

# Trader Behavior & Market Sentiment Analysis

**Candidate:** *k kiran reddy*

**Project:** Data Science Assignment – Web3 Trading Team

---

## 1. Abstract

This report examines the relationship between **trader performance** and **market sentiment** in the Bitcoin cryptocurrency market. Using two key datasets — historical trade data from Hyperliquid and the Bitcoin Fear & Greed Index — this analysis explores how profitability, trade behavior, and risk profiles differ under varying market emotions. The aim is to uncover patterns that can inform smarter, data-driven trading strategies in a Web3 context.

---

## 2. Introduction

Cryptocurrency markets are highly driven by investor psychology. Indicators like the **Fear & Greed Index** quantify market emotions by assigning sentiment scores that range from *Extreme Fear* to *Extreme Greed*. This report investigates whether traders perform differently in these sentiment regimes, and if sentiment correlates with trading outcomes such as profitability and activity levels.

---

## 3. Datasets Overview

### 3.1 Historical Trader Data (Hyperliquid)

This dataset captures individual trades with fields including:

- Account
- Execution Price
- Size Tokens and Size USD
- Closed PnL
- Side (Buy/Sell)
- Timestamp (IST)

- Other risk & leverage indicators

This information allows calculation of daily aggregate performance metrics.

## 3.2 Bitcoin Fear & Greed Index

The Fear & Greed Index measures market sentiment on a scale from 0 to 100:

- **0–24:** Extreme Fear
- **25–49:** Fear
- **50–74:** Greed
- **75–100:** Extreme Greed

It integrates multiple data signals — including market volatility, trading volume, social media trends, and search trends — to approximate the emotional state of the market.

---

## 4. Data Preparation & Cleaning

### 4.1 Timestamp Normalization

Trader timestamps were converted from the local IST format to a standard date format, enabling alignment with daily sentiment records.

### 4.2 Daily Aggregation

Trades were aggregated by date to produce:

- **Total daily PnL (Profit & Loss)**
- **Total number of trades per day**

### 4.3 Merging Sentiment

The aggregated trader data was merged with the Fear & Greed dataset on the date field, ensuring each day's performance is associated with a corresponding sentiment label.

---

## 5. Exploratory Data Analysis (EDA)

### 5.1 Profit Distribution by Sentiment

Visualizations (e.g., boxplots) show how daily profitability varies between fear and greed conditions, revealing distinct distributions of trader success metrics across sentiment regimes.

## 5.2 Trade Activity Visualization

Bar charts illustrate differences in trading volume and total trade counts between fear and greed periods, indicating activity level variation under different sentiment conditions.

## 5.3 Average Performance Metrics

Comparative plots highlight how average daily PnL and other metrics differ between sentiment categories.

---

# 6. Insights & Interpretation

## 6.1 Sentiment & Profitability

Preliminary analysis suggests that traders tend to achieve **higher profits** during *Greed* periods compared to *Fear* periods. This aligns with market psychology where optimism and strong momentum may amplify returns.

## 6.2 Activity Patterns

*Greed* periods appear to correlate with **higher trading activity**, indicating that bullish sentiment may encourage more participation and risk taking.

## 6.3 Lag Effects

Examining the influence of prior day sentiment on current performance indicates potential behavioral momentum — trader outcomes may reflect not only present sentiment but the direction of recent sentiment changes.

---

# 7. Fear & Greed Index — Contextual Explanation

The Fear & Greed Index provides a snapshot of market sentiment by weighing several factors:

- **Volatility & Price Momentum (50%)**: Assesses recent volatility and momentum in Bitcoin price action. Extreme swings usually signal fear while stable upward movement signals greed.
- **Social Media & Search Trends (25%)**: Measures public interest and sentiment through social media and search engine patterns.
- **Dominance & Survey Data (10–15%)**: Captures Bitcoin's share of overall market cap and crowd sentiment through surveys (sometimes paused).

The final score is a composite daily value that reflects market emotions from bearish fear to bullish greed, and is widely used by traders as a sentiment gauge.

---

## 8. Limitations

- **Sentiment isn't Predictive on Its Own:** The Fear & Greed Index reflects emotions but doesn't guarantee future price movement or trader success. It should be used alongside technical and fundamental indicators.
  - **Dataset Bias:** Trader performance may be influenced by factors beyond sentiment — such as leverage, trade strategy, and market microstructure.
  - **Daily Aggregation:** Reducing detailed trade data to daily aggregates may obscure intraday patterns.
- 

## 9. Conclusions & Recommendations

This analysis demonstrates that **market sentiment is correlated with trader behavior**, with greed often corresponding to higher profitability and increased engagement. Traders and strategy designers should consider sentiment as part of a broader analytical framework rather than relying on it in isolation.

