

Data Science Assignment Report

1. Introduction

The goal of this project is to understand how trader behavior changes with overall market sentiment. We used two datasets: (1) a Fear & Greed Index and (2) historical trader activity from Hyperliquid. We wanted to see if traders act differently in 'Fear' versus 'Greed' periods.

2. Dataset Overview

- Sentiment dataset: Columns include date, value, and classification (Fear or Greed).
- Trader dataset: Columns include account, trade size, execution price, side (long/short), timestamp, PnL, and leverage.

3. Data Preprocessing

Steps performed:

- Converted date and timestamp columns to standard datetime.
- Extracted only date part from timestamps.
- Merged both datasets on date so each trade has its sentiment attached.

4. Exploratory Data Analysis (EDA)

We analyzed leverage, trade volume, profitability (PnL), and trade sides across Fear and Greed.

- Leverage distribution: Higher in Greed.
- PnL: Higher but more volatile in Greed, smaller but consistent in Fear.
- Trade volume: Larger in Greed, showing higher activity.
- Trade side: More Shorts in Fear, more Longs in Greed.
- Correlation: Weak negative link between leverage and PnL.

Below are placeholders for key graphs:

[Insert Graph: leverage_by_sentiment.png]

[Insert Graph: avg_pnl_by_sentiment.png]

[Insert Graph: correlation_heatmap.png]

5. Key Insights

1. Traders take more risk during Greed (higher leverage, larger positions).
2. Greed shows higher but riskier PnL outcomes.
3. Fear shows smaller positions, more short trades, more cautious behavior.
4. Sentiment indicators align closely with trading activity.

6. Conclusion & Recommendations

Trader behavior strongly aligns with sentiment:

- Greed → higher leverage, bigger positions, more longs, riskier outcomes.

- Fear → cautious trading, smaller positions, more shorts, lower volatility in PnL.

Recommendation: Sentiment indices like Fear & Greed can be used as signals for trading strategies. Example: tighten risk management during Greed and seek opportunities during Fear.