Market Sentiment vs Trader Performance

This report analyzes the relationship between Bitcoin market sentiment, as captured by the Fear & Greed Index, and the actual trading performance derived from execution-level trading logs.

1. Introduction

Cryptocurrency markets, particularly Bitcoin, are heavily influenced by trader psychology and collective sentiment. The Fear & Greed Index is a widely used indicator that compresses multiple market signals such as volatility, market momentum, social media activity and dominance into a single score ranging from 0 (Extreme Fear) to 100 (Extreme Greed). In parallel, trading logs capture how real traders open and close positions, how much volume they trade and what profit or loss they generate.

The objective of this assignment is to connect these two sources of information – market sentiment and trader behaviour – to understand whether certain sentiment regimes (fear, neutral, greed) are associated with distinctive patterns in price, trading volume or realized profit and loss (PnL). The analysis is based on a combination of an historical Fear & Greed Index dataset and a detailed execution-level trading dataset.

2. Data Description

2.1 Fear & Greed Index Dataset

The first dataset contains daily values of the Bitcoin Fear & Greed Index. Each record includes: **timestamp**: Unix timestamp of the observation. **date**: Human-readable calendar date. **value**: Sentiment score between 0 and 100. **classification**: Categorical sentiment label (e.g., Extreme Fear, Fear, Neutral, Greed, Extreme Greed). The time range for this dataset spans from 2018-02-01 to 2025-05-02. This long history is useful to study sentiment cycles, although only part of it overlaps with the available trading data.

2.2 Trading Dataset

The second dataset is an execution-level trading log. Each row corresponds to a single trade and contains, among others, the following fields: **Account**: Wallet or account identifier. **Execution Price**: Price at which the trade was executed. **Size Tokens** and **Size USD**: Trade size expressed in tokens and in USD value. **Side**: Direction of the trade (BUY / SELL). **Closed PnL**: Realized profit and loss associated with the position. **Fee**: Transaction fee paid for the execution. **Timestamp**: Millisecond-resolution Unix timestamp. From this granular data we derive daily aggregates that summarize trading activity and performance.

2.3 Overlapping Analysis Window

The Fear & Greed Index provides data from 2018-02-01 to 2025-05-02, while the trading dataset covers the period from 2023-03-28 to 2025-06-15. After aligning both sources by calendar date, there are 6 days where both trading data and sentiment data are available. All subsequent joint analysis focuses on this overlapping window. Because the overlap contains a limited number of days, results should be interpreted as indicative rather than statistically definitive.

3. Methodology

The analysis follows a standard data science workflow: **Data Cleaning:** All timestamps are converted to a common datetime format. Numeric fields such as execution price, trade size and PnL are

explicitly cast to numeric types with invalid values handled as missing. **Feature Engineering:** For the trading dataset, trades are grouped by calendar date to compute daily metrics: Total number of trades. Total traded volume in USD. Weighted average execution price using USD volume as weights. Total realized PnL and total fees. **Alignment:** The daily trading metrics are merged with the daily Fear & Greed Index values on the date column, ensuring that each row in the merged dataset corresponds to a single trading day with an associated sentiment score. **Exploratory Data Analysis (EDA):** Time-series plots and scatter plots are used to visually inspect the relationship between sentiment, price, volume and PnL on the overlapping days. **Correlation Analysis:** Pearson correlation coefficients are computed between the sentiment score and key numeric variables such as weighted average price, total volume and total PnL to quantify linear associations. The choice of **weighted average execution price** is important: by weighting each execution price by its USD size we obtain a more realistic estimate of the price actually experienced by capital on that day, rather than a simple unweighted average.

3.1 Sentiment and Price Dynamics

The first step in the exploratory analysis is to visualize how the Fear & Greed Index and the weighted average Bitcoin price evolve over the overlapping dates. Although only a small number of days intersect between the datasets, plotting both series helps reveal whether extreme sentiment values coincide with unusually high or low traded prices.

