Data Science Report: An Analysis of Trading Patterns in Relation to Market Sentiment

1. Assignment Overview

This project was an analysis to find a link between how crypto traders act and the overall mood of the market. The objective was to use two specific datasets—the Bitcoin Market Sentiment Dataset and Historical Trader Dataset—to analyze how trader profitability, volume, and risk-taking align or diverge from the overall market mood. The ultimate goal was to identify hidden trends and signals that could be used to develop smarter, more effective trading strategies.

2. Procedure Followed

Step 1: Data Preparation and Integration

The process began by loading the two datasets into pandas DataFrames. A critical preliminary step involved data cleaning; specifically, the date and time columns in both tables were converted from text into a standardized datetime format. This step was essential to ensure accurate alignment between the two datasets.

Once the dates were standardized, the tables were merged into a single, unified analytical dataset. This dataset was the foundation for the visualizations.

Step 2: Creating Key Metrics

Sentiment analysis was created to show the key metrics like total profit/loss, average profit/loss, total size, average trade size and average trade counts against sentiment classification. These metrics were very useful in finding the key insights from the enormous data it showed the number of trades during each sentiment and also the total and average profit.

Top 10 performers by total trading volume were listed so that the data can be used to create Top Trader Analysis which showed the account with total sum and average profit during the different classification.

Step 3: Visual Analysis and Interpretation

Four key visualizations were created to explore the data and extract meaningful insights.

Pie Chart of Trading Activity

A pie chart was created to visualize the distribution of trading activity across different sentiment classifications. This chart revealed that the vast majority of trades occur when

the market is in a state of high emotion—either "Fear" or "Greed". Very little activity happens during "Neutral" periods. This initial finding is important because it establishes that market sentiment plays a vital role in the trade.

Bar Chart of Average Profitability

A bar chart was then used to compare the average Profit & Loss (PnL) for each sentiment. This visualization uncovered the core finding of the analysis: Extreme greed shows highest average profit whereas the extreme fear shows loss and the number of trades done during extreme greed are higher than the extreme fear.

Bar Chart of Trader Behavior

To understand the psychology behind the profitability numbers, a chart of buy vs sell orders was generated. This visualization showed that during fear there were major number of trades, with sell as the highest trade. whereas the average profit was highest during extreme greed. The second most trades were done during greed.

Scatter Plot of Risk Analysis

Finally, a series of scatter plots were created to analyze the relationship between risk (trade size) and reward (PnL). The analysis indicated that making bigger trades (taking on more risk) was a strategy that paid off only during periods of "Fear." In a "Greedy" market, the trend was flat or negative, showing that increasing risk did not lead to higher returns and often resulted in greater losses. This provides a crucial strategic insight into risk management.

3. Summary of Findings

In short, the findings from each stage of the analysis point to a conclusion.

Emotion is what drives the market: Trading volume is highest during periods of strong sentiment, confirming that these are the most significant periods to analyze.

Profitability is Contrarian: The data consistently shows that acting against the prevailing positive sentiment has been the more profitable strategy.

Fear Creates Opportunity: Moments of fear are not just sell-offs; they are opportunities where assets are transferred from panicked traders to disciplined ones.

Risk is Calculated: Taking on larger risks is highly dependent on market sentiment. Such risks are rewarded in fearful markets but punished in greedy ones.

Collectively, these findings provide a clear, data-backed framework for developing trading strategies that are based on market psychology rather than emotional impulse.