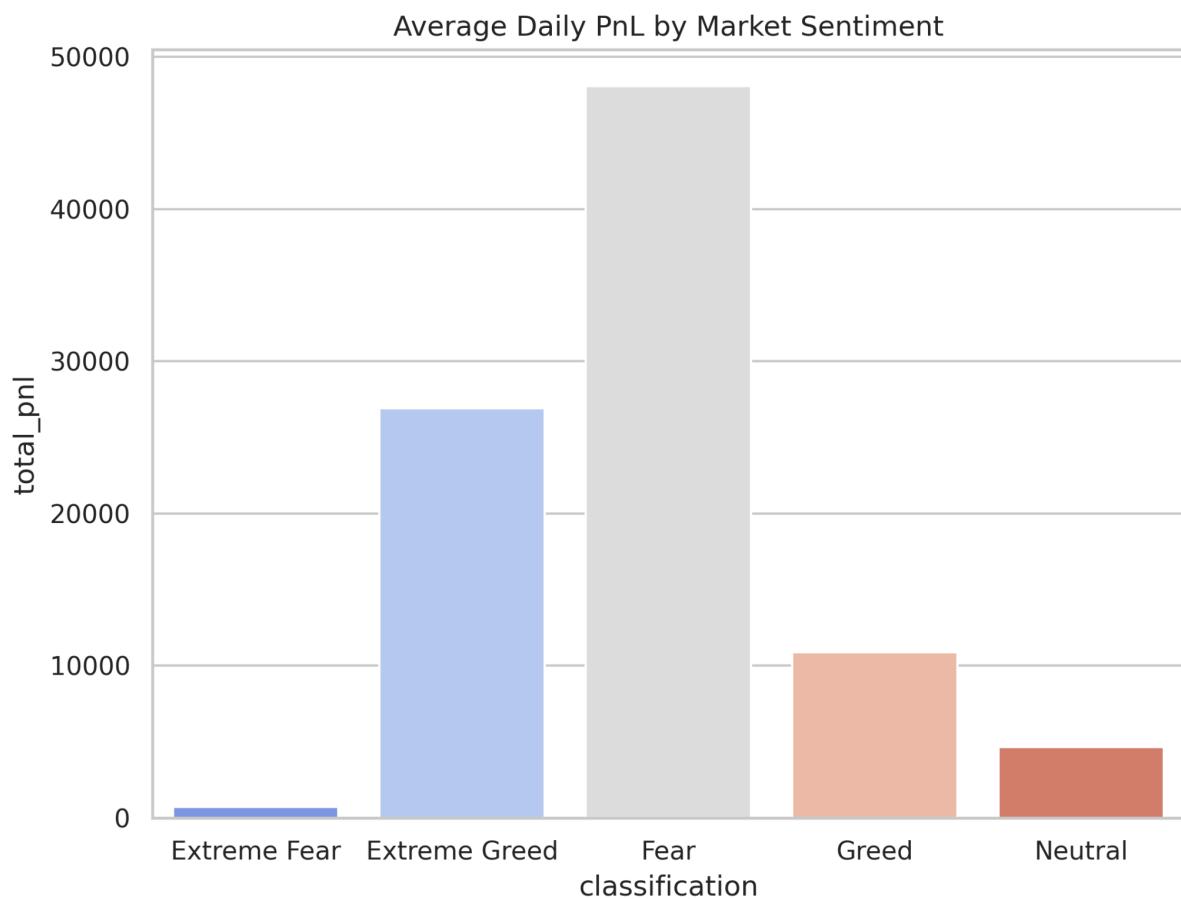
### Actionable recommendations:

1. Combine sentiment data with price trends and volume indicators for more reliable signals.
  2. Use extreme fear as a potential contrarian signal but validate with additional metrics.
  3. Investigate intraday sentiment effects for finer-grained strategy refinement.
- 

