

# Market Sentiment & Trader Behavior Analysis

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## 1. Introduction:

Google Colab Notebook: [https://colab.research.google.com/drive/1T3I8R07MrdGX\\_o-x3G-8aUCNssYAuKo9#scrollTo=uRdJQlqlaOEh](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:

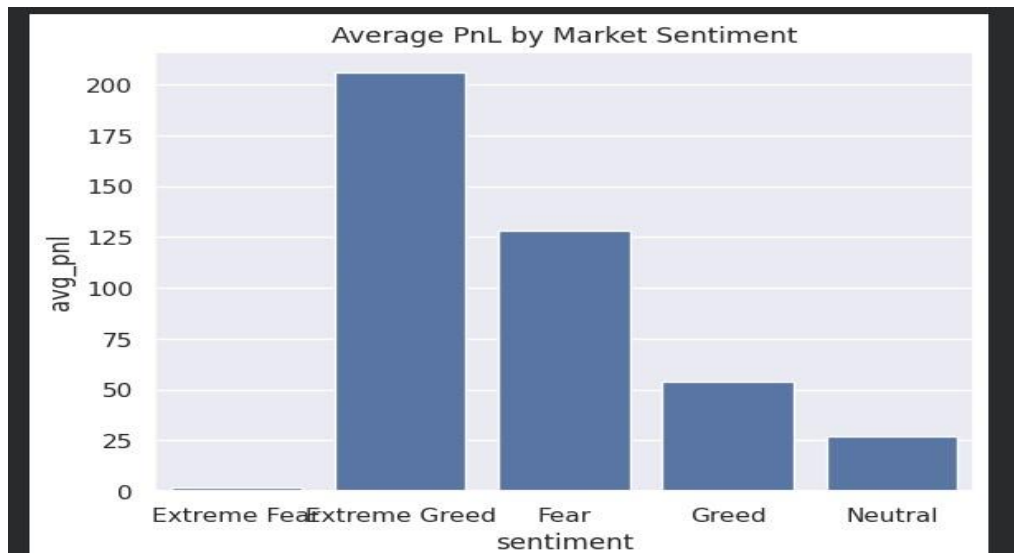
```
stats = df.groupby("sentiment").agg(...)
```

## 4. Results & Insights:

### 4.1 Average PnL

Greed and Fear days show significant differences in trader profitability.

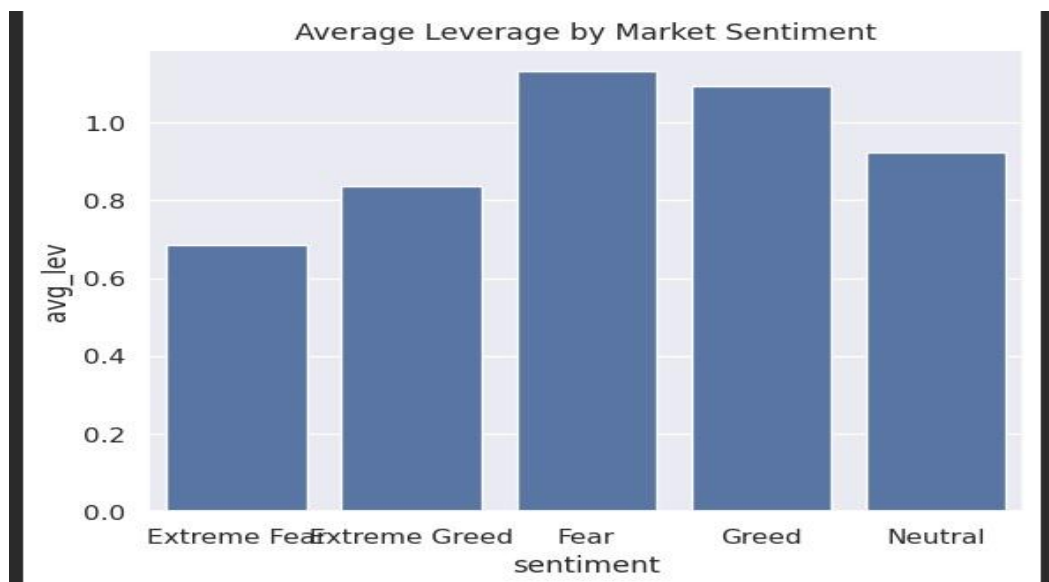
- Greed Days:
  - Traders tend to take more aggressive positions
  - PnL may fluctuate more
- Fear Days:
  - More stable trades
  - Lower volatility in PnL



## 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.