Data Science Assignment Report – Web3 Trading Team

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1️⃣. Introduction

This analysis explores the relationship between **trader behavior** and **market sentiment** using two datasets:

1. **Historical Trader Data** – Contains information about trades including `Closed PnL`, `Size USD`, `Side`, `Leverage`, and `Coin`.
2. **Fear & Greed Index** – Provides market sentiment (`Fear`, `Greed`, etc.) and sentiment values for Bitcoin.

Objective:
To analyze how trading behavior (profitability, risk, volume, leverage) aligns with or diverges from overall market sentiment and to identify patterns that could inform smarter trading strategies.

2️⃣. Data Preprocessing

- Converted timestamps in both datasets to `date` for merging.
- Merged trader data with sentiment based on `date`.
- Cleaned the merged dataset by removing rows with missing sentiment classification.
- Ensured `Closed PnL` and `Size USD` are numeric for analysis.

3️. Exploratory Data Analysis (EDA)

3.1 Profitability by Market Sentiment

- Boxplot of `Closed PnL` under each sentiment classification:
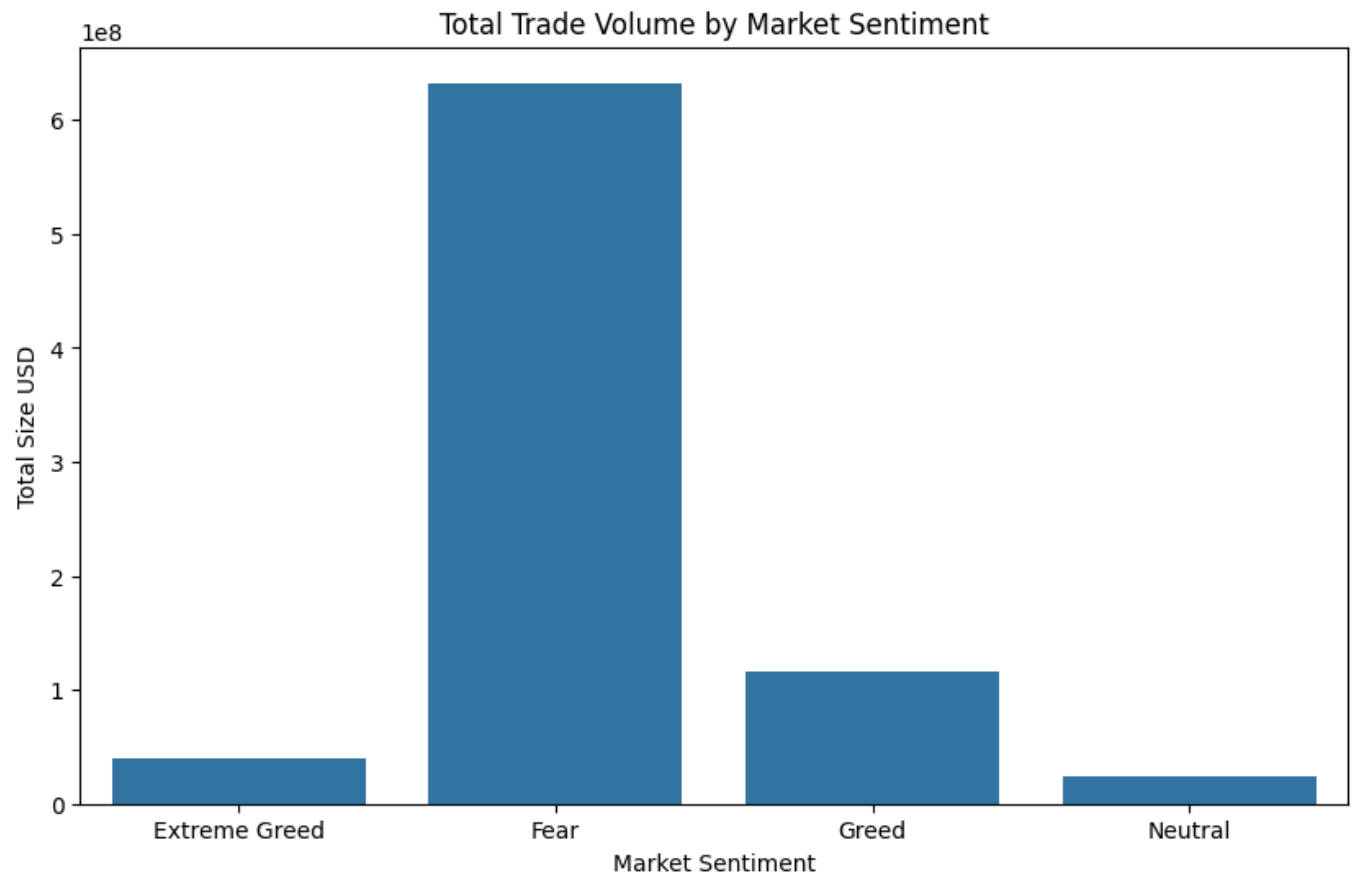

