**Data Science Assignment Report**

**Name:** Afisar Alam

**Project:** Trader Behavior & Market Sentiment Analysis

**Role Applied For: Junior Data Scientist :Trader Behavior Insights**

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## Objective

The main objective of this project is to analyse trader behavior and overall market sentiment using two key data sources **Fear & Greed Index** and **Historical Trader Data**.
Through this analysis, the goal is to understand how market psychology and trading activity patterns impact decision-making, volatility, and price movements.

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## Data Sources

- **Fear & Greed Index Data (fear_greed_index.csv)**
  Contains daily records of the Fear & Greed Index values, reflecting overall market sentiment**.**
- **Historical Trader Data (historical_data.csv)**
  Includes trading activity such as executed prices, trade sizes, coin names, and sentiment classification.

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## Methodology

## Data Exploration

- Loaded both datasets in Google Colab using Pandas.
- Checked for missing values, duplicates, and data consistency.
- Converted date columns into proper datetime formats for time-series analysis.

## Data Visualization

Created multiple charts to visualize relationships and trends:

- Fear & Greed Index Trends: to understand how market sentiment changes over time.
- Trader Sentiment Distribution: to classify traders into bullish, bearish, and neutral categories.
- Top Traded Coins: identified the most active coins by trade volume.
- Execution Price Distribution & Trade Size Distribution: analyzed pricing behavior and trade sizes.

- 30-Day Moving Average of Sentiment: smoothed the volatility for better pattern detection.

All charts are saved inside the outputs/ folder as .png images.

### Time Series Forecasting

- Applied an ARIMA model on execution prices to forecast future market movement trends.
- Evaluated the model performance using RMSE and visual inspection of predicted vs. actual values.

### Summary & Insights

Generated two summary reports:

- summary_report.txt → Overall insights from both datasets.
- trader_data_summary.txt → Focused summary of trading activity and sentiment behavior.

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### Key Insights

1. **Fear & Greed Index** shows cyclical patterns indicating alternating market fear and confidence phases.
2. During "greedy" phases, trading volume and average trade size tend to increase.
3. **Top traded coins** maintain consistent popularity across both bullish and bearish sentiment days.
4. The **ARIMA forecast** suggests short-term stability followed by minor volatility in execution prices.
5. Sentiment moving averages show traders' emotions lag slightly behind market price changes — a sign of reactive trading.

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**Tools & Technologies**

- **Python (Pandas, Matplotlib, Seaborn, Statsmodels)**
- **Google Colab**
- **GitHub & Google Drive (for submission)**
- **Jupyter Notebook (.ipynb)**

