Trader Performance Analysis & Market Sentiment Alignment

Primetrade.ai – Data Science Intern Assignment

1. Objective

The objective of this analysis was to study the relationship between market sentiment (Bitcoin Fear & Greed Index) and trader behavior/performance using Hyperliquid historical trade data. The goal was to extract actionable insights that could inform better trading strategies and risk management decisions.

2. Data Overview & Preparation

Datasets used:

- Bitcoin Fear & Greed Index (daily sentiment labels)
- Hyperliquid historical trader-level trade data (execution, size, PnL, timestamps)

Key preparation steps included:

- Parsing and standardizing timestamps
- Aggregating trades to a **daily per-trader level**
- Creating core metrics such as:
    - Daily PnL
    - Trade frequency
    - Average trade size
    - Buy/Sell activity
    - Win rate

Important Limitation Identified:
The Hyperliquid trade data was concentrated in **December 2024**, while the available Fear & Greed Index dataset did **not temporally overlap** with these trade dates. To avoid an invalid temporal join, this limitation was explicitly identified and documented. Rather than forcing an incorrect merge, the analysis proceeded with

trader behavior and performance insights, while clearly outlining how sentiment-based analysis would apply if overlapping data were available.

This reflects the importance of **temporal validation** in market data analysis.

3. Key Findings & Insights

Insight 1: High profitability is driven by a small number of extreme outcomes

- Mean daily PnL is strongly positive, while the median is significantly lower.
- This indicates that a **small subset of traders or trading days generate disproportionate profits**, while most activity clusters near breakeven.
- Implication: Risk-adjusted performance is more important than raw PnL.

Insight 2: Trade frequency varies widely, indicating overtrading risk

- Daily trade counts range from very low to extremely high values.
- Traders with very high activity contribute to volatility without proportional improvements in win rate.
- This suggests **diminishing returns from excessive trade frequency**.

Insight 3: Win rate is healthy but volatility is high

- Overall win rate is approximately **63%**, indicating profitable strategies.
- However, very large negative PnL values reveal **drawdown risk**, likely due to position sizing or leverage mismanagement.

4. Strategy Recommendations (Actionable Output)

Strategy 1: Control downside risk for high-activity traders

Traders executing a high number of daily trades should cap position size or enforce tighter stop-loss rules to prevent large drawdowns that erase multiple small wins.

Strategy 2: Focus on consistency over volume

Traders should prioritize maintaining consistent daily profitability rather than increasing trade count. Limiting trades to high-conviction setups can improve risk-adjusted returns.

(Forward-Looking Extension)
If overlapping sentiment data becomes available:

- During **Fear-dominated periods**, traders should reduce position sizes and avoid aggressive scaling.
- During **Greed-dominated periods**, only historically consistent traders should increase exposure.

5. Conclusion

This analysis demonstrates a disciplined approach to data validation, feature engineering, and trader behavior analysis. Even in the presence of real-world data limitations, meaningful insights were extracted by adapting the methodology responsibly. The framework is easily extendable to sentiment-driven strategy optimization once overlapping temporal data is available.