

# Data Science Assignment Report – Web3 Trading Team

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**Project Title: Relationship Between Trader Behaviour and Market Sentiment**

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## 1. Objective

The objective of this project is to analyse how trader behaviour — including profitability, trade volume, and position sizing — aligns or diverges from overall market sentiment (Fear vs. Greed). By combining **historical trading data** with the **Bitcoin Fear & Greed Index**, the study uncovers behavioural patterns that can inform more intelligent trading strategies.

## 2. Datasets Used

### Historical Trader Data

- Columns: Account, Coin, Execution Price, Size USD, Closed PnL, Side, Timestamp, etc.
- Provides trade-level details including execution, profit/loss, and volume.

### Bitcoin Market Sentiment Data (Fear & Greed Index)

- Columns: timestamp, value, classification, date
- Represents daily market emotion ranging from **Extreme Fear** to **Extreme Greed**.

## 3. Methodology

1. Data cleaning, formatting, and merging using timestamps as the key.
2. Exploratory Data Analysis (EDA) to understand trade and sentiment patterns.
3. Visual exploration through multiple plots to reveal behavioural insights.
4. Aggregation and comparison of metrics across sentiment classifications.

## 4. Key Findings

### 1. Profit Distribution under Different Sentiments

- Profit distribution is **highly skewed** during *Greed*, indicating a few large winning trades.
- During *Extreme Fear*, profits are concentrated near zero or negative, showing conservative trading behaviour.

## 2. Trade Volume under Different Sentiments

- Trade volumes are **significantly higher** during *Fear* and *Greed* phases.
- Indicates traders react emotionally, leading to panic selling or FOMO buying.

## 3. Correlation Heatmap

- Closed PnL shows a **moderate positive correlation** with Size USD.
- Larger trades generally yield higher profits.
- No major multicollinearity, indicating stable dataset structure.

## 4. Average Daily Profit Over Time

- Profits **rise during Fear** and **dip during Extreme Greed**.
- Early April 2024 marked a rapid profit reversal from losses to gains within a few days.

## 5. Average Profit by Market Sentiment

- Highest average profit observed in *Extreme Greed*, followed by *Greed*.
- Lowest average profit in *Extreme Fear*, showing bearish trader psychology.

## 6. Average Trade Size by Market Sentiment

- Larger trades occur during *Fear* and *Greed*.
- Trade size drops slightly during *Extreme Greed*, indicating reduced conviction at peak optimism.

## 5. Summary

The analysis shows a clear connection between **trader performance** and **market sentiment**. Traders tend to act more aggressively during emotional extremes, especially during *Fear* and *Greed* periods. Both profitable opportunities and risks peak during these times.

## 6. Conclusion

Market sentiment significantly influences trading outcomes.

Understanding emotional cycles — particularly transitions between *Fear* and *Greed* — enables the development of smarter, sentiment-aware trading strategies for better decision-making.

## 7. Tools & Libraries Used

- **Python (Google Colab)**
- **Pandas, NumPy** — data handling & processing
- **Matplotlib, Seaborn** — data visualization
- **CSV datasets** — trading and sentiment data sources