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### Folder Structure

**My Drive**

**└── ds_afisar_alam**

**├── notebook_1.ipynb**

**├── csv_files**

**│ ├── fear_greed_index.csv**

**│ └── historical_data.csv**

**├── outputs**

**│ ├── daily_sentiment_time_series.png**

**│ ├── sentiment_classification_count.png**

**│ ├── sentiment_30day_moving_avg.png**

**│ ├── top_traded_coins.png**

**│ ├── execution_price_distribution.png**

**│ ├── trade_side_distribution.png**

**│ ├── trade_size_usd_distribution.png**

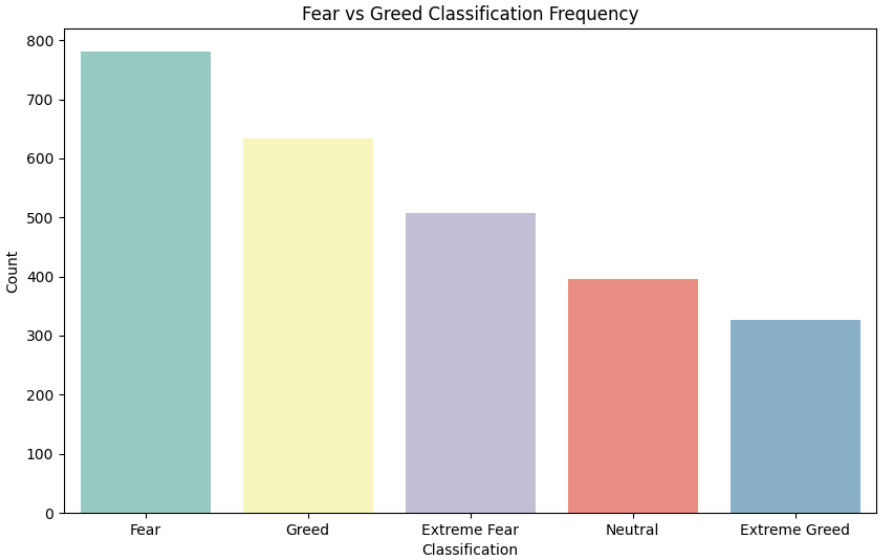
**│ ├── arima_execution_price_forecast.png**