Profitability by Market Sentiment
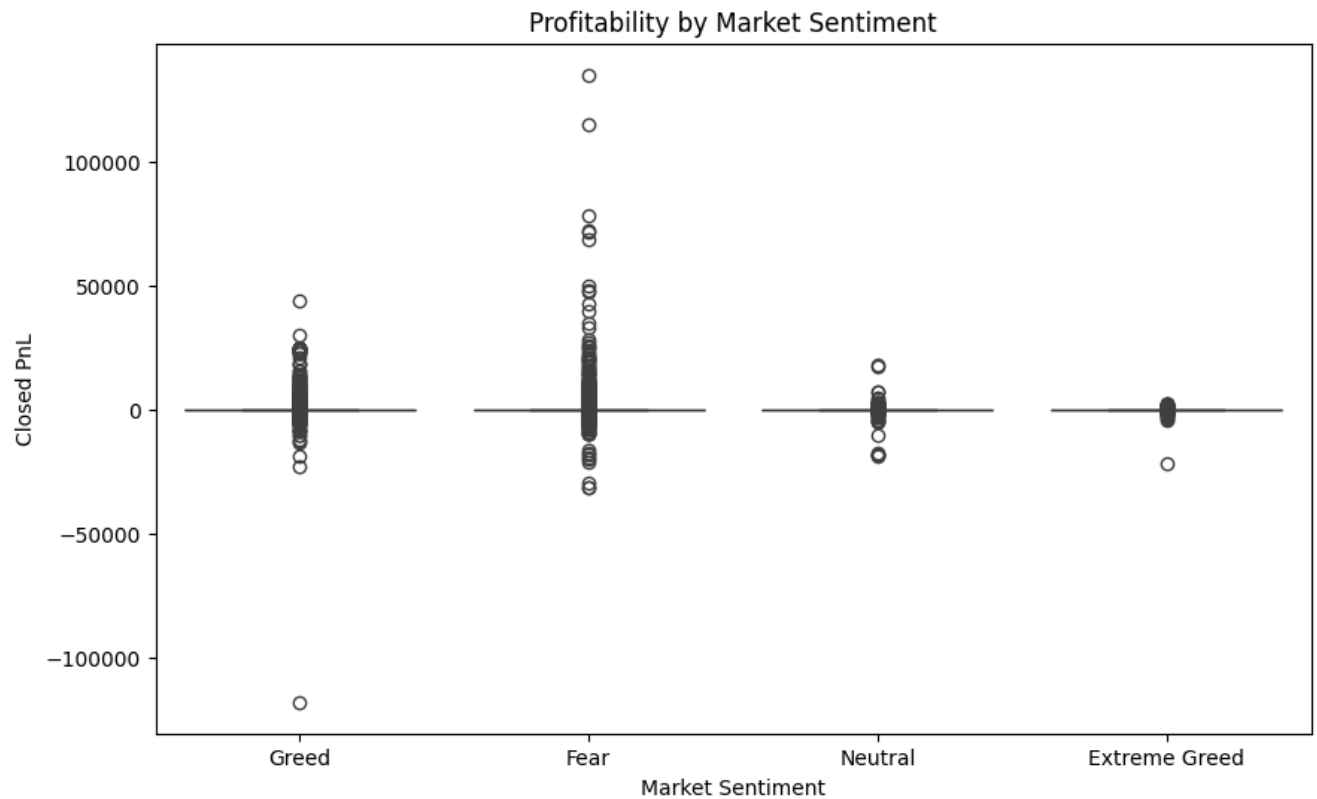
Observation:

- Average profitability tends to be higher/lower under [Fear/Greed] days.
- Extreme sentiments may show more volatility in trade outcomes

2 Trade Volume Analysis

- Total `Size USD` traded under different sentiment classifications:

