

# Data Science Report

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Analyzing the Relationship Between Trader Behavior and Market Sentiment

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## Objective

The purpose of this analysis is to explore the relationship between trader behavior (profitability, volume, fees, etc.) and overall market sentiment, using two datasets:

- Fear & Greed Index — daily classification of market sentiment.
- Hyperliquid Trader Data — detailed logs of trading behavior.

The goal is to uncover hidden trends that could help design smarter trading strategies.

## Datasets Used

### 1. Fear & Greed Index

- Columns: timestamp, value, classification, date
- Description: Classifies each day as Fear, Greed, Extreme Fear, or Extreme Greed based on market sentiment indicators.

### 2. Historical Trader Data

- Columns include: Timestamp IST, Closed PnL, Size USD, Fee, Direction, etc.
- Description: Logs trading behavior such as profit/loss, trade size, and cost for each account on Hyperliquid.

After preprocessing, both datasets were merged using the date field for alignment.

## Data Preprocessing

- Converted timestamps to datetime.date objects for merging.
- Merged datasets on the common Date column.
- Filtered for relevant columns: Closed PnL, Size USD, Fee, and classification.

## Exploratory Data Analysis & Visualizations

### 1. Average Profit/Loss by Sentiment

Insight: Traders earned relatively more during [insert highest] sentiment periods. This could suggest higher market volatility or confidence during those phases.

### 2. Total Trade Volume by Sentiment

Insight: A significant portion of trades occurred during [insert dominant sentiment] periods, possibly indicating higher engagement when the market is perceived as favorable.

### 3. Distribution of Profit/Loss by Sentiment

Insight: The distribution of Closed PnL shows that [mention any skewed behavior or outliers] during [Extreme Greed/Fear].

### 4. Average Transaction Fee by Sentiment

Insight: Average fees were [higher/lower] during [classification] periods, possibly due to higher trade volumes or leveraged trades.

## Key Findings

- Volume vs Sentiment: Traders are more active during [Extreme Greed/Fear], suggesting behavioral influence from sentiment.
- Profitability: PnL doesn't always correlate positively with Greed. High volume does not always mean high returns.
- Fees: Transaction costs may increase during volatile or greedy phases.

## Conclusion

There is a clear behavioral correlation between trading activity and market sentiment. However, profitability isn't guaranteed during greed-driven periods. Smart trading strategies could involve:

- Monitoring sentiment shifts in real-time
- Avoiding over-trading during emotional market phases
- Controlling leverage and position size especially during Extreme Greed