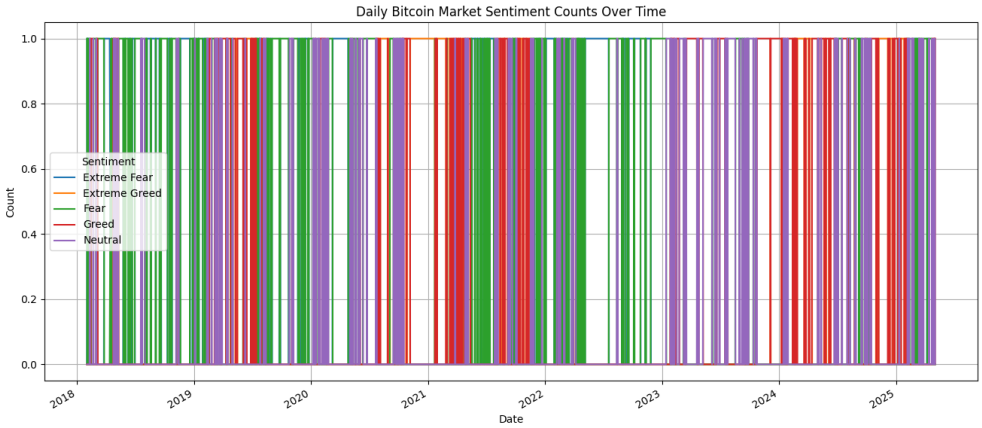
**│ ├── summary_report.txt**

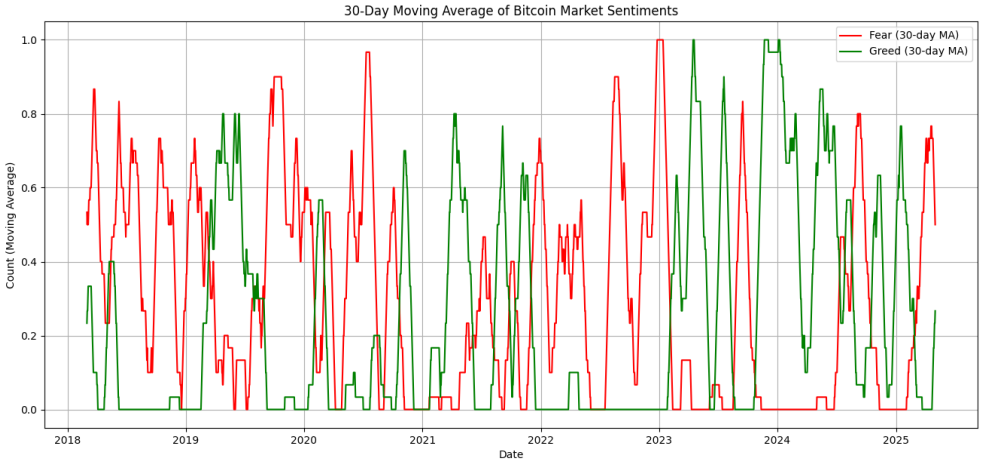
**│ └── trader_data_summary.txt**

**├── ds_report.pdf**

# Bitcoin Market Sentiment Analysis (Charts)

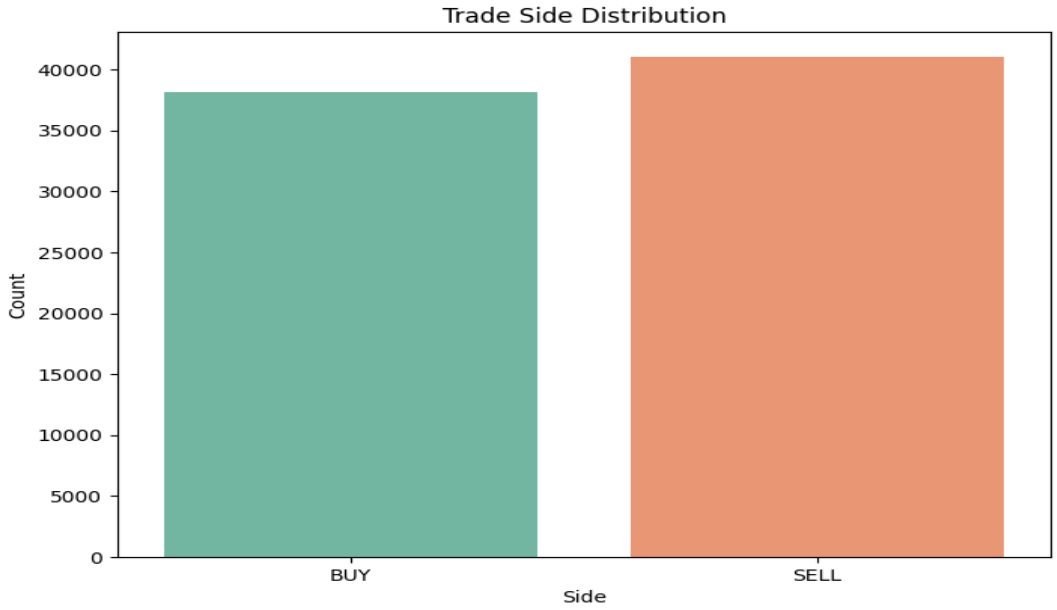


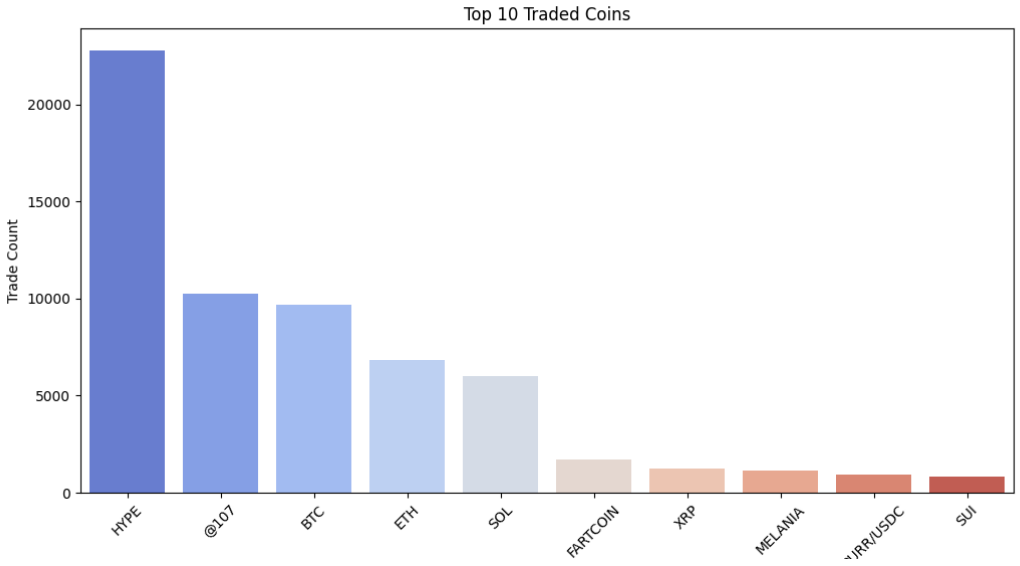



