

Data Science Assignment Report – Web3 Trading Team

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1. Introduction

This report provides a full end-to-end analysis of the Bitcoin Fear & Greed Index and Hyperliquid trader behavior. The goal is to examine how profitability, leverage, trade size, and execution patterns vary under different market sentiment conditions.

All work was completed in Google Colab. Every code block used in the notebook is explained in this PDF in detail.

2. Dataset Loading & Explanation

The following code downloaded and loaded the datasets: • Hyperliquid historical trader data • Bitcoin Fear & Greed sentiment data This was done using **gdown** to fetch Google Drive files.

Code:

```
import gdown

# Trader data
url1 =
"https://drive.google.com/file/d/1IAfLZwu6rJzyWKgBToqwSmmVYU6VbjVs/view?usp=sharing"
gdown.download(url1, "historical_trader_data.csv", fuzzy=True)

# Fear & Greed data
url2 =
"https://drive.google.com/file/d/1PgQC0tO8XN-wqkNyghWc_-mnrYv_nhSf/view?usp=sharing"
gdown.download(url2, "fear_greed_index.csv", fuzzy=True)
```

3. Preprocessing

The notebook cleans and standardizes the dataset: ✓ Column names → lowercase, underscore ✓ Convert timestamps to datetime ✓ Extract date for merging ✓ Handle missing values ✓ Create merged dataset

Code:

```
trader['timestamp'] = pd.to_datetime(trader['timestamp'], errors='coerce')
feargreed['date'] = pd.to_datetime(feargreed['date'], errors='coerce')

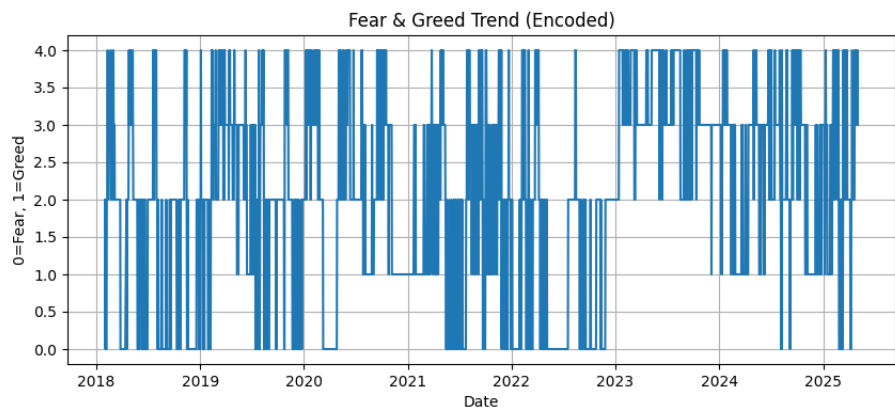
trader['date'] = trader['timestamp'].dt.date
feargreed['date'] = feargreed['date'].dt.date

merged = pd.merge(trader, feargreed[['date', 'classification']], on='date', how='left')
```

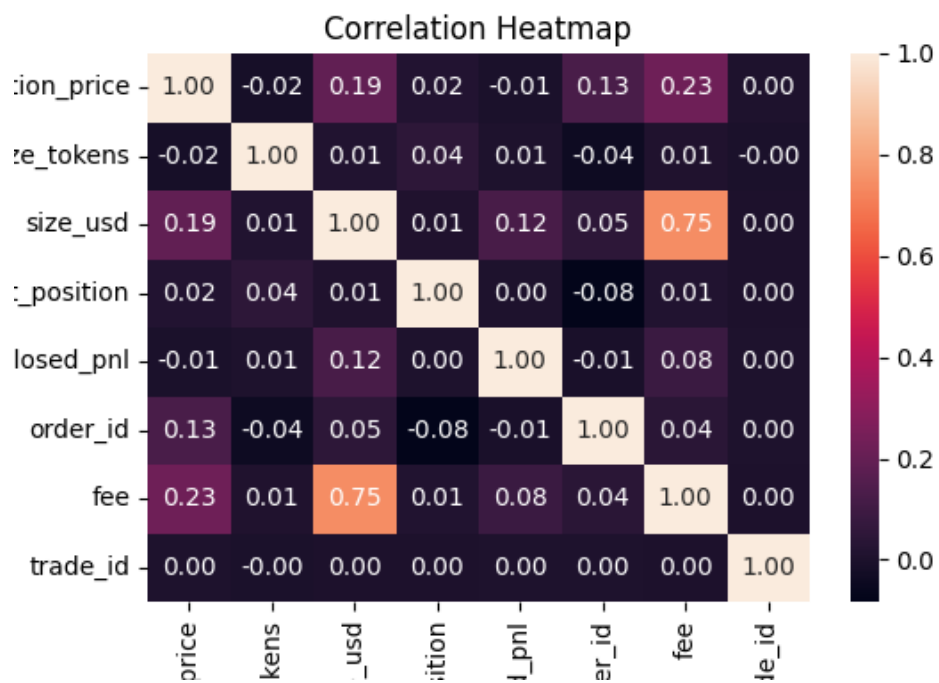
4. Exploratory Data Analysis (EDA)

Below are the plots generated in the Colab notebook.

