

Trader Behavior & Market Sentiment Analysis

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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.
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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.
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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

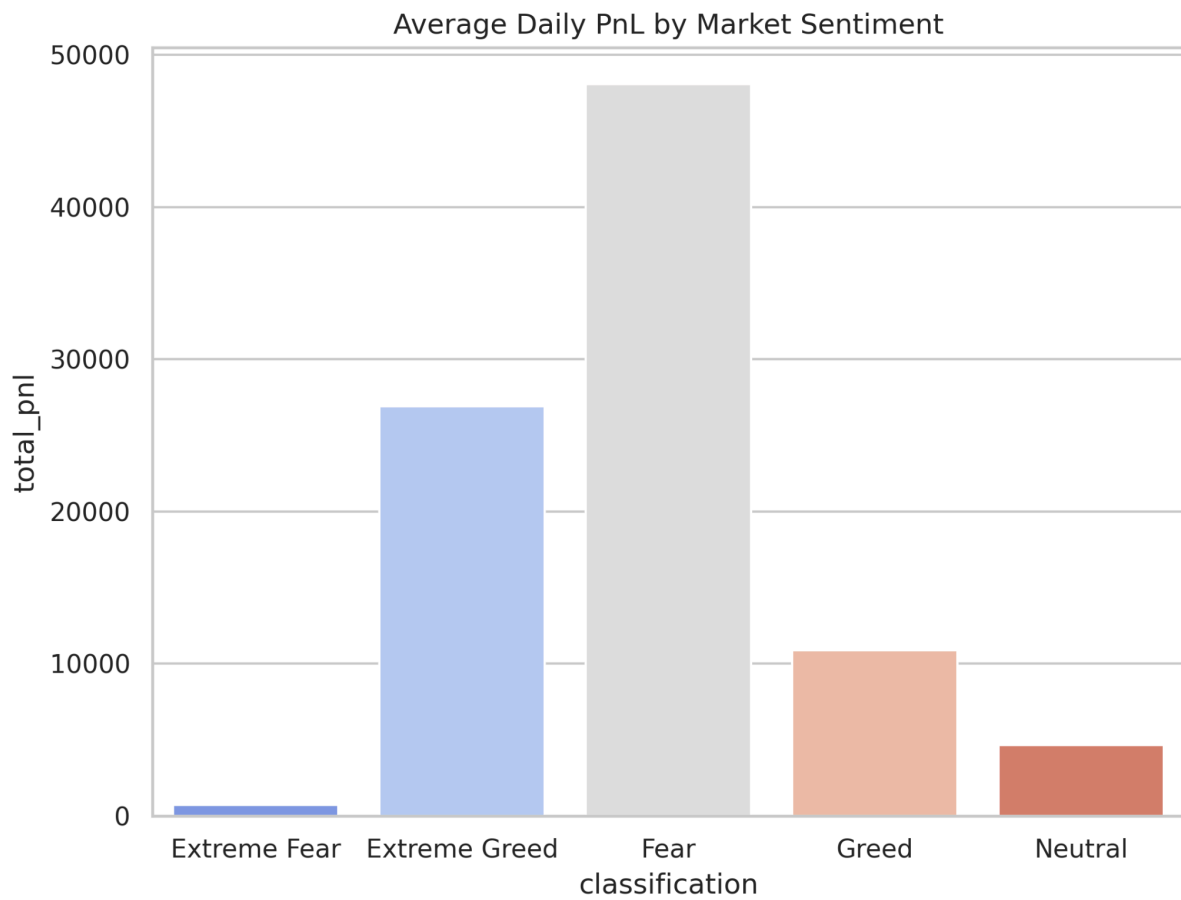


Fig 2 Daily Total PnL by Market Sentiment

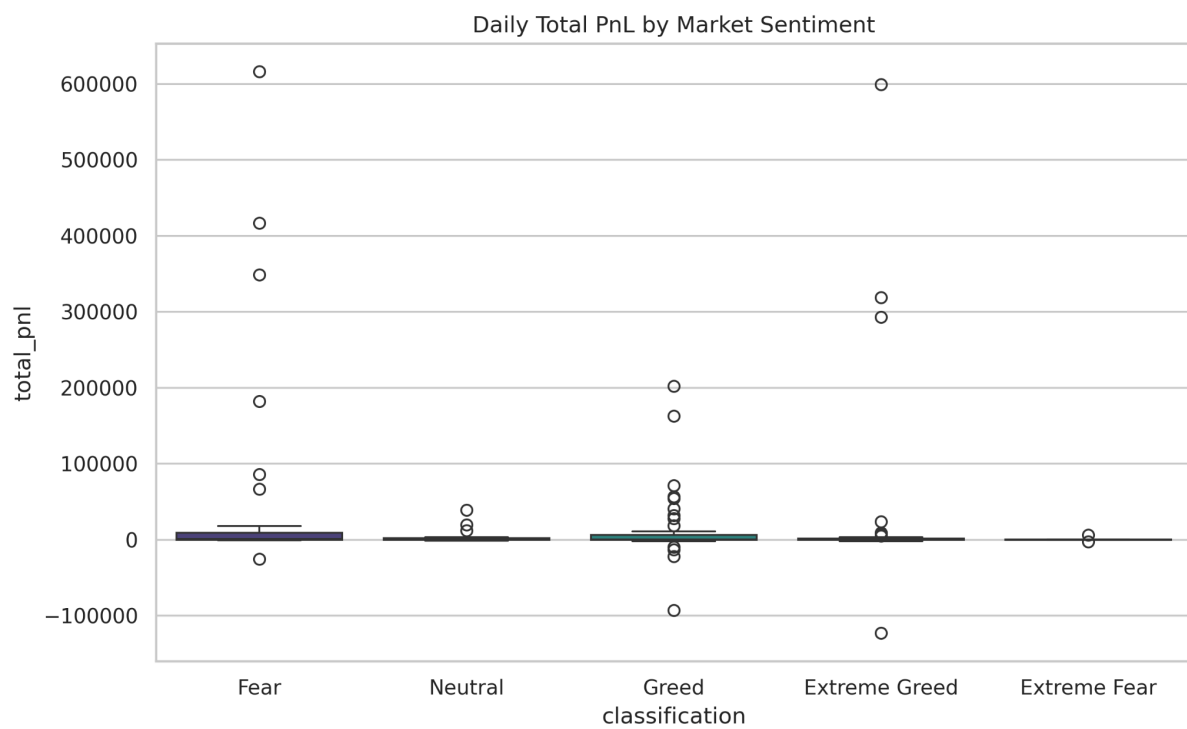


Fig 3: Daily PnL over Time with Sentiment Overlay

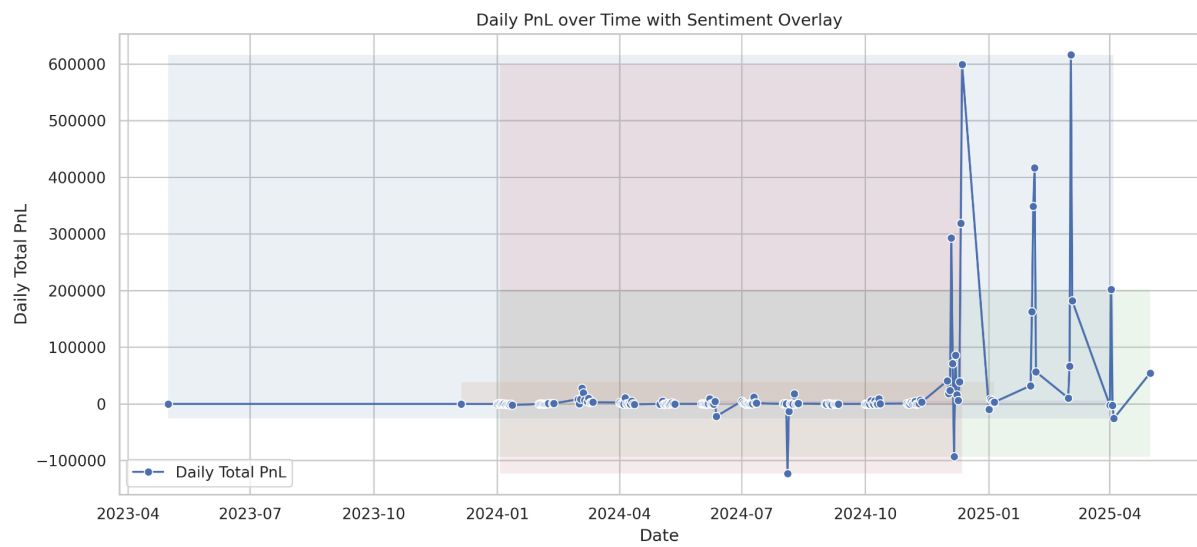


Fig 4: Total Trades per Market Sentiment"

