

# Primetrade.ai

**Title:** Data Science Assessment — Shaikh Amaan

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## 1. Executive Summary

This assessment explores the relationship between trading behaviour and the Bitcoin Fear & Greed Index. After cleaning and preparing the data, daily aggregates were generated, merged with sentiment indicators, visualised, and statistically evaluated.

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## 2. Data Description

- historical\_data.csv — trade-level history with timestamps, positions, volume, PnL, and metadata.
  - fear\_greed\_index.csv — daily market sentiment classification (Fear / Greed) and index score.
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## 3. Data Cleaning & Preprocessing

- Standardised column names (snake\_case).
  - Fixed timestamp inconsistencies using the Timestamp IST field (%d-%m-%Y %H:%M).
  - Converted numeric fields: execution\_price, size\_tokens, size\_usd, closed\_pnl, fee.
  - Removed duplicate rows and filtered invalid entries.
  - Extracted date for daily-level aggregation.
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## 4. Feature Engineering & Aggregations

Daily aggregates include:

- total\_trades
- total\_volume\_tokens
- total\_volume\_usd
- net\_pnl
- avg\_pnl
- pct\_profitable
- buy\_count / sell\_count
- buy\_sell\_ratio

These were merged with Fear/Greed classifications using a left join.

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## 5. Exploratory Data Analysis

- Time-series analysis of net PnL over time.
  - Scatter plot with color-coded market sentiment (Fear = red, Greed = green, Missing = gray).
  - Patterns observed between profitability and sentiment-driven behaviour.
  - Visual outputs saved in outputs/.
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## 6. Statistical Testing

- Conducted t-test and Mann–Whitney U test comparing net PnL on Fear vs Greed days.
- Insert your p-values here:

T-test p-value: 0.021709969966269897

Mann-Whitney p-value: 0.009470524637068167

Interpretation (example):

Low p-values indicate meaningful distribution differences in net PnL between Fear and Greed environments.

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## 7. Limitations

- Missing sentiment for some dates.
  - Small dataset limits reliability of statistical conclusions.
  - Aggregations remove intra-day volatility information.
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## 8. Recommendations

- Consider leveraging Fear days to adjust risk exposure.
  - Explore sentiment-aware position sizing.
  - Extend analysis to account-level behavioural clustering.
  - Expand dataset for stronger statistical power.
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## 9. Acknowledgment of Assistance

*Parts of the code structure, explanation formatting, and presentation improvements were created with guidance from AI-based tools (ChatGPT). All analysis, interpretation, debugging, and final decisions were performed manually by me.*