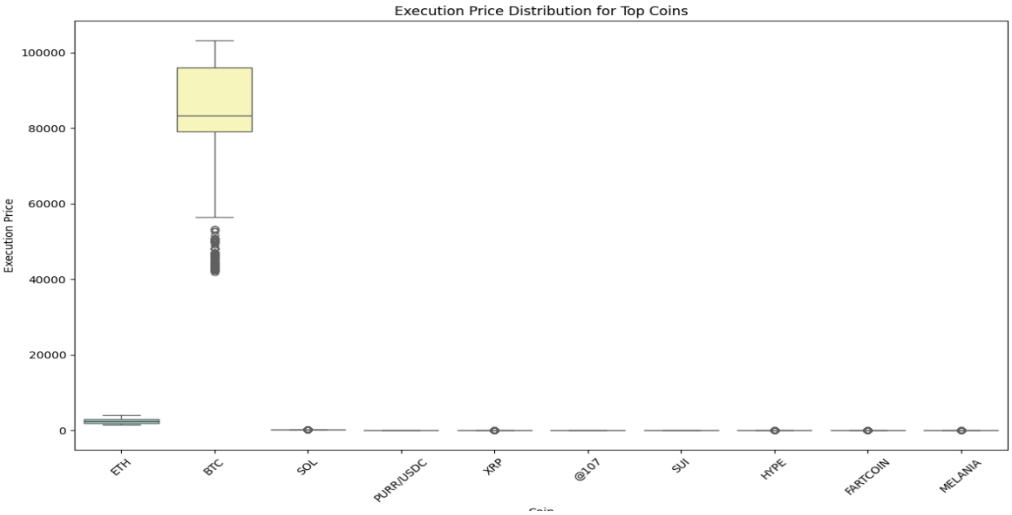



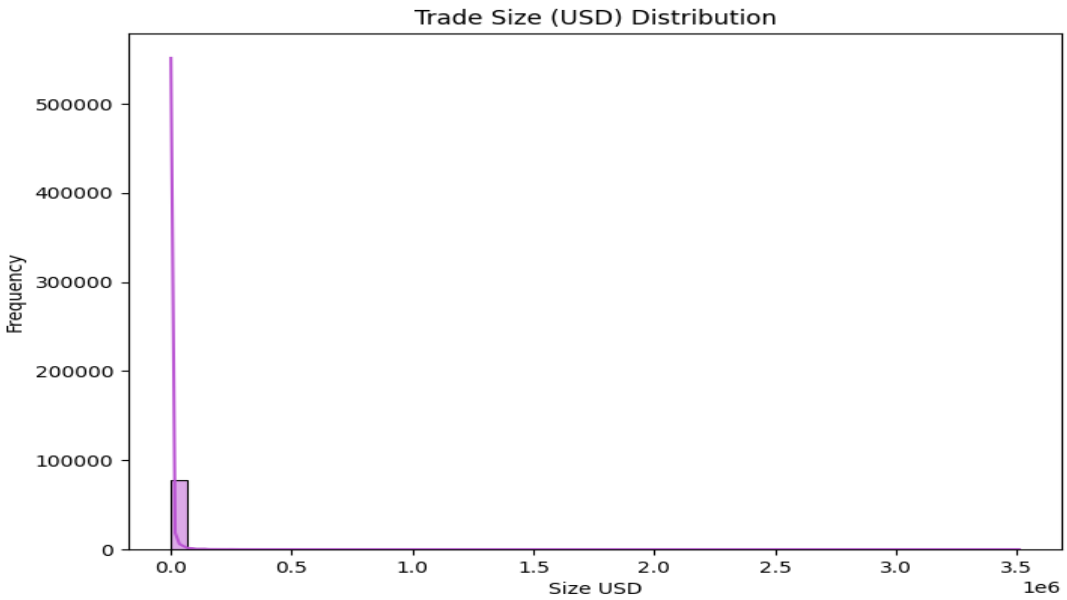
This chart shows how the Fear & Greed Index changes over time.
It clearly highlights the emotional cycles of the crypto market — when the market becomes overly greedy or extremely fearful.

