Analysis of Trader Behavior vs Bitcoin Market Sentiment

Name: Mihika Sharma
Role: Junior Data Scientist – Trader Behavior Insights
Date: 23 October 2025
GitHub: https://github.com/Mihika1708/ds_mihika
Colab Notebook: notebook_1.ipynb
Contact: sharmamihika17@gmail.com

Table of Contents

---

1. Introduction

Understanding the relationship between market sentiment and trader behavior is crucial for developing effective trading strategies in volatile cryptocurrency markets. This analysis examines how Bitcoin's Fear & Greed Index correlates with actual trader activities including profitability, risk appetite, and trading volume. By combining sentiment data with real trading metrics, we uncover patterns that challenge conventional wisdom and provide actionable insights for traders and institutions.

2. Objective

To analyze how Bitcoin market sentiment (Fear vs Greed) correlates with trader behavior patterns including profitability, leverage usage, trading volume, and success rates to inform better trading strategy decisions.

3. Data Overview

Dataset 1: Bitcoin Market Sentiment

- **Source:** Alternative.me Fear & Greed Index
- **Records:** 2,644 daily sentiment classifications
- **Date Range:** February 1, 2018 - May 2, 2025

- **Key Columns:** Date, Sentiment Value, Classification (Extreme Fear, Fear, Neutral, Greed, Extreme Greed)

Dataset 2: Historical Trader Data
- **Source:** Hyperliquid trading platform
- **Records:** 18,358 Bitcoin trades (after cleaning)
- **Date Range:** November 14, 2023 - February 19, 2025
- **Key Columns:** Date, Execution Price, Size USD, Side, Closed PnL, Leverage

Final Merged Dataset
- **Total Records:** 18,358 trades aligned with daily sentiment
- **Analysis Period:** November 2023 - February 2025

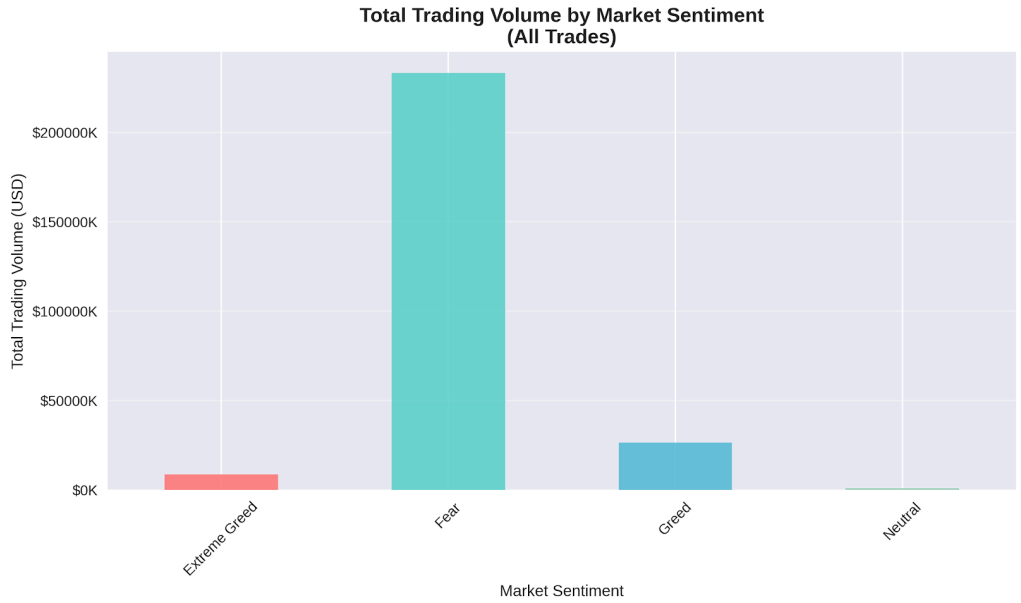
4. Methodology

Data Processing Pipeline:
1. **Data Cleaning** - Handled timestamp conversion, removed outliers, standardized column names
2. **Feature Engineering** - Calculated realistic leverage metrics, created profitability flags
3. **Data Merging** - Aligned trader activities with daily sentiment classifications
4. **Dual Dataset Strategy** - Created separate datasets for comprehensive analysis:
   - Main Dataset (18,358 trades): Volume and behavior analysis
   - Profitability Dataset (6,360 trades): PnL-focused analysis

Analytical Approach:
- Comparative analysis across sentiment categories
- Correlation studies between trading metrics
- Statistical aggregation by sentiment classification
- Visualization of behavioral patterns