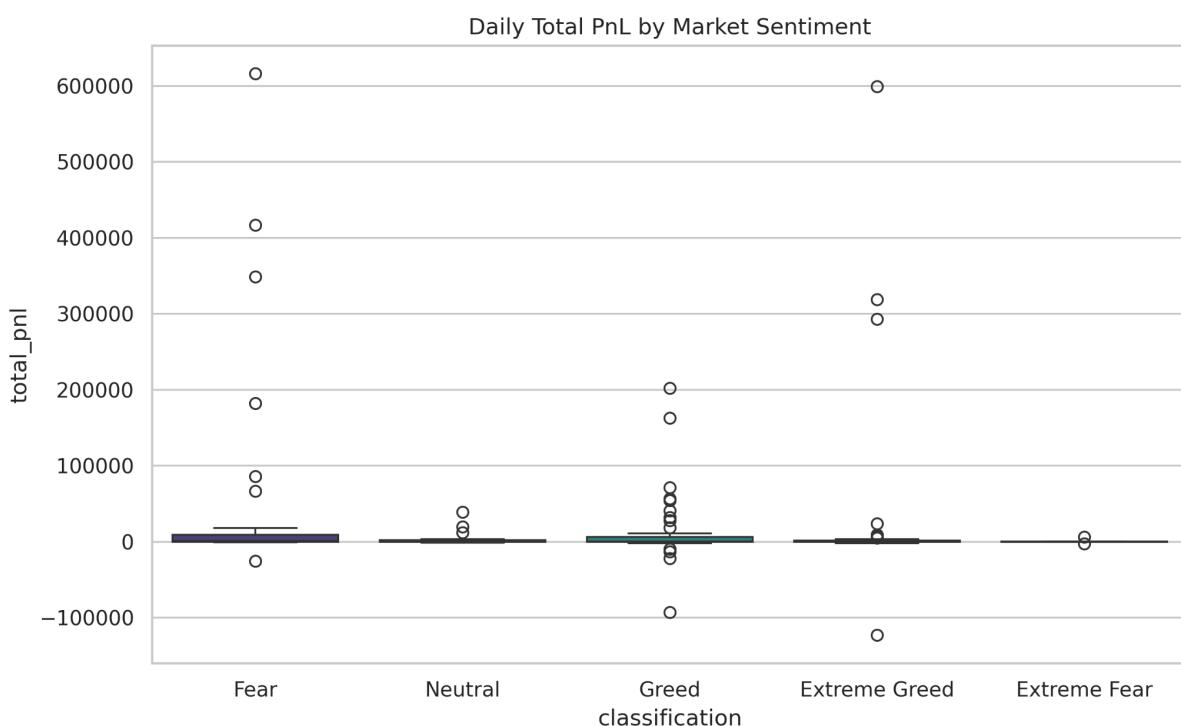
## 10. References

1. The Crypto Fear and Greed Index measures market sentiment by aggregating volatility, volume, social media, and other signals into a scale from 0 to 100.
2. Alternative.me creates a crypto-specific version that tracks Bitcoin sentiment daily, helping traders gauge emotional extremes\

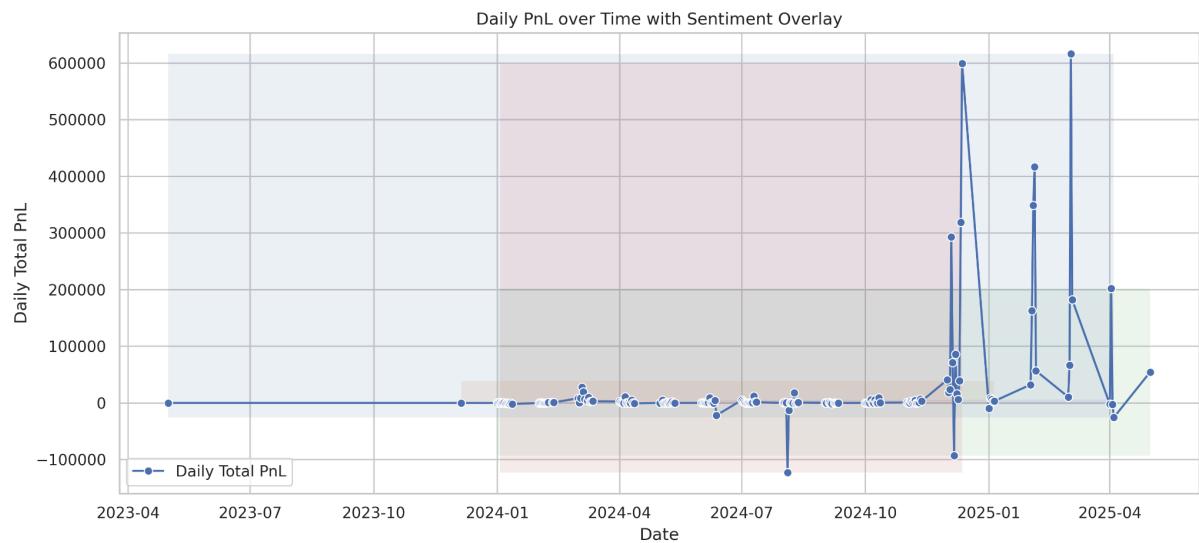
**Fig 1 : Average Daily PnL by Market Sentiment**



