Trader Performance & Market Sentiment Analysis

1. Introduction:

The objective of this project is to explore the relationship between Bitcoin market sentiment (Fear/Greed Index) and trader performance using Hyperliquid's historical trading data.

Market sentiment often influences trader psychology, which in turn impacts trading decisions such as entry/exit timing, position sizing, and risk exposure. By analyzing these datasets together, we aim to uncover hidden patterns that can drive smarter and more resilient trading strategies.

2. Datasets Used

Bitcoin Market Sentiment Dataset

- **Columns:** Date, Classification (Fear / Greed)
- **Description:** Represents crowd psychology through the Fear & Greed Index.

Hyperliquid Historical Trader Data

- **Columns:** Account, Symbol, Execution Price, Trade Volume, Profit/Loss (PnL)
- **Description:** Captures real trader activity, execution behavior, and profitability.

Preprocessing Steps:

- Converted timestamps to a consistent format.
- Merged sentiment data with trading records by date.
- Removed incomplete/missing values.
- Generated derived metrics (daily PnL averages, win rates, exposure under fear vs. greed).

3. Methodology / Approach

1. **Data Preprocessing** – Standardized and merged datasets, aligned by trading days.
2. **Exploratory Data Analysis (EDA)** – Visualized sentiment cycles, trader returns, and trading volumes.
3. **Feature Engineering** – Classified trades into "Fear" vs. "Greed" regimes.
4. **Comparative Analysis** – Compared performance metrics across different sentiment conditions.
5. **Statistical Correlations** – Measured associations between sentiment classification and trading outcomes.
6. **Visualization** – Plotted key trends (saved in outputs/).

4. Key Findings / Insights

- **Fear Periods:** Traders adopted more conservative positions, leading to **lower volatility and smaller but safer profits**.
- **Greed Periods:** Higher trade frequency and aggressive position sizing were observed, often resulting in **larger profits but higher losses** for less disciplined accounts.
- **Consistency Matters:** A small subset of traders maintained steady performance across both regimes, suggesting that **rule-based strategies outperform sentiment-driven trading**.
- **Correlation Evidence:** PnL volatility showed a strong positive correlation with "Greed" sentiment days, while win-rate consistency was higher in "Fear" periods.

5. Visual Outputs

Key charts included (from outputs/ folder):

- **Sentiment Trends:** Fear and Greed cycles over time.
- **Performance Distributions:** PnL histograms under fear vs. greed.

- **Comparative Analysis:** Trader profitability segmented by sentiment.
- **Correlation Heatmap:** Relationships between sentiment and performance metrics.

6. Conclusion & Recommendations:

This analysis demonstrates that **market sentiment significantly influences trading behavior**. Traders are prone to over-exposure during greed phases, while being overly cautious during fear phases.

Recommendations:

- Treat sentiment as a **risk management signal** rather than a direct trading trigger.
- Apply **separate strategy backtests** under fear vs. greed conditions to identify robustness.
- Encourage **discipline and rule-based systems**, as they perform consistently regardless of sentiment regime.
- Monitor greed periods for **opportunity with caution**, as they present both high upside and high risk.