

# Ds\_report of Data Science Assignment

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## 1. Title

**Data Science Assignment — Web3 Trading**

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## 2. Introduction

The goal of this analysis is to explore the relationship between trader behavior and Bitcoin market sentiment.

We analyze two datasets:

1. **Bitcoin Market Sentiment Dataset** — Fear & Greed Index
2. **Historical Trader Data from Hyperliquid** — individual trades with profit/loss, size, and leverage

The objective is to identify trends or signals that may inform smarter trading strategies.

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## 3. Data Description

### 3.1 Fear & Greed Dataset

Column	Description
timestamp	UNIX timestamp of the index
value	Fear & Greed value (0–100)
classification	Fear / Extreme Fear / Greed / Extreme Greed
date	Date (YYYY-MM-DD)

### 3.2 Hyperliquid Trader Data

Column	Description
Account	Trader account identifier

Column	Description
Coin	Coin symbol
Execution Price	Price of trade executed
Size USD	Trade size in USD
Side	BUY / SELL
Timestamp IST	Date and time of trade
Closed PnL	Profit or Loss from the trade
...	Other columns like leverage, fees, transaction hash

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#### 4. Data Cleaning & Processing

1. Loaded CSV files into pandas.
  2. Converted timestamps to proper datetime format.
  3. Extracted date\_only column for merging.
  4. Merged datasets on date\_only to assign Fear/Greed sentiment to each trade.
  5. Handled missing values in sentiment using forward-fill and backward-fill.
  6. Created new columns for analysis:
    - side\_numeric → BUY = 1, SELL = -1
    - profit\_flag → 1 if trade profitable, 0 if loss
    - sentiment\_numeric → 0 = Fear, 1 = Greed
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#### 5. Exploratory Data Analysis (EDA)

##### 5.1 Trade Counts

- BUY vs SELL trades: visualized using countplot
- Observed that most trades are BUY

##### 5.2 Profitability Distribution

- Number of profitable vs losing trades
- Less than 50% of trades are profitable overall

### 5.3 Trade Volume vs Sentiment

- Boxplot shows larger average trade sizes during Fear
- Smaller trades during Greed

*(Include the plots saved in outputs/ folder)*

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## 6. Advanced Analysis

### 6.1 Profitability under Fear vs Greed

Sentiment	Average Profitability
Fear	41%
Greed	42%

- Slightly higher profitability during Greed
- Overall, less than half of trades are profitable

### 6.2 Average Trade Size by Sentiment

Sentiment	Average Trade Size (USD)
Fear	7182
Greed	4575

- Traders trade larger volumes during Fear

### 6.3 Profitability by Trade Type

Sentiment	Trade Type	Profitability
Fear	BUY	25%
Fear	SELL	56%

Sentiment	Trade Type	Profitability
Greed	BUY	32%
Greed	SELL	51%

- SELL trades are consistently more profitable than BUY trades
- BUY trades are riskier, especially during Fear

*(Include the barplot from outputs/buy\_sell\_profitability.png)*

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## 7. Key Insights & Recommendations

1. Traders are more profitable selling than buying under both Fear and Greed.
2. Large trades are executed during Fear, indicating higher risk-taking.
3. Profitability is slightly higher during Greed, but the difference is small.
4. Recommendation: Consider automated strategies to reduce risk on BUY trades during Fear.
5. Monitoring Fear & Greed Index can help time trade sizes and manage leverage more effectively.

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## 8. Conclusion

This analysis shows clear patterns between trader behavior and market sentiment:

- Trade type, volume, and profitability all vary with Fear vs Greed
- Sentiment indicators can be integrated into trading strategies to optimize risk and returns

All datasets, summary tables, and plots have been saved in the project folders as required for submission.

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## 9. Appendix

- **CSV Files:** merged\_trades\_sentiment.csv, profit\_summary.csv, volume\_summary.csv, buy\_sell\_summary.csv

- **Plots:** profitability\_fear\_greed.png, trade\_size\_fear\_greed.png, buy\_sell\_profitability.png