Data Science Assignment Report

Trader Behaviour vs Market Sentiment Analysis

Name: Lavanya S
Team: Web3 Trading Team — Data Science Internship Assignment

◆ 1. Objective

The goal of this analysis is to explore how **trader behaviour**—including profitability, trading volume, and side (buy/sell)—**aligns or diverges** from overall **market sentiment** expressed by the Bitcoin Fear & Greed Index.
By combining both datasets, we aim to identify patterns that explain how market psychology affects trading decisions and performance.

◆ 2. Datasets Used

Dataset	Description	Key Columns
Trader Data (Hyperliquid)	Contains individual trade records with metrics such as price, size, leverage, and PnL.	Execution Price, Size USD, Closed PnL, Side, Timestamp IST
Market Sentiment (Fear & Greed Index)	Daily classification of Bitcoin sentiment.	Date, Classification (Fear/Greed), Value

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◆ 3. Data Preparation

1. Converted Timestamp IST to proper datetime format and extracted the **date**.
2. Cleaned missing or invalid timestamps by removing text like "IST" and applying flexible parsing.
3. Forward-filled missing sentiment dates to align with trading days.
4. Merged both datasets on date to assign a **sentiment label** to each trade record.
5. Final dataset contained over **2 lakh trades** mapped to five sentiment categories: Extreme Fear, Fear, Neutral, Greed, and Extreme Greed.

◆ 4. Exploratory Data Analysis (EDA)

4.1 Trade Frequency by Sentiment

- **Fear** phase recorded the **highest activity (~14 000 trades)**.

- **Greed** followed (~11 000 trades).
- **Extreme Fear / Extreme Greed / Neutral** showed much lower counts.

Insight 🧠:

Trader participation is highest during Fear phases—likely due to market volatility prompting more reactions.
In Extreme sentiment phases, traders act more cautiously, reducing volume.

4.2 Trader Profitability by Sentiment

Sentiment	Avg Closed PnL
Extreme Fear	1.89
Extreme Greed	205.82
Fear	128.29
Greed	53.99

Insight 🧠:

Profitability peaks during **Extreme Greed** and **Fear** periods, showing that traders exploit market swings.
However, these also display **wider profit ranges**, indicating higher volatility and risk exposure.

4.3 Overall Understanding

- Traders respond dynamically to market psychology.
- Fear → High activity, mixed profitability (more trades ≠ more profit).
- Extreme Greed → Fewer trades but higher average returns.
- Market extremes amplify both **risk and reward**.

🔹 5. Key Findings

1. **Sentiment strongly influences trading volume.**
   - Fear drives the most activity; Greed encourages confident trading.
2. **Extreme market emotions create both opportunities and danger.**
   - Higher profits but larger losses possible.

3. **Risk management is crucial.**
    - Consistency in returns is lower when sentiment extremes dominate.

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6. Conclusion

This study highlights a clear behavioural pattern:

Traders tend to react emotionally to market sentiment—trading heavily during fear and profiting during greed.

Understanding these psychological cycles can help design **smarter trading algorithms** that adjust position sizes or leverage based on prevailing sentiment, improving both stability and profitability.