DS Report – Trader Behavior vs Market Sentiment

1. Introduction

This project explores the relationship between **trader behavior** and **market sentiment** using two datasets:

1. **Fear & Greed Index** (2018–2025) – provides daily sentiment values and classifications (Extreme Fear, Fear, Neutral, Greed, Extreme Greed).
2. **Hyperliquid Trader Data** (211,224 trades) – includes execution price, trade size, side, leverage, PnL, and account-level activity.

Objective:
Analyze how trading behavior (profitability, risk, volume, leverage) aligns or diverges from market sentiment and identify hidden signals that can inform smarter trading strategies.

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2. Dataset Overview

- **Fear & Greed Dataset**:
  - 2,644 daily records.
  - Classification categories: 5 sentiment phases.
  - No missing values.
- **Trader Dataset**:
  - 211,224 trade records, 16 columns.
  - 32 unique accounts, 246 unique coins.
  - No missing values.
  - Numeric timestamp in milliseconds (converted to datetime).

Both datasets were cleaned and merged using **nearest-date matching** to align each trade with the latest available market sentiment.

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3. Exploratory Analysis

3.1 Sentiment Distribution

- Balanced coverage across Fear, Neutral, and Greed phases.
- Frequent transitions between extreme phases indicate strong volatility.

3.2 Trader Behavior

- **Sides:** BUY and SELL were almost equally distributed.
- **Volume:** Concentrated in a few coins (e.g., HYPE, ETH, BTC).

- **PnL:** Wide distribution, with extreme outliers.
- **Leverage:** Skewed towards lower values but with significant high-leverage trades.

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4. Insights from Merged Analysis

4.1 Profitability vs Sentiment

- **Average PnL**:
    - Fear ≈ 50
    - Greed ≈ 51
    - Neutral ≈ 22
    - Extreme Greed ≈ 25
- Traders are **more profitable during Fear & Greed markets** than Neutral phases.

4.2 Volume vs Sentiment

- **Greed phases** → highest trading volume.
- **Neutral phases** → lowest trading activity, showing reduced confidence.

4.3 Risk Distribution

- **Boxplots** reveal:
    - Higher volatility in Fear & Greed phases.
    - Neutral phases more stable but less rewarding.

4.4 Statistical Validation

- **ANOVA test** → significant differences ($p < 0.05$) in PnL across sentiment classes.
- Confirms profitability patterns are not random.

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5. Extended Analysis (Notebook 2)

- **Per-Account Insights**: Certain accounts consistently outperform during Fear phases, suggesting contrarian strategies.
- **Risk-Adjusted Returns**: Greed phases offer high returns but also high volatility; Fear phases provide more balanced risk–reward.
- **Coin-Level Analysis**: Some tokens show stronger sentiment-linked profitability.
- **Predictive Modeling**: Basic Random Forest showed partial ability to predict sentiment from trader features.

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6. Conclusion

- Traders tend to perform **better in volatile sentiment environments** (Fear & Greed) compared to Neutral periods.
- Market sentiment can serve as a **predictive signal** for trading strategies.
- Risk management is crucial, since high profit also comes with high volatility.