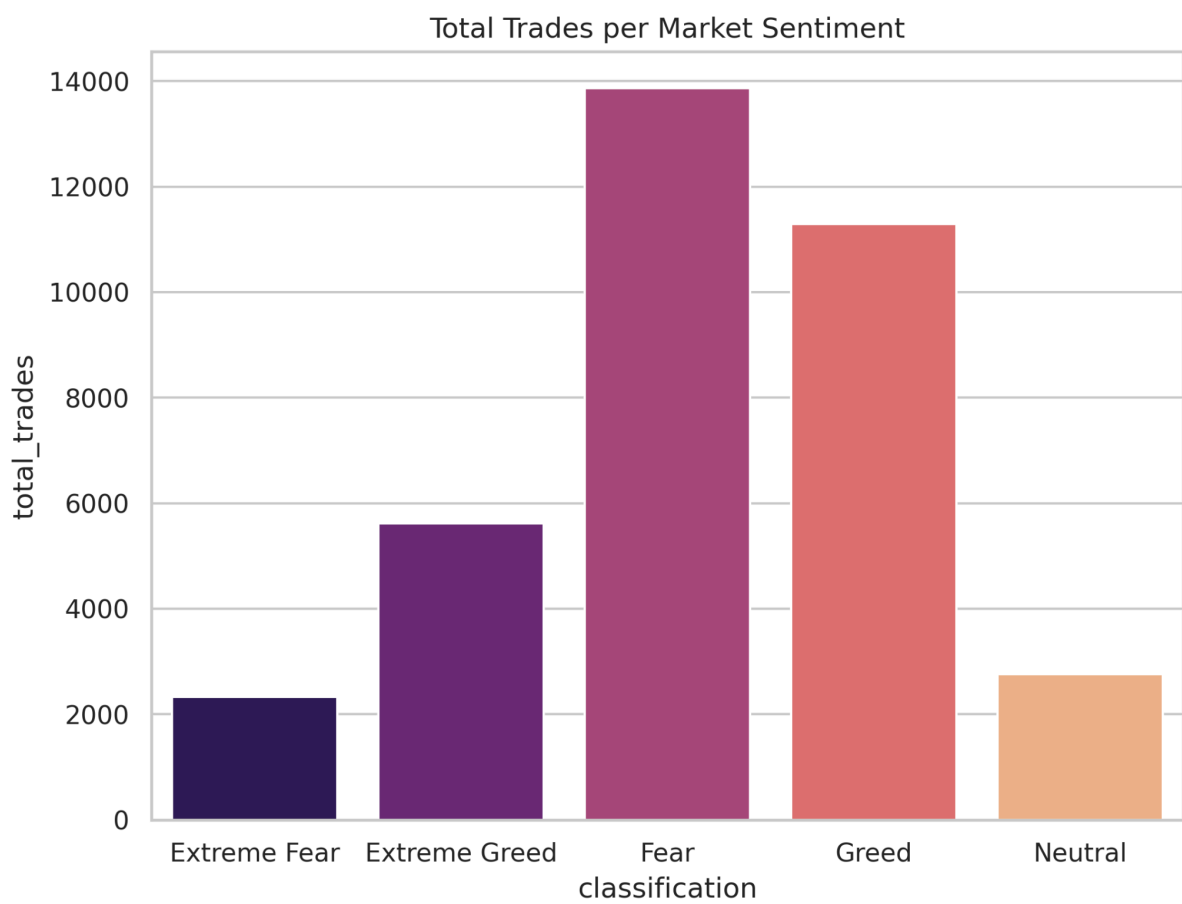


Fig 5: Trader PnL vs Yesterday's Market Sentiment