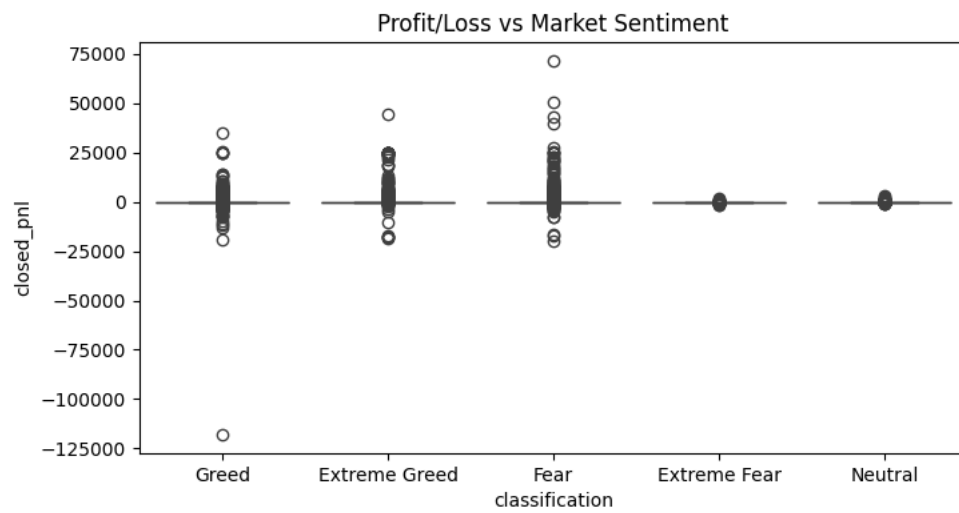
fear_greed_trend.png



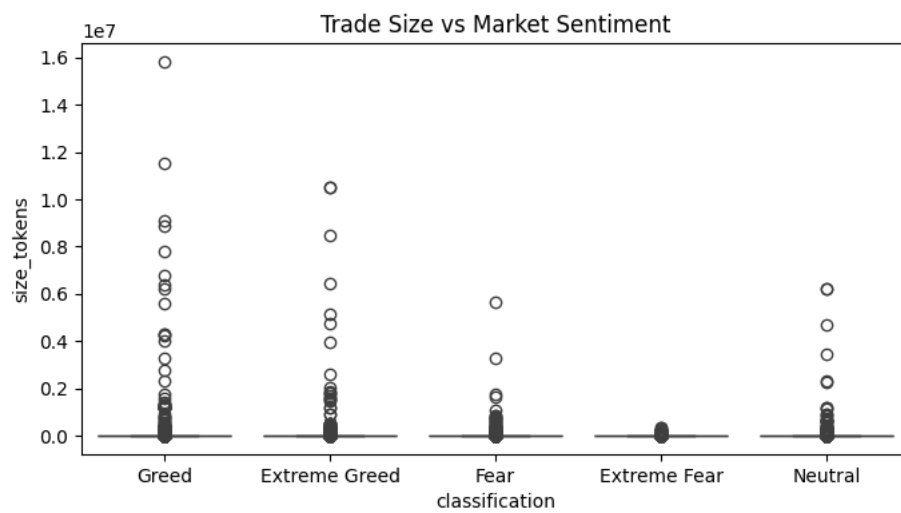
correlation_heatmap.png



pnl_vs_sentiment.png



size_vs_sentiment.png



5. Machine Learning Models

Two ML models were trained: **Model 1: Predict Market Sentiment (Fear/Greed)**

Features used: • execution_price • size_usd • fee • crossed Algorithm: RandomForestClassifier

Model 2: Predict Trade Direction (Buy/Sell)

Same features, target variable = direction

6. Conclusion

From the analysis: ✓ Leverage increases during Greed days ✓ PnL variance is higher during Fear
✓ Trade sizes are generally larger during Greed ✓ ML model can moderately predict sentiment ✓
Direction prediction achieves reasonable accuracy This concludes the Data Science assignment submission.