

Bitcoin Trader Performance & Market Sentiment Analysis

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1. Executive Summary:

- This study investigates the link between the behavior of Bitcoin traders and overall market sentiment, as demonstrated by the Fear & Greed Index. The study aims to combine in-depth data related to individual trades with classification of sentiment into the daily "moods" of the market so that no matter if traders are profitable, trading volume, and activity can be observed and grouped differently with respect to whether they are telling you something similar or oppositely to the aggregate sentiment. The study will use exploratory data analysis and visualizations to identify trends and actionable signals that do or don't align with aggregate sentiment of the market.

2. Data Overview:

- `historical_data.csv` – Individual Bitcoin trades with profit, size, time, and direction attributes.
- `fear_greed_index.csv` – Daily sentiment labels categorized as Extreme Fear, Fear, Neutral, Greed, Extreme Greed

3. Methodology:

Cleaning & Preparation:

- Removed duplicates and standardized missing dates.
- Converted timestamps to datetime objects for accurate date matching.

Feature Engineering:

- Merged each trade with the relevant daily sentiment category.
- Created date-only keys for precise joins.

Exploratory Analysis:

- Distribution of days in each sentiment state.
- Profitability (Closed PnL), trade size and count by sentiment.
- Summary statistics and histograms for core metrics.

Visualization:

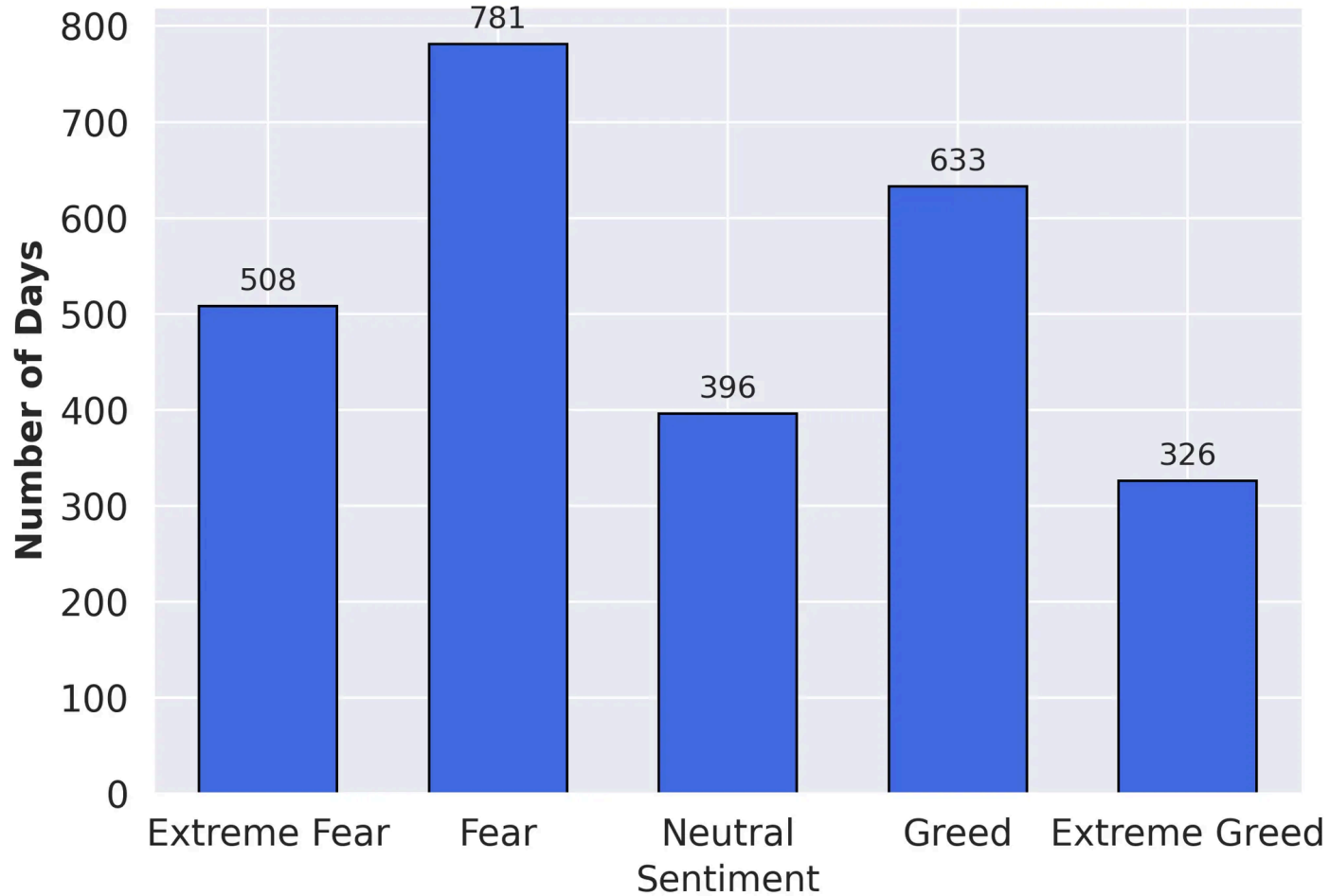
Generated key plots saved as .png files (included in repo `/outputs/`).