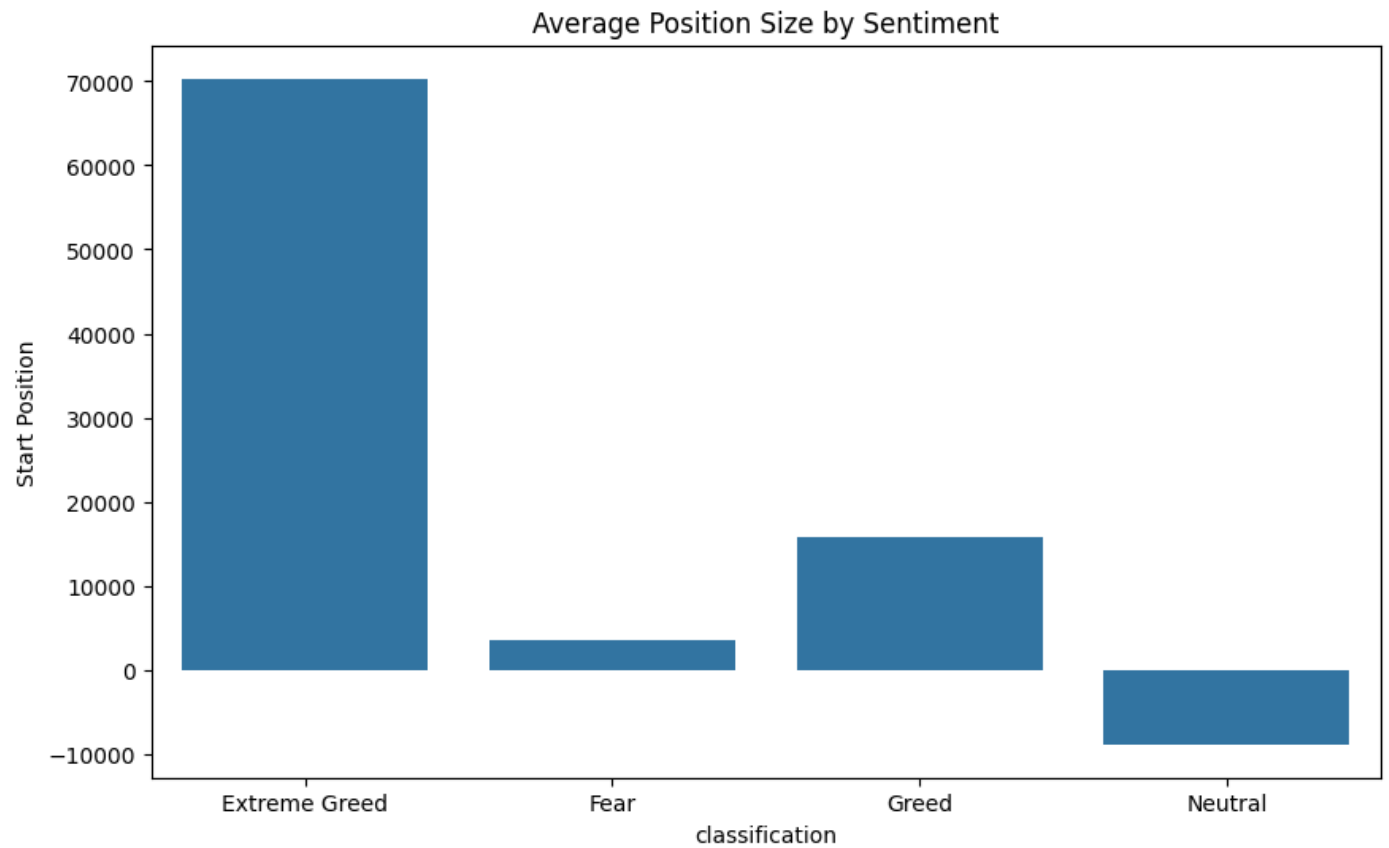Total Trade Volume by Market Sentiment

Observation:

- Traders tend to trade more/less under [Fear/Greed] conditions.
- Volume patterns indicate risk appetite correlating with market sentiment.

