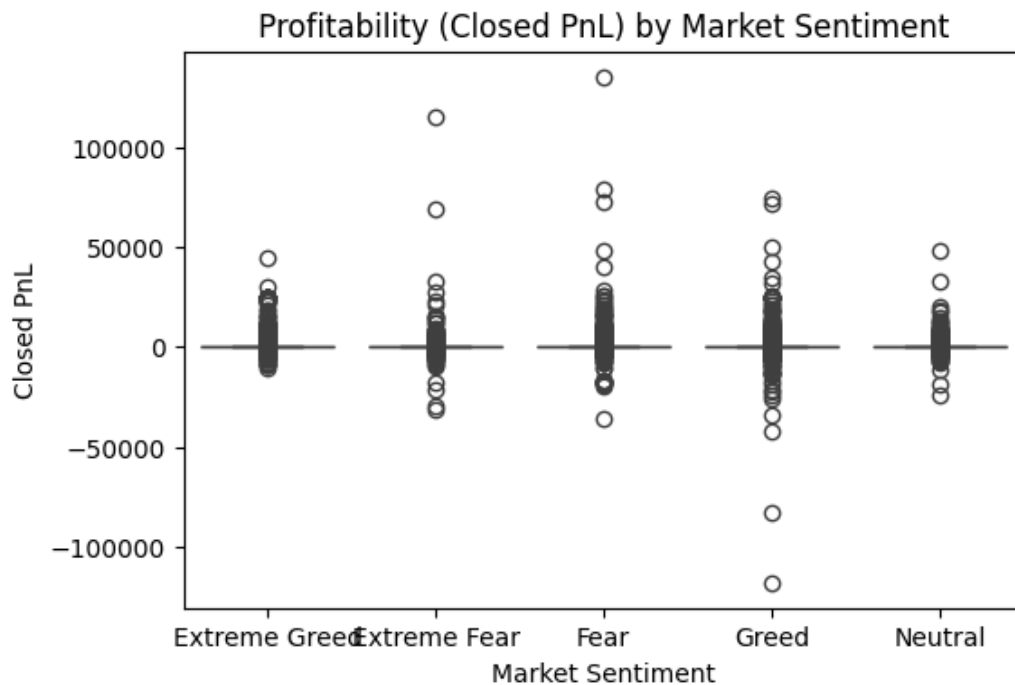
- **Correlation Heatmap:**

A heatmap showed the correlation matrix among numeric features, highlighting relationships including those between sentiment values and trade metrics.



- **Profitability (Closed PnL) by Market Sentiment:**

Box plots focused on Closed PnL distribution by sentiment, showing profitability spread.



- **Pairplot:**  
Pairwise plots of numeric features colored by sentiment revealed relationships and potential clusters influenced by sentiment.
- 

## 4 KEY FINDINGS AND OBSERVATIONS

---

- **Sentiment Distribution:**  
The data shows a varied distribution of market sentiment, with 'Fear' being the most common condition.
  - **Profitability:**  
The summary statistics and total Closed PnL bar plot suggest that trading during 'Fear' and 'Extreme Greed' periods correspond to higher overall profits, although mean profitability per trade varies widely.
  - **Trading Volume and Sentiment:**  
The daily traded USD volume and sentiment score plots indicate some alignment where increased trading volume occurs alongside shifts in sentiment, though the relationship is not perfectly linear.
  - **Execution Price:**  
Trade execution prices show a skewed distribution, with many trades executed at lower price ranges.
  - **Trade Side by Sentiment:**  
More Sell trades than Buy trades are recorded across all sentiment categories, indicating possible market selling pressure.
  - **Correlations:**  
The heatmap shows expected strong correlations (e.g., between Size Tokens and Size USD) and weaker correlations between sentiment scores and execution price.
- 

## 5 CONCLUSION

---

This analysis suggests that market sentiment as captured by the Fear and Greed Index does influence trading patterns and profitability in nuanced ways. While trading volume and fees tend to increase during periods of fear and greed, profitability shows mixed signals, with some evidence supporting contrarian trading strategies. Further work could include investigating specific trader behaviors or sentiment-driven algorithmic strategies.