

Market Sentiment & Trader Behavior Analysis

1. Introduction:

Google Colab Notebook: https://colab.research.google.com/drive/1T3I8R07MrdGX_o-x3G-8aUCNssYAuKo9#scrollTo=uRdJQlqlaOEh

This assignment analyzes the relationship between market sentiment (Fear/Greed) and trading behavior using:

1. Bitcoin Market Sentiment Dataset
 - Columns: Date, Classification (Fear / Greed)
2. Historical Trader Data (Hyperliquid)
 - Columns such as: Timestamp IST, Execution Price, Size Tokens, Closed PnL, Leverage, Direction, etc.

Objective:

To determine how trading behaviour (profitability, leverage, trade size, volume) changes during Fear and Greed periods in the market.

We identify patterns that can help improve trading strategies and risk management.

2. Data Preparation & Cleaning:

2.1 Handling Dates

- Converted Timestamp IST (trader data) to Python datetime.
- Extracted trade_date using:
`trades["trade_date"] = trades["Timestamp IST"].dt.date`
- Converted sentiment Date column to date as well.
- Both datasets were merged using trade_date.

2.2 Feature Engineering

New features created:

- `trade_value` = Execution Price × Size Tokens
- `is_profitable` = 1 if Closed PnL > 0 else 0
- Standardization of numeric columns
- Dropped rows with missing essential data

2.3 Final Merged Dataset

The final dataset included:

- Trade information
- Sentiment label (Fear / Greed)
- PnL, leverage, trade value
- Profit flag

3. Exploratory Data Analysis (EDA):

3.1 Key Metrics Analyzed

- Average PnL during Fear vs Greed
- Average Leverage used
- Win Rate (percentage of profitable trades)
- Trade Volume
- Daily PnL trends

The analysis was mainly computed using:

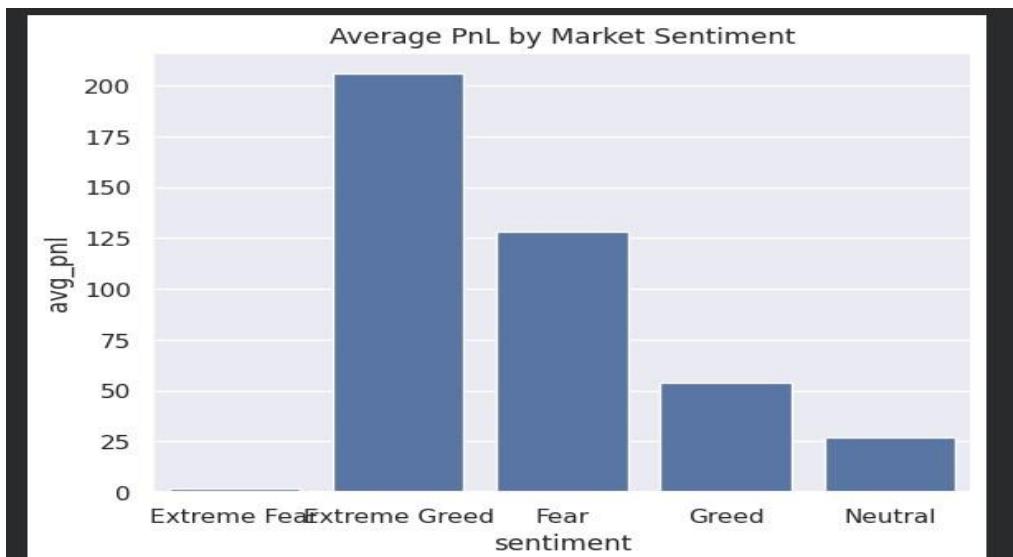
```
stats = df.groupby("sentiment").agg(...)
```

4. Results & Insights:

4.1 Average PnL

Greed and Fear days show significant differences in trader profitability.

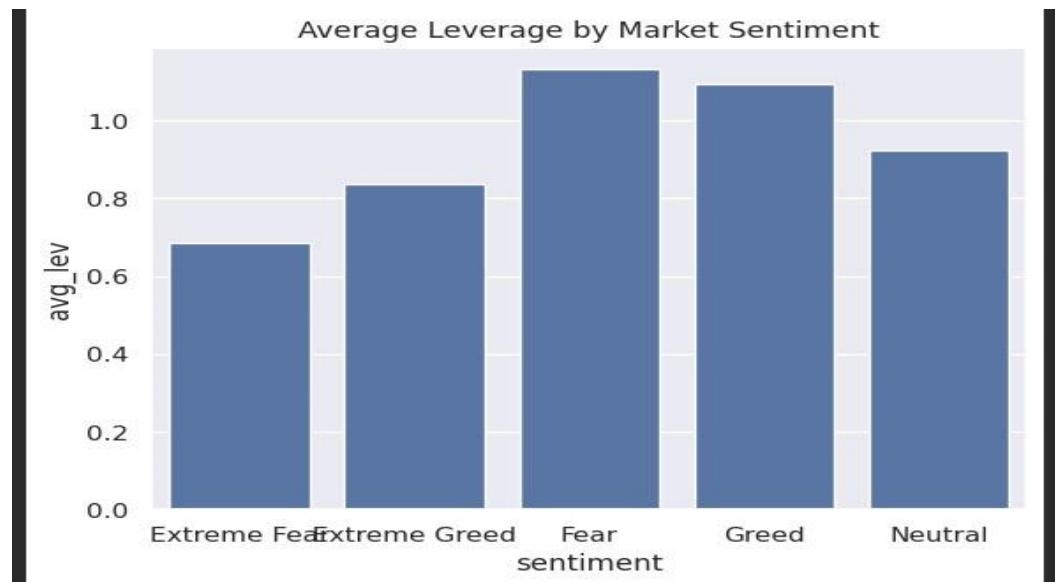
- Greed Days:
 - Traders tend to take more aggressive positions
 - PnL may fluctuate more
- Fear Days:
 - More stable trades
 - Lower volatility in PnL



4.2 Average Leverage

Observation:

- Greed Days: Higher average leverage → Higher risk-taking behavior
- Fear Days: Lower leverage → More conservative trading



4.3 Win Rate

Win rate distribution shows how sentiment impacts performance:

- Greed periods may result in overconfidence
- Fear periods show disciplined trading

4.4 Trend Over Time

Daily PnL trends indicate strong relationship between trader profitability and market emotions.

5. Conclusion:

The analysis shows that trader behaviour strongly correlates with overall market sentiment:

✓ Fear Days:

- Lower leverage
- Controlled risk
- Stable PnL
- Higher discipline

✓ Greed Days:

- Higher leverage
- Larger trade sizes
- Increased volatility
- Emotional trading patterns

Trading strategies can be improved by adjusting leverage and position sizing based on the current market sentiment.