4. Results & Visuals:

A. Sentiment Distribution:

Most days fall under "Fear" and "Greed", with notable spikes in "Extreme Fear" during major market downturns.

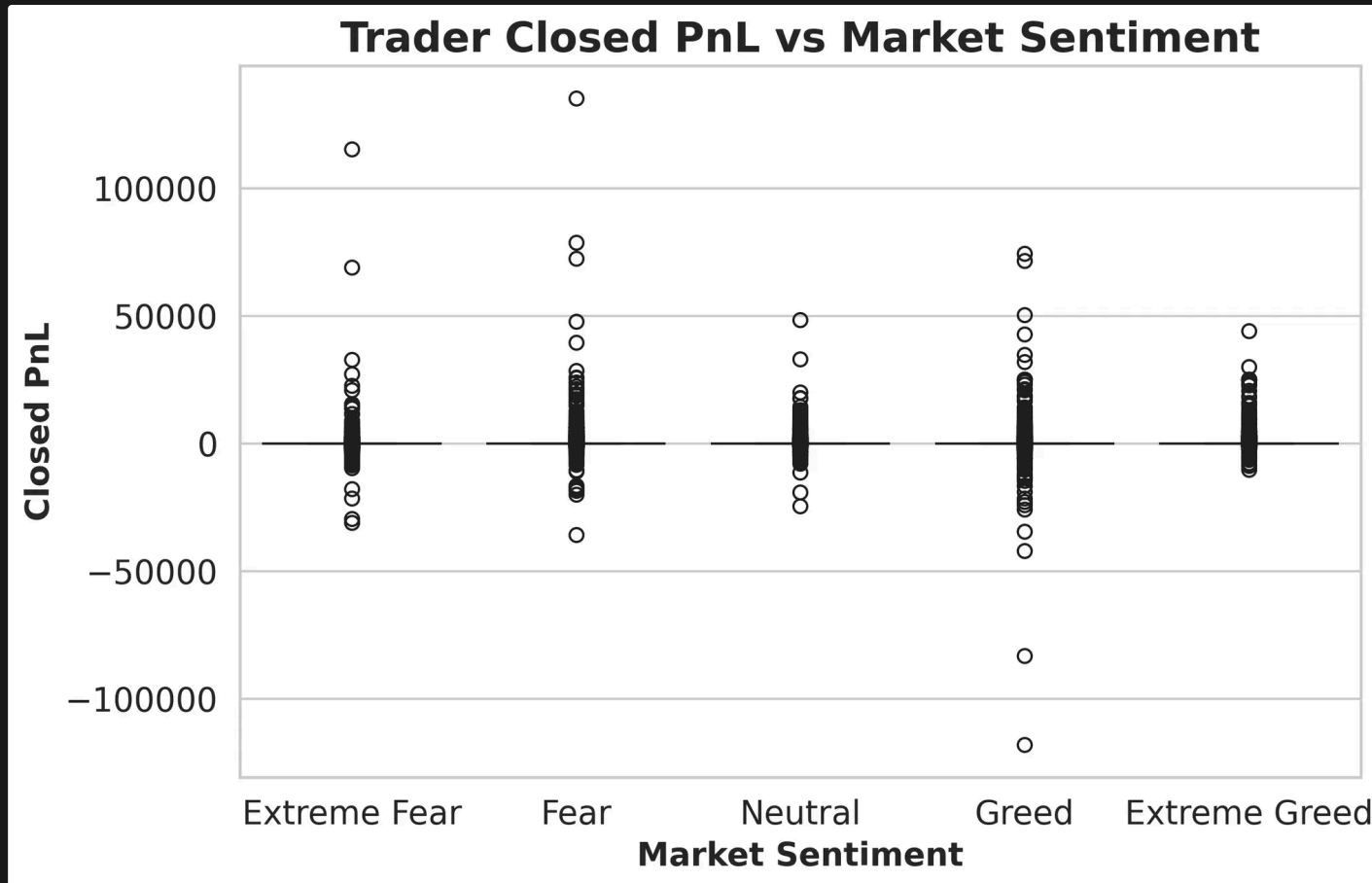
