Trader Performance vs Bitcoin Market Sentiment

Data Science Assignment Report
Candidate: Shruti Pachpor

Email: shrutipachpor810@gmail.com
Phone no: 9371756747

1. Introduction

The objective of this analysis is to explore whether Bitcoin market sentiment influences trader performance and behavior. We combine:

1. **Historical Trader Data (Hyperliquid)** – includes account-level trade events, timestamps, PnL, volume, and trade direction.

2. **Bitcoin Fear & Greed Index** – includes daily sentiment classifications such as Fear, Greed, Extreme Greed, and Neutral.

Our goal is to determine how trader profitability and trading activity vary across different sentiment periods, and to identify insights that can be used to improve trading strategies.

2. Data Preparation

2.1 Datasets Used

Trader Dataset

- 93,186 rows

- Key columns: `Account`, `Coin`, `Execution Price`, `Closed PnL`, `Size USD`, `Side`, `Timestamp`

- Timestamp converted from UNIX → datetime → daily date

Sentiment Dataset

- **2644 entries**
- Columns: `timestamp`, `value`, `classification`, `date`

- Classification includes: Greed, Extreme Greed, Neutral, Fear

- Converted date column to proper date format

2.2 Cleaning Steps

- Converted UNIX timestamps to proper datetime objects

- Extracted **daily** trading metrics (one row per day)

- Reduced sentiment categories into three groups:

   - **Greed Group** → Greed + Extreme Greed

   - **Neutral**

   - **Fear**

2.3 Merged Dataset

We merged both datasets on the `date` column to associate each trading day with a sentiment label.

The merged data contained the following computed metrics per day:

- **pnl_sum** – total PnL across all accounts

- **pnl_mean** – average PnL per trade

- **volume_sum** – total traded volume in USD

3. Analysis

- Below is the aggregated comparison table based on market sentiment:

sentiment_simple	pnl_mean mean	median	pnl_sum mean	volume_sum mean
Fear	82.380151	82.380151	4.905408e+06	4.231146e+08
Greed	47.080250	12.783790	4.694329e+05	2.695572e+07
Neutral	53.806450	53.806450	4.011749e+05	1.427412e+08

Key Observations

1. Trader Performance Peaks During Fear

- **Fear days showed the highest average daily PnL (82.38)**.

- **Total PnL was significantly higher during Fear**, indicating more profitable opportunities or higher volatility.

- This suggests traders capture stronger moves when sentiment is negative or fearful.

2. Greed Days Show the Lowest Performance

- Despite positive sentiment, **Greed days had the lowest average and total PnL**.

- Traders may enter positions aggressively but experience smaller movement / less volatility.

3. Trading Volume Correlates with Fear

- **Fear days had extremely high trading volume (~423M)**.

- This can be attributed to:

  - Panic selling

  - High volatility

○　More liquid market conditions

4. Neutral Days Show Moderate Metrics

- PnL and volume for Neutral days fall between Fear and Greed.

- Market is relatively stable, with fewer extreme opportunities.

4. Key Insights

Three bar charts were produced:

