

Data Science Report: Bitcoin Market Sentiment & Trader Performance Analysis

1. Introduction

This report presents an analysis of two datasets:

- Bitcoin Market Sentiment (Fear & Greed Index) :- Provides daily sentiment indicators for the crypto market (fear or greed).
- Historical Trader Data :- Contains detailed trading activity such as execution price, trade size, side, PnL, leverage, and timestamps.

The objective of this assignment is to merge these datasets, perform exploratory analysis, and generate meaningful insights into how trader performance correlates with market sentiment

2. Data Sources

- Fear & Greed Index Dataset:-
 - Columns: timestamp, value, classification, date
 - Provides a daily classification of market mood as *Fear* or *Greed*.
 - Historical Trader Data Dataset:-
 - Columns include: Account, Coin, Execution Price, Size Tokens, Size USD, Side, Timestamp IST, Start Position, Closed PnL, Direction, etc.
 - Records trader-level performance and trade details.
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3. Data Preprocessing

- Steps performed in Notebook 1:
 - Cleaned column names for consistency.
 - Converted Timestamp columns into proper datetime objects.
 - Mapped sentiment data (classification) to each trader record using date alignment.
 - Merged the two datasets into a single file: **merged_data.csv**.
 - Outputs:
 - merged_data.csv (final cleaned and merged dataset).
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4. Exploratory Data Analysis (EDA)

- Steps performed in Notebook 2:
 - Analyzed daily PnL trends by sentiment (Fear vs. Greed).

- Computed summary metrics (average PnL, total trades, win/loss ratio) by sentiment.
- Visualized:
 - Distribution of trades across Fear/Greed days.
 - Trader performance trends under different sentiment regimes.

➤ Outputs:

- daily_pnl_by_sentiment.csv
 - sentiment_summary_metrics.csv
 - Charts showing performance under Fear vs. Greed.
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5. Key Insights

- Traders showed higher average PnL during *Greed* days compared to *Fear* days.
 - Trade activity was more frequent during *Greed* sentiment, suggesting higher market participation.
 - Losses were more severe on *Fear* days, possibly due to increased volatility and uncertainty.
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6. Deliverables

The following files were generated as part of this assignment:

- **Notebook 1:**
 - Data preprocessing & merging
 - Output: merged_data.csv
 - **Notebook 2:**
 - Exploratory analysis & insights
 - Outputs: daily_pnl_by_sentiment.csv, sentiment_summary_metrics.csv
 - Visualizations (stored in outputs folder)
 - **Report:**
 - This document (ds_report.pdf)
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7. Conclusion

- This project successfully combined sentiment and trader datasets to analyze the relationship between market psychology (Fear/Greed) and trading outcomes. Results indicate a positive correlation between Greed sentiment and profitable trades, while Fear periods are marked by higher volatility and losses.
- Future work may include:
 - Extending the analysis to multiple timeframes (hourly, weekly).
 - Applying machine learning models to predict PnL based on sentiment and trade features.
 - Evaluating risk-adjusted performance metrics (e.g., Sharpe ratio) by sentiment.