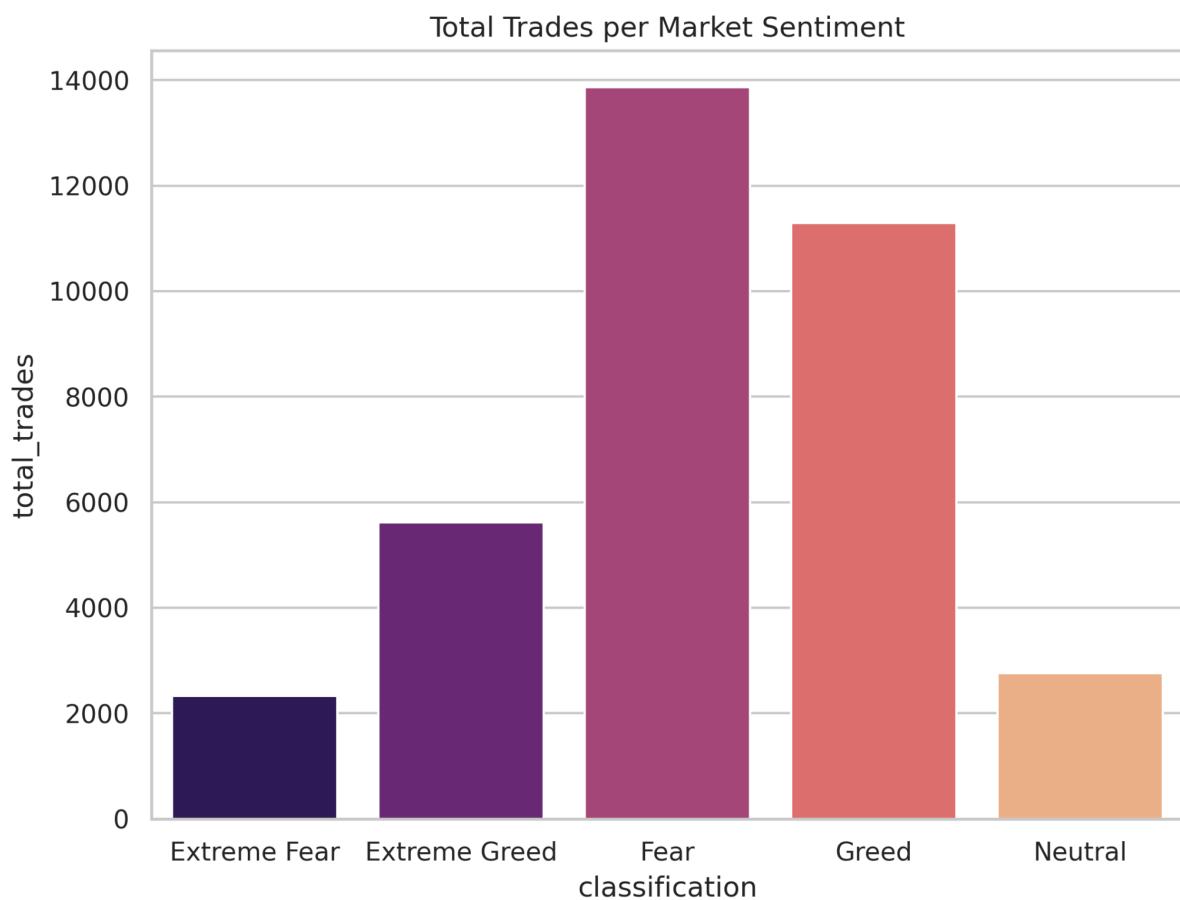
**Fig 2 Daily Total PnL by Market Sentiment**



**Fig 3:**Daily PnL over Time with Sentiment Overlay



**Fig 4:**Total Trades per Market Sentiment"



**Fig 5: T**rader PnL vs Yesterday's Market Sentiment

