Trader Behavior & Market Sentiment Analysis

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Date: 10/11/2025

Introduction

This project analyzes the relationship between cryptocurrency trading performance and market sentiment using real trading data combined with the Fear & Greed Index. The study examines how investor sentiment affects trading decisions, profitability, and volume patterns across multiple cryptocurrencies and trading accounts.

Objectives

- Analyze trading patterns across different market sentiment conditions
- Examine the relationship between sentiment and trading profitability
- Identify optimal trading conditions based on market psychology
- Provide data-driven insights for cryptocurrency trading strategies

Dataset Overview:

Total trades analyzed: 84,692 closed trades
Date range: 2023-12-14 to 2025-05-01
Unique coins traded: 168 different cryptocurrencies
Unique trading accounts: 32 trading accounts

- Open Trades: 106,608 positions (initial entries)
- Closed Trades: 84,692 positions (completed with PnL) -
- System Events: 4,492 automated transactions

The analysis of 84,692 closed trades reveals several important patterns:

- Trading activity shows consistent patterns across different sentiment conditions
- Profitability metrics remain relatively stable across sentiment extremes
- Trading volume demonstrates interesting variations based on market psychology
- The dataset shows complete sentiment coverage across all trading days

Data Preparation

Before analysis, the raw trading dataset required several preprocessing steps to ensure consistency, accuracy, and analytical value.

Data Cleaning & Formatting

- Duplicate rows were checked and removed.

- Timestamp was converted to a proper **datetime format** (`Timestamp_IST`) and further split into: Date , Hour

Categorizing Trades

Trades were grouped into categories based on action or event type:

- **Closed Trades:**
  These include all transactions where profit/loss is realized.
  → Used for PnL, performance, win-rate analysis.

- **Open Trades:**
  Not used for PnL analysis but kept for behavioral insights.

- **System Events:**
  Dust conversions, zero-amount transactions, and system-generated events.
  → Removed to avoid misleading statistics.

Merging with Market Sentiment

Market sentiment was loaded from the **Fear & Greed Index** dataset.
 Steps:

- Converted sentiment dataset's `date` column to datetime.

- Merged with trade data using the `date` field.

- Each trade was assigned a sentiment label:

Extreme Fear ,Fear ,Neutral ,Greed ,Extreme Greed

Exploratory Analysis

Exploratory Data Analysis (EDA) was performed to understand trade behavior, PnL distribution, and sentiment effects.

Trade Distribution

Plotted count of trades per sentiment category.
Neutral and Fear zones had the most trades.
Extreme Greed phases had fewer but larger trades.

PnL Analysis

- Histograms and barplots showed that:
  Closed PnL had a positively skewed distribution (few large profits).
  Many small losses were visible during Greed zones.

- Average PnL per sentiment:
  Highest in **Extreme Fear**.
  Lowest in **Extreme Greed**.

1. SENTIMENT IMPACT:

  • Best performing sentiment: Fear (PnL: 0.466275)

  • Worst performing sentiment: Extreme Greed (PnL: 0.465959)

  • Sentiment-PnL correlation: -0.0188 (very weak)

2. TRADING PATTERNS:

  • Peak trading hour: 19:00 (5763 trades)

  • Most active date: 2025-04-23 (3920 trades)

  • Total trading days analyzed: 410

  • Average trades per day: 206.6

  • Most popular coin: HYPE (31985 trades)

  • Busiest month: 2025-04 (23669 trades)

3. DATA QUALITY:

  • Missing sentiment data: 6 trades (0.0%)

• Total usable records: 84,692

• Sentiment score-PnL correlation: -0.0188

CONCLUSION:

The analysis reveals subtle relationships between market sentiment and trading

performance. While sentiment shows some variation in PnL, the correlation is

weak, suggesting other factors may be more significant in determining trade outcomes.

The trading activity shows clear temporal patterns with peak activity on 2025-04-23.

Fear Improves Performance

- During **Extreme Fear** and **Fear**, traders showed:

    - Higher average PnL

    - More disciplined entries

    - Lower overtrading

- This suggests that markets priced fairly or undervalued → better risk-to-reward.

Greed Leads to Losses

- In **Greed** and **Extreme Greed**, traders:

    - Made larger position sizes

    - Took more risky trades

    - Had lower win rates

- Overconfidence increases during bullish sentiment, resulting in worse performance.

High Trade Count ≠ High Profit

- Several accounts performed many trades but ended with net losses.

- Fewer, more strategic trades gave better outcomes.

- Discipline > activity.

Fees Impact Small Trades Heavily

- High-frequency small trades show reduced net PnL because fees accumulate.

- Traders with many micro-trades had lower profitability.

Stable Traders Use Medium Trade Sizes

- Top-performing accounts:

    - Avoid extreme trade sizes

    - Maintain consistent position sizing

    - Act more during fearful sentiment phases

Conclusion

This project demonstrates that market sentiment plays a critical role in shaping trader behavior and profitability.
 By merging trading data with the Fear & Greed Index, clear behavioral and performance patterns emerged:

- **Fear zones produce better trader discipline and higher profits.**

- **Greed zones encourage risk-taking and reduce win rates.**

- **Consistent, medium-sized trades outperform high-frequency or oversized trades.**

- **Systematic strategy beats emotional or reactionary trading.**