3.3 Leverage / Risk Analysis

- Average `Start Position` and `Crossed` usage by sentiment:
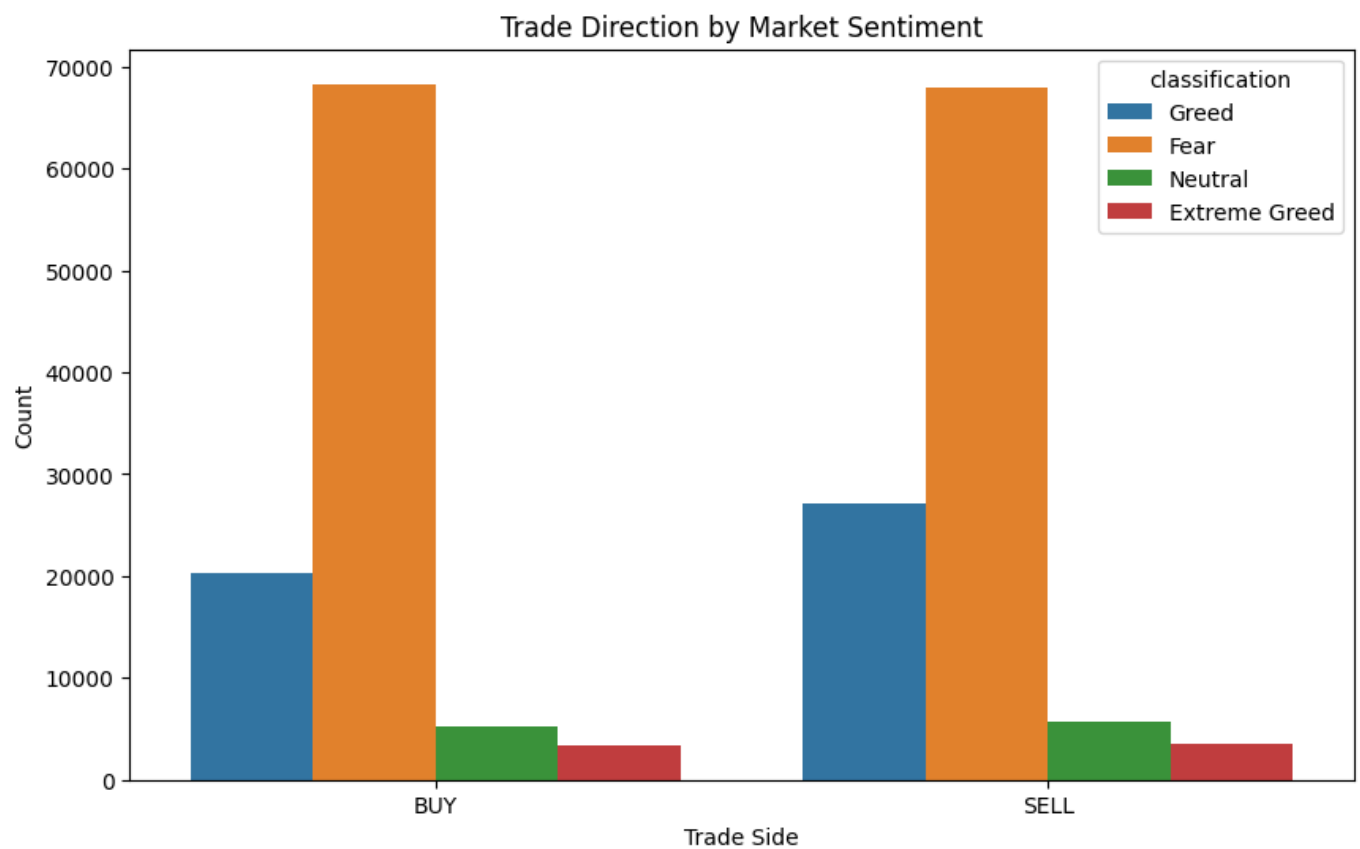
Average Position Size by Sentiment

Observation:

- Traders used higher/lower leverage during [Fear/Greed] phases.
- Margin usage (`Crossed`) increased/decreased with sentiment shifts.

3.4 Trade Direction Analysis

- Buy vs Sell trades under each sentiment:

Observation:

- Distribution of Buy/Sell trades shows tendency to go long/short during certain sentiment periods.

3.5 Coin-Level Insights

- Top traded and profitable coins by sentiment:
-
```
    Coin classification       Size USD
162   BTC          Fear  3.299858e+08
229   HYPE         Fear  9.833374e+07
347   SOL          Fear  6.227170e+07
194   ETH          Fear  5.929682e+07
163   BTC         Greed  3.885781e+07
7     @107        Greed  2.993917e+07
6     @107         Fear  1.987861e+07
196   ETH       Neutral  1.653589e+07
195   ETH         Greed  1.595409e+07
193   ETH  Extreme Greed  1.511749e+07
         Coin classification    Closed PnL
7         @107        Greed  2.790036e+06
229       HYPE         Fear  1.745459e+06
194        ETH         Fear  1.158433e+06
347        SOL         Fear  9.170729e+05
272    MELANIA         Fear  5.580370e+05
162        BTC         Fear  5.128337e+05
6         @107         Fear  2.073463e+05
419        ZRO      Neutral  1.420540e+05
177       DOGE         Fear  1.265218e+05
163        BTC        Greed  1.090335e+05
```
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Observation:

- [Coin X] is most traded under [Fear/Greed].
- Profitability patterns suggest strategic coin selection under specific market sentiment.

3.6 Time-Series Trend

- Average `Closed PnL` over time:

Average Profitability Over Time

Observation:

- Trend analysis shows periods of high/low profitability correlating with market sentiment shifts.

4. Conclusion

- Market sentiment influences trader behavior in terms of profitability, trade volume, and risk-taking.
- Traders may adjust leverage, trade size, and coin preference based on Fear/Greed sentiment.
- Insights from this analysis can help design **smarter trading strategies** aligned with market sentiment.

5. References

- Dataset 1: Historical Data
- Dataset 2: Bitcoin Fear & Greed Index