3.2 Trading Performance and Sentiment

Next, we examine how daily realized PnL behaves across the overlapping days. By aggregating closed PnL per date we obtain a measure of how profitable trading activity was on each day. When this is viewed alongside sentiment and price information, it is possible to qualitatively assess whether profitable days tend to coincide with fearful markets, greedy markets or more neutral conditions.

4. Correlation Analysis

To quantify the linear relationships between sentiment and trading metrics, Pearson correlation coefficients were computed on the overlapping days. The key results are: Correlation between sentiment score and weighted average price: **-0.202** Correlation between sentiment score and total traded volume (USD): **-0.572** Correlation between sentiment score and total closed PnL: **-0.453** Given the small number of overlapping days, these correlations should be treated as indicative patterns rather than statistically robust estimates. In this sample, higher sentiment scores (tilting towards greed) are modestly associated with lower traded volume and lower realized PnL, whereas price shows a weak relationship with sentiment. At the same time, traded volume and realized PnL are strongly positively correlated with each other and with the weighted average price, which is expected: days with more activity and higher prices naturally create more opportunities for profit and loss.

A practical interpretation of these findings is that sentiment alone does not fully explain trading outcomes in this dataset. Instead, it likely interacts with other factors such as volatility, leverage, risk management rules and execution quality. Still, extreme sentiment days may coincide with unusually busy or volatile trading sessions, and further analysis on a larger overlapping sample would be valuable.

5. Key Insights and Recommendations

The analysis yields several qualitative insights that are relevant for traders, risk managers and strategy designers: **Sentiment provides contextual information but is not a standalone signal:** The Fear & Greed Index helps characterize the overall market mood, yet trading performance depends on how strategies respond to that context. Blindly fading or following sentiment is unlikely to work consistently. **Execution-level data is extremely valuable:** Having access to detailed trade logs enables the construction of daily performance metrics, estimation of effective trading prices and analysis of fee drag. This level of detail is crucial for post-trade analytics and for identifying structural weaknesses in strategies. **Sample size matters:** The limited number of days where both sentiment and trading data overlap constrains the statistical power of the correlation analysis. For production use, a larger, fully aligned dataset should be assembled. **Potential for regime-based strategies:** Even with limited data, it is reasonable to hypothesize that certain strategies may perform better during fearful markets (e.g., mean-reversion or liquidity provision), while others may benefit from greedy markets (e.g., trend-following). This suggests segmenting performance evaluation by sentiment regime.

6. Limitations and Future Work

Limitations

The overlap between the sentiment dataset and the trading dataset contains only 6 days, which is not sufficient to draw strong statistical conclusions. The analysis uses daily aggregates, which may hide important intraday dynamics such as sharp sentiment shifts or intraday volatility spikes. PnL values do not distinguish between different strategies, instruments or leverage levels, so the impact of sentiment on specific trading styles cannot be isolated. **Future Work**

Extend the overlapping period by sourcing additional trading history aligned with the full Fear & Greed Index series. Introduce volatility and liquidity measures to better capture market conditions alongside sentiment. Segment performance by sentiment regime (Extreme Fear, Fear, Neutral, Greed, Extreme Greed) and by strategy or account, to identify which combinations are most robust. Develop predictive models that use sentiment as one feature among many, rather than as the sole driver, and backtest those models using realistic execution assumptions.

7. Conclusion

This report demonstrates how external market sentiment indicators and internal trading logs can be combined into a unified analytical view. By aligning the Bitcoin Fear & Greed Index with execution-level trading data, we constructed daily metrics for price, volume and PnL and performed exploratory and correlation analysis on the overlapping days.

While the limited sample size prevents strong statistical claims, the exercise highlights a practical framework that can be extended to larger datasets: clean and aggregate trading data, align with sentiment or macro indicators, visualize patterns, quantify correlations and interpret the results in the context of trading strategy design and risk management. For a company, this type of analysis is a powerful tool for understanding how trader behaviour interacts with market conditions and for designing more robust, sentiment-aware trading strategies.