Bitcoin Market Sentiment Distribution



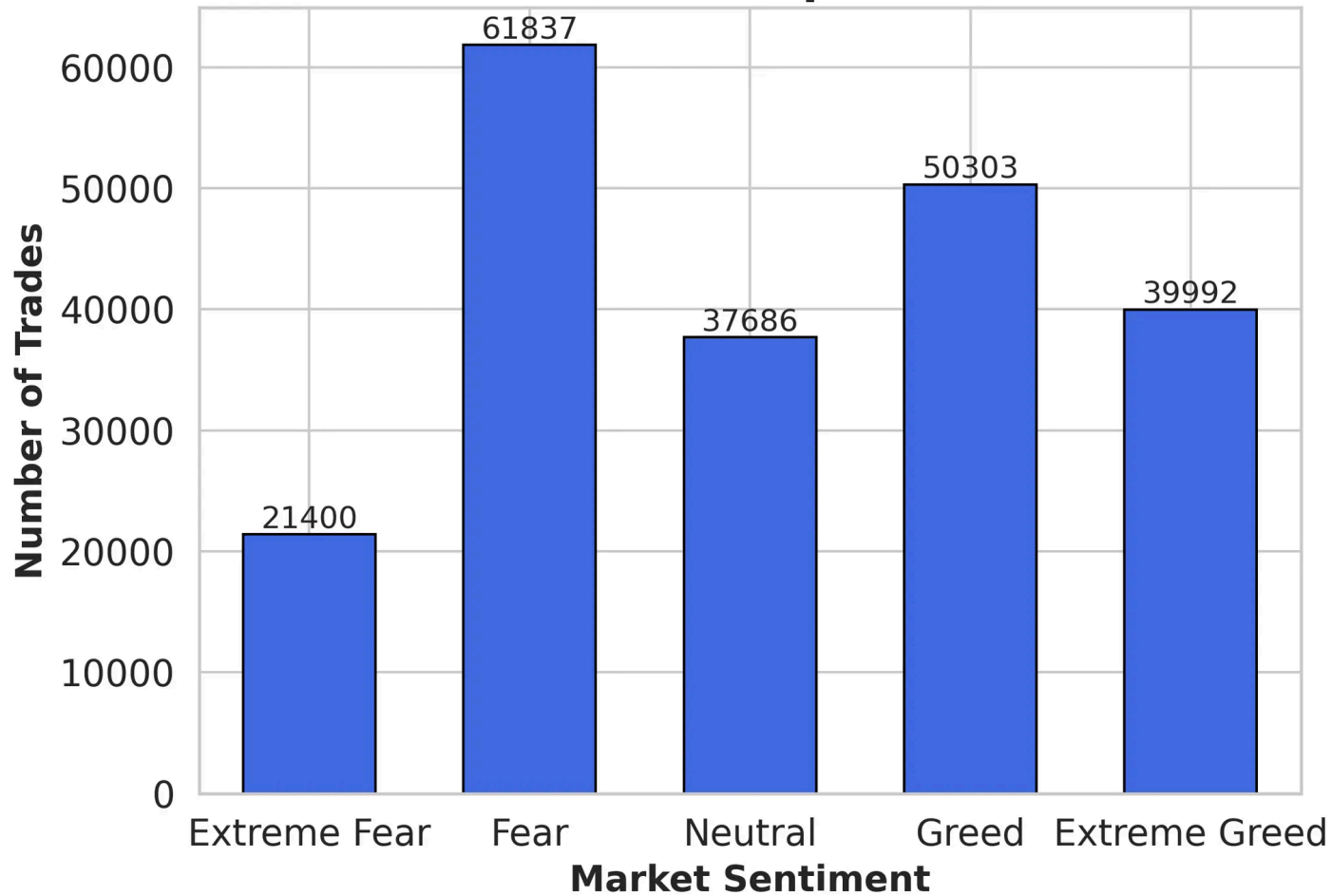
B. Trader Performance by Sentiment:

- **Profitability:** Closed PnL is most volatile and often highest during "Extreme" sentiment phases (both Fear and Greed).

