Trader Behavior Analysis Based on Market Sentiment

(Fear vs Greed)

1. Introduction

Financial markets are heavily influenced by investor sentiment. In the crypto market, emotions such as fear and greed often drive trading behavior.
This project analyzes how **trader performance, risk-taking, and trading activity** vary under different market sentiment conditions using historical trader data and the Bitcoin Fear & Greed Index.

The goal is to uncover patterns that can help design **smarter, sentiment-aware trading strategies**.

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2. Datasets Used

2.1 Bitcoin Market Sentiment Dataset

- **Source:** Fear & Greed Index
- **Key Columns:**
    - `date`: Calendar date
    - `classification`: Fear, Extreme Fear, Neutral, Greed, Extreme Greed

Sentiment labels were normalized into two categories:

- **Fear** → Fear, Extreme Fear
- **Greed** → Greed, Extreme Greed
  Neutral values were excluded to maintain clear sentiment comparison.

2.2 Historical Trader Data (Hyperliquid)

- **Records:** ~211K trades
- **Key Columns:**

- `Timestamp IST`
- `Execution Price`
- `Size USD`
- `Closed PnL`
- `Fee`
- `Side`, `Direction`, `Account`

Trades were merged with sentiment data based on **trade date**.

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3. Methodology

1. Converted all timestamps to proper datetime format
2. Extracted trade-level dates
3. Normalized sentiment categories (Fear vs Greed)
4. Removed Neutral sentiment records
5. Merged trader data with daily market sentiment
6. Performed exploratory data analysis on:
   - Profitability
   - Risk (position size)
   - Trading activity
   - Transaction costs

Final merged dataset contained **173,532 trades**.

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4. Key Findings & Insights

4.1 Profitability vs Sentiment

- Trades executed during **Greed** periods show:
  - Higher **average PnL**
  - Higher **win rate**
- Indicates that optimistic market conditions generally favor profitability.

Insight:
Greed-driven markets reward momentum and short-term strategies.

4.2 Risk & Position Size Behavior

- Surprisingly, **Fear periods** show:
  - Larger average position sizes
  - Higher median trade size

Insight:
During Fear, traders tend to place **fewer but higher-conviction trades**, possibly reflecting mean-reversion or defensive strategies.

4.3 Trading Activity & Cost

- Fear periods incur:
  - Higher average transaction fees
  - Higher total fees paid
- Suggests heavier and more expensive trades during fearful markets.

Insight:
Fear-driven trading is costlier and risk-heavy, while Greed-driven trading is more frequent but lighter per trade.

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5. Conclusion

This analysis highlights a clear divergence in trader behavior based on market sentiment:

- **Greed:** Higher profitability, smaller positions, lower cost per trade
- **Fear:** Larger positions, higher fees, higher conviction but increased risk

Understanding these patterns can help traders:

- Adjust position sizing dynamically
- Manage risk exposure during fear-driven markets
- Optimize strategies based on sentiment regimes

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6. Future Work

- Incorporate leverage analysis
- Study account-level performance consistency
- Extend sentiment to multi-level classification
- Build predictive models using sentiment as a feature