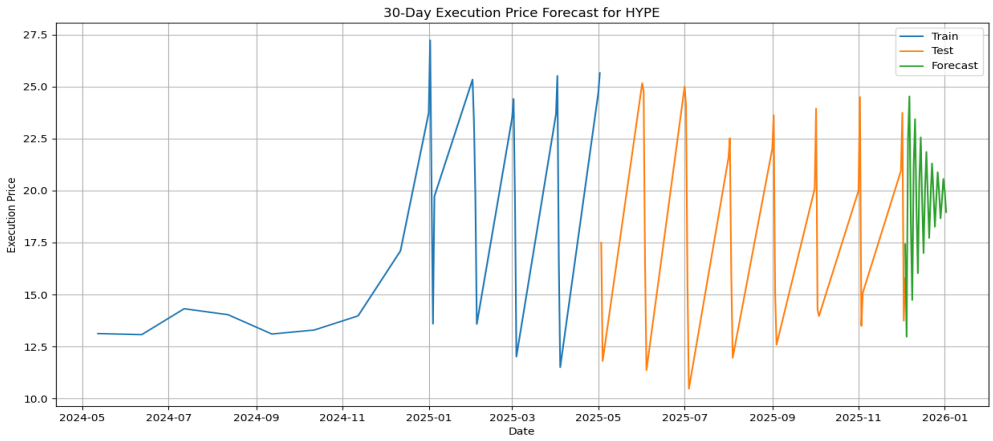
## Historical Trader Data Analysis (Hyperliquid)




Execution Price Distribution for Top Coins
Execution Price
100000
80000
60000
40000
20000
0
ETH
BTC
SOL
PURR/USDC
XRP
@107
SUI
HYPE
FARTCOIN
MELANIA


Trade Size (USD) Distribution
Frequency
500000
400000
300000
200000
100000
0
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
Size USD
1e6


30-Day Execution Price Forecast for HYPE
Train
Test
Forecast
Execution Price
27.5
25.0
22.5
20.0
17.5
15.0
12.5
10.0
2024-05
2024-07
2024-09
2024-11
2025-01
2025-03
2025-05
2025-07
2025-09
2025-11
2026-01
Date

This chart represents trading data such as trade size, profit/loss, and leverage.
It helps us see how traders react during different market moods — whether they increase their trading volume during greed or stay cautious during fear.

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## Conclusion

The project shows that **trader behavior is strongly linked to market sentiment**, but not always in a predictable way.
When the market is greedy, traders tend to take more risk — sometimes this pays off, sometimes not.
During fear, the overall trading volume drops, but smart and disciplined traders can still find good opportunities.

By combining sentiment data with trading metrics, we can better understand how emotions drive decisions in the crypto market.
This kind of analysis can be useful for risk management and for designing smarter trading strategies in Web3 environments.

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## Final Note

This project helped me understand how market psychology and trading behavior connect with each other.
In future versions, I would like to explore predictive models to forecast trading performance based on real-time sentiment data.

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## Links

- **GitHub Repository:** https://github.com/afisaralam07/ds_afisar_alam
- **Google Drive Folder:** Drive Link


## Prepared by: Afisar Alam
***Data Science Candidate – Web3 Trading Team***