

# Data Science Assignment Report

## Trader Behavior Insights & Market Sentiment Analysis

Candidate: Om Shinde

Date: August 10, 2025

---

### 1. Introduction

This report presents a data-driven analysis of how cryptocurrency trader behavior varies with market sentiment. The primary objective was to explore the relationship between trader profitability, win rate, trade volume, and leverage against the Fear & Greed sentiment index. Insights derived here aim to inform smarter trading strategies in Web3 trading ecosystems.

---

### 2. Data Overview

Two datasets were analyzed and merged by date for correlation:

- **Trader Data:** Detailed trade records including account, coin, execution price, trade size, profit/loss (PnL), leverage proxy (Start Position), and timestamps.
- **Fear & Greed Index:** Daily market sentiment classification into categories: Extreme Fear, Fear, Neutral, Greed, Extreme Greed.

After cleaning and preprocessing, the datasets were merged on date to assign sentiment labels to each trade.

---

### 3. Methodology

- Preprocessed date columns for accurate merging.
  - Calculated key metrics grouped by sentiment category:
    - Average Closed Profit/Loss (PnL) per trade
    - Total Trade Volume in USD
    - Average Position Size (as proxy for leverage)
    - Win Rate (% of profitable trades)
  - Visualized metrics using bar charts to highlight trends.
- 

### 4. Key Findings

#### Profitability by Market Sentiment

Sentiment	Avg Closed PnL (USD)
Extreme Fear	1.89
Fear	128.29
Neutral	27.09
Greed	53.99
Extreme Greed	205.82

- Highest average profits occur during Extreme Greed and Fear periods.
- Lowest profits coincide with Extreme Fear sentiment.

#### Trade Volume by Market Sentiment

Sentiment	Total Trade Volume (USD)
Extreme Fear	9,580,240
Fear	79,674,391
Neutral	11,939,551
Greed	57,045,815
Extreme Greed	18,223,760

- The majority of trading activity occurs during Fear and Greed sentiments.
- Extreme Fear and Extreme Greed see significantly less volume.

#### Position Size and Leverage Insights

Sentiment	Avg Start Position
Extreme Fear	21,902.80
Fear	8,146.36

Sentiment	Avg Start Position
Neutral	89,199.59
Greed	37,276.79
Extreme Greed	24,593.24

- Largest average positions occur in Neutral and Greed markets.
- Traders take smaller positions during Fear.

#### Win Rate by Market Sentiment

Sentiment	Win Rate (%)
Extreme Fear	29.28
Fear	38.18
Neutral	49.49
Greed	43.57
Extreme Greed	55.33

- Highest win rates are seen under Extreme Greed sentiment.
- Lowest win rates occur during Extreme Fear, indicating losses increase in highly fearful markets.

---

## 5. Visual Insights

(Include your saved bar charts here:

- Average Closed PnL by Sentiment
- Total Trade Volume by Sentiment
- Average Position Size by Sentiment
- Win Rate by Sentiment)

---

## 6. Conclusions

This analysis reveals clear patterns in trader behavior influenced by market sentiment:

- Traders tend to achieve the best profitability and win rates during Extreme Greed, likely due to momentum-driven strategies.
- Fear and Greed phases see the highest volume, indicating active participation, while extremes see lower activity.
- Leverage and position sizes vary significantly with sentiment, suggesting risk appetite shifts with market psychology.
- The poorest performance is during Extreme Fear, highlighting the risks of panic-selling or market turmoil.

These insights could guide more nuanced, sentiment-aware trading strategies to optimize risk and reward in volatile cryptocurrency markets.

## **7. Submission Contents**

- `notebook_1.ipynb` — Google Colab notebook with data loading, cleaning, analysis, and plots
- `csv_files/merged_data.csv` — Cleaned and merged dataset used for analysis
- `outputs/` — Folder containing all relevant charts (PNG files)
- `ds_report.pdf` — This concise report summarizing methodology, results, and conclusions
- `README.md` — Optional instructions or notes for reviewers