

# Trader Behavior Insights Based on Market Sentiment

## 1. Objective

This project aims to analyze how trader behavior on a crypto trading platform varies with overall market sentiment, using historical trading data from Hyperliquid and a Bitcoin market sentiment index.

The key goal is to uncover:

- How sentiment (Fear, Greed, etc.) affects **profitability, trade volume, risk-taking**, and **buy/sell decisions**
- If meaningful patterns exist that can help in building **smarter and more adaptive trading strategies**

## 2. Data Sources & Cleaning

### A. Datasets Used:

- **Market Sentiment Dataset:** Daily market mood (Fear, Greed, Neutral, etc.)
- **Hyperliquid Trader Data:** Historical trades with features like account, coin, price, size, side, timestamp, and closed PnL

### B. Data Cleaning Steps:

- Converted **Timestamp IST** in trade data and **Date** in sentiment data to `datetime.date` format
- Merged both datasets using the `date_only` field
- Removed null values and rows with invalid or zero timestamps
- Parsed numerical columns like **Closed PnL** and **Size USD** to proper formats

### 3. Key Analyses Performed

#### **A. Profitability by Market Sentiment**

- Calculated average **Closed PnL** per sentiment
- **Highest average profits** occurred during **Greed** and **Extreme Greed**
- **Extreme Fear** and **Fear** showed lower or negative average PnL

#### **B. Trade Volume (Size USD) by Sentiment**

- Columns was **highest** in Greed and Extreme Greed
- Indicates traders trade larger sizes when the market is bullish

#### **C. Buy vs Sell Behavior by Sentiment**

- **BUY** trades dominated during Greed phases
- **SELL** trades slightly more common during Fear
- Suggests psychological bias (buying in bull markets, selling in bear markets)






#### **D. High-Risk Trade Analysis**

- Defined trades above **\$10,000** as high-risk
- Found that **Extreme Fear** had the **highest % of high-risk trades**, suggesting panic-driven aggressive behavior

#### **E. Top Performing Traders**





- Identified top 10 trader accounts based on total PnL
- These accounts were profitable across multiple sentiments, suggesting robust trading strategies

## 4. Visuals Generated

-  **Boxplot:** Closed PnL vs Market Sentiment
-  **Bar Chart:** Volume by Sentiment
-  **High-Risk** Trade % by Sentiment
-  **Time-based** PnL trend (weekly)
-  **Top Trader** Bar Chart

All charts are saved in **/outputs/** folder and included in GitHub

## 5. Insights Summary

-  **Traders earn more during Greed and Extreme Greed**
-  **Risk-taking increases in Extreme Fear**
-  **Neutral periods show less volume and lower win rates**
-  **Profitable traders maintain consistency across all sentiment phases**

## 6. Conclusion

This analysis proves that market sentiment significantly impacts trader behavior.

Key takeaways:

- Traders trade bigger and more profitably during optimistic phases
- Fear leads to lower profits and higher risk, often emotionally driven
- Understanding sentiment-driven behavior can help improve strategy design, especially in volatile markets

The findings from this analysis can support the development of sentiment-aware trading bots, risk management models, and better strategy backtesting.

