Data Science Assignment – Market Sentiment & Trader Behavior Analysis

1. Introduction

This assignment analyzes the relationship between crypto trader behavior and overall market sentiment using historical trading data and the Bitcoin Fear & Greed Index.
The objective is to understand how traders perform under different sentiment regimes (Fear vs Greed) and identify patterns that can support smarter trading strategies.

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2. Datasets Overview

Two datasets were used:

1. Bitcoin Market Sentiment Dataset

- Contains daily sentiment classifications such as Fear, Extreme Fear, Greed, and Extreme Greed.
- Used to categorize market conditions.

2. Historical Trader Data (Hyperliquid)

- Contains individual trade-level data including trader account, trade size, profit/loss, and timestamps.
- Used to evaluate trader performance metrics.

Trades were aligned with market sentiment using trade dates.

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3. Methodology

The analysis followed these steps:

- Cleaned and preprocessed both datasets
- Mapped each trade to its corresponding market sentiment
- Simplified sentiment into two regimes: **Fear** and **Greed**
- Computed trader-level performance metrics under each sentiment:
    - Total PnL
    - Win rate
    - ROI
    - Sharpe ratio
    - Maximum drawdown
- Ranked traders by performance
- Identified contrarian traders who performed differently across sentiment regimes

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4. Key Findings

- Trader performance varies significantly between Fear and Greed regimes.
- Some traders generated strong profits during Fear but underperformed during Greed, indicating contrarian or risk-off strategies.
- Greed periods showed higher variability in returns and risk for certain traders.
- Risk-adjusted metrics (Sharpe ratio and drawdown) revealed that high PnL does not always imply stable performance.

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5. Trader Ranking & Contrarian Analysis

- Traders were ranked separately under Fear and Greed using ROI.
- Contrarian traders were identified as those with positive ROI in one regime and negative ROI in the other.
- These traders may benefit from sentiment-aware strategy allocation.

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6. Actionable Insights

- Market sentiment can be used as a filter for trader selection.
- Traders with consistent performance during Fear may be suitable for defensive strategies.
- Sentiment-based strategy rotation could improve risk-adjusted returns.
- Monitoring drawdown alongside profitability is essential for capital protection.

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7. Conclusion

This analysis demonstrates that market sentiment plays a meaningful role in trader performance. By incorporating sentiment-aware insights, trading strategies can be made more adaptive and risk-conscious.