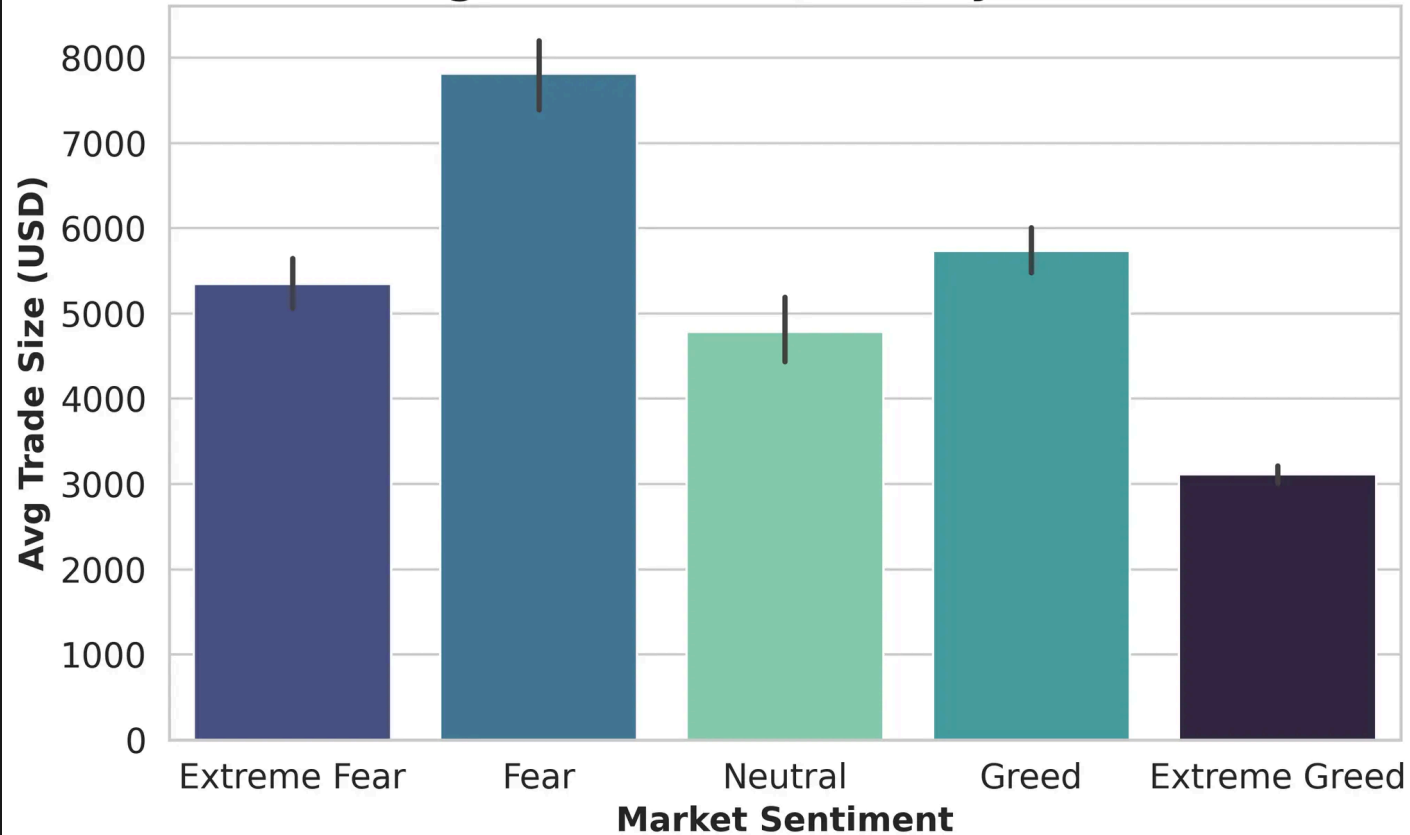
- **Trade Sizes:** Larger average trade sizes cluster in "Greed" and "Extreme Greed" environments.
- **Volume/Activity:** Trade count surges dramatically in both "Extreme Fear" and "Extreme Greed" periods, showing traders respond strongly to sentiment extremes.



Number of Trades per Sentiment



Average Trade Size (USD) by Sentiment



Key Insights

1. **Fear**: Highest mean PnL (54.29) with 61,837 trades best profitability
2. **Extreme Greed**: Second-highest PnL (67.89) but smallest avg trade size
3. **Extreme Fear**: Mean PnL 34.54 with largest avg trade size (5,349.73)

4. **Greed:** Mean PnL 42.74 - lower than Fear periods
5. **Neutral:** Mean PnL 34.31 with moderate trade volumes

5. Statistical Summary:

Sentiment	Mean PnL	Median PnL	Std Dev (PnL)	Total PnL	Mean Trade Size (USD)	Total Trade Size (USD)
Extreme Fear	34.54	0.00	1136.06	739,102	5349.73	114,484,300
Extreme Greed	67.89	0.00	766.83	2,715,171	3112.25	124,465,200
Fear	54.29	0.00	935.36	3,357,155	7816.11	483,324,800
Greed	42.74	0.00	1116.03	2,150,129	5736.88	288,582,500
Neutral	34.31	0.00	517.12	1,292,921	4782.73	180,242,100

6. Attachments & Reproducibility:

- **Code & Notebooks:** See `notebook_1.ipynb` for full exploratory code, analysis, and visualizations.
- **Data Files:** All raw and merged CSVs are under `/csv_files/`.
- **Visual Outputs:** All source figures are included in `/outputs/`.
- **Summary Report:** This PDF file (`ds_report.pdf`).