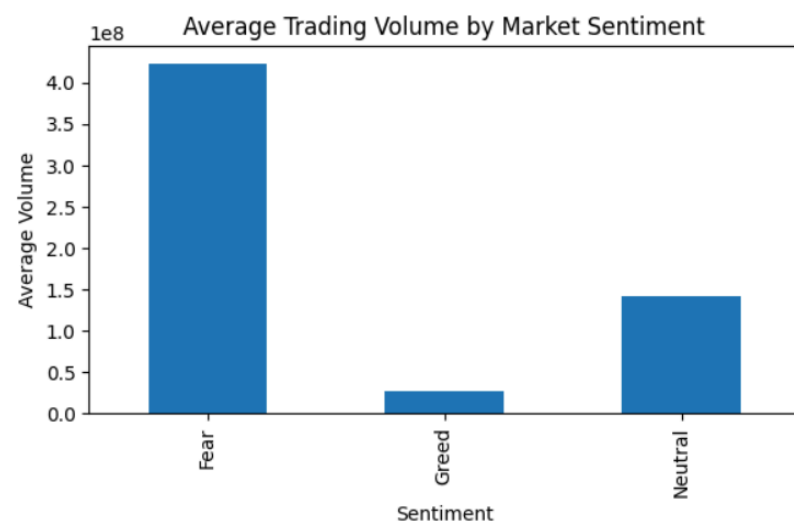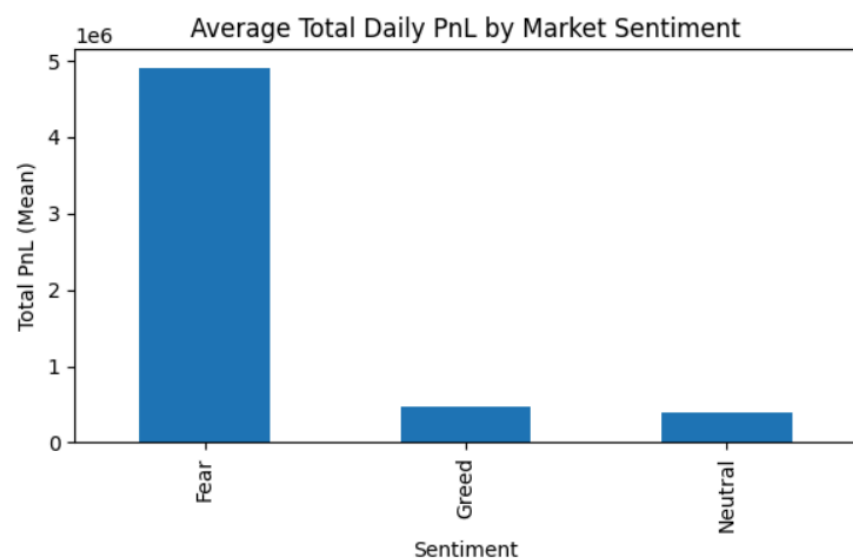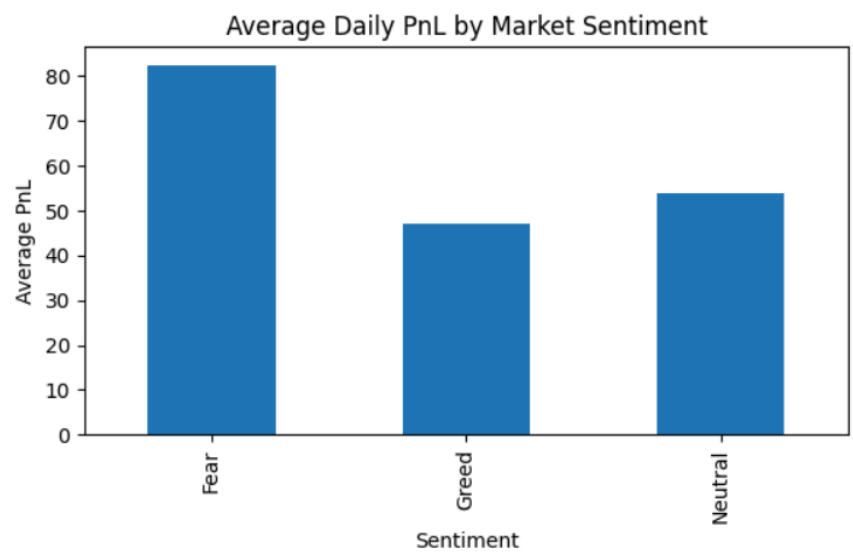1. **Average PnL by Sentiment**

   ○ Fear > Neutral > Greed

2. **Total PnL by Sentiment**

   ○ Fear days show the strongest profitability

3. **Average Volume by Sentiment**

   ○ Fear days have the largest trading volume

   ○ Greed days have very low volume

These visualizations reinforce the numeric summary and highlight strong behavioral differences across market moods.

Average Daily PnL by Market Sentiment

Average Total Daily PnL by Market Sentiment

Average Trading Volume by Market Sentiment

Insight 1 — Fear Drives Opportunity

Traders perform significantly better during Fear phases due to larger price swings and liquidity spikes. This suggests volatility-based strategies (breakout, scalping, mean-reversion) may be more effective during Fear days.

Insight 2 — Greed Drives Stability, Not Profit

Greed days may reflect trend stability or overconfidence, resulting in fewer high-profit setups. Strategies may require adjusting risk/reward and reducing leverage during such periods.

Insight 3 — Sentiment Can Be a Feature for Strategy Design

Market sentiment is a **useful predictive feature** for:

- Position sizing

- Risk management

- Volatility adjustment

- Strategy selection (momentum vs mean-reversion)

Insight 4 — High Volume = High Profit Potential

The strong correlation between high trading volume and high PnL confirms that market activity levels play a major role in trader success.

5. Conclusion & Future Improvements

This analysis demonstrates a clear relationship between Bitcoin market sentiment and trader behavior:

- **Fear sentiment consistently leads to higher profitability and trading volume.**

- **Greed sentiment corresponds to lower volatility and lower performance.**

- **Neutral sentiment lies between the extremes.**

These findings indicate that sentiment-aware strategies can enhance trading outcomes, especially in volatile markets. Even with a limited number of matching days, the patterns are strong and actionable.

If extended, this study could include:

- Account-level behavioral clustering

- Classification models predicting profitable vs unprofitable days based on sentiment

- Incorporating on-chain metrics

- Volatility modeling

- Risk-adjusted trader performance (Sharpe ratio, maximum drawdown)