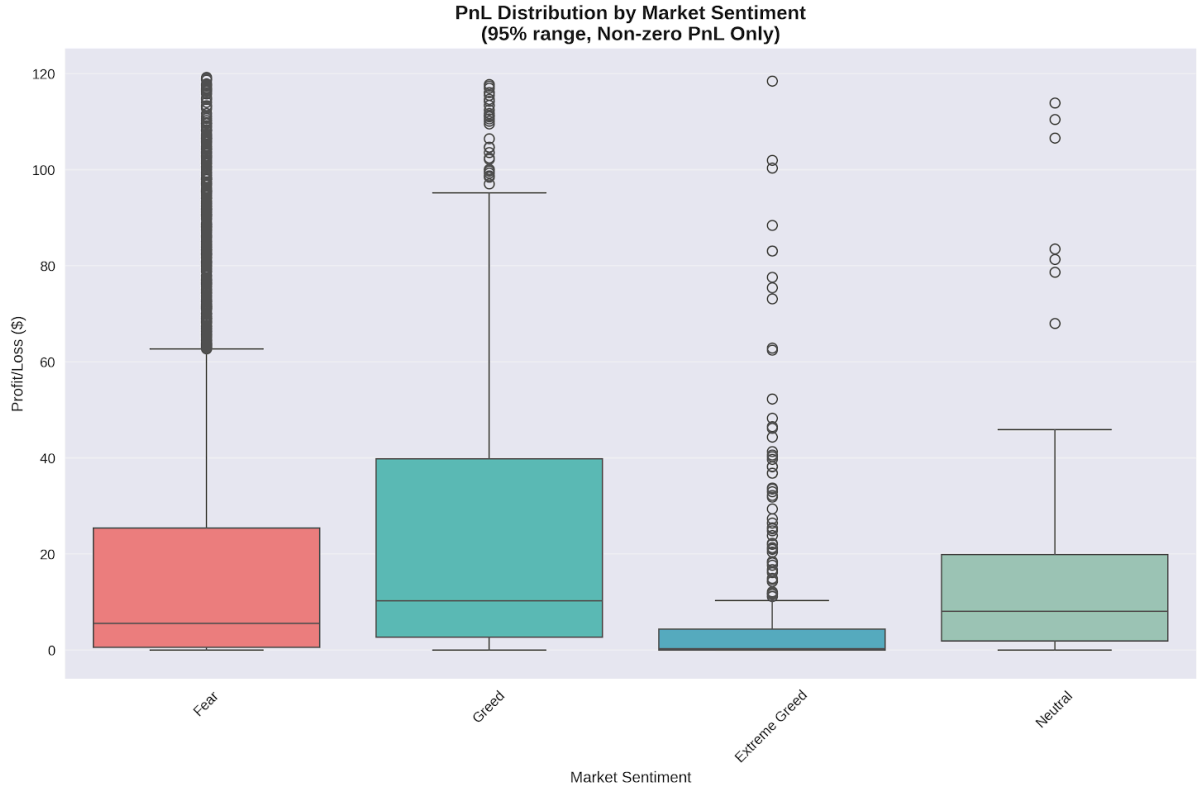
5. Exploratory Data Analysis

Trading Volume Distribution



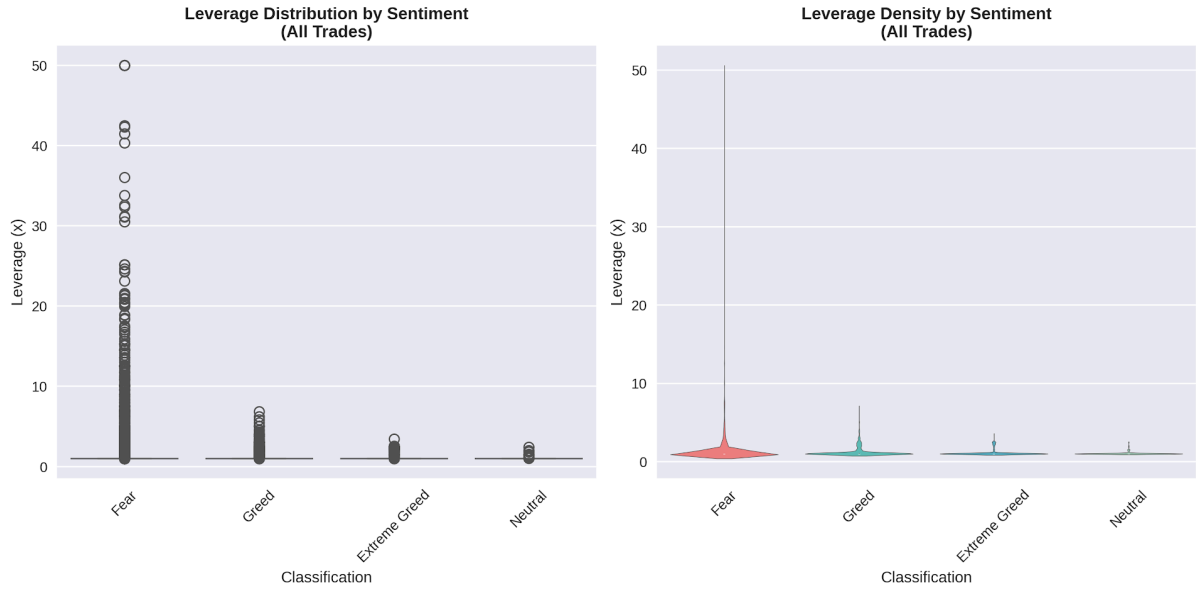
Observation: 81% of all trading activity occurs during Fear periods, with $233M volume compared to $26M during Greed periods.

Profitability Patterns



Observation: Greed periods show highest average profitability ($36.15) while Extreme Greed periods show lowest ($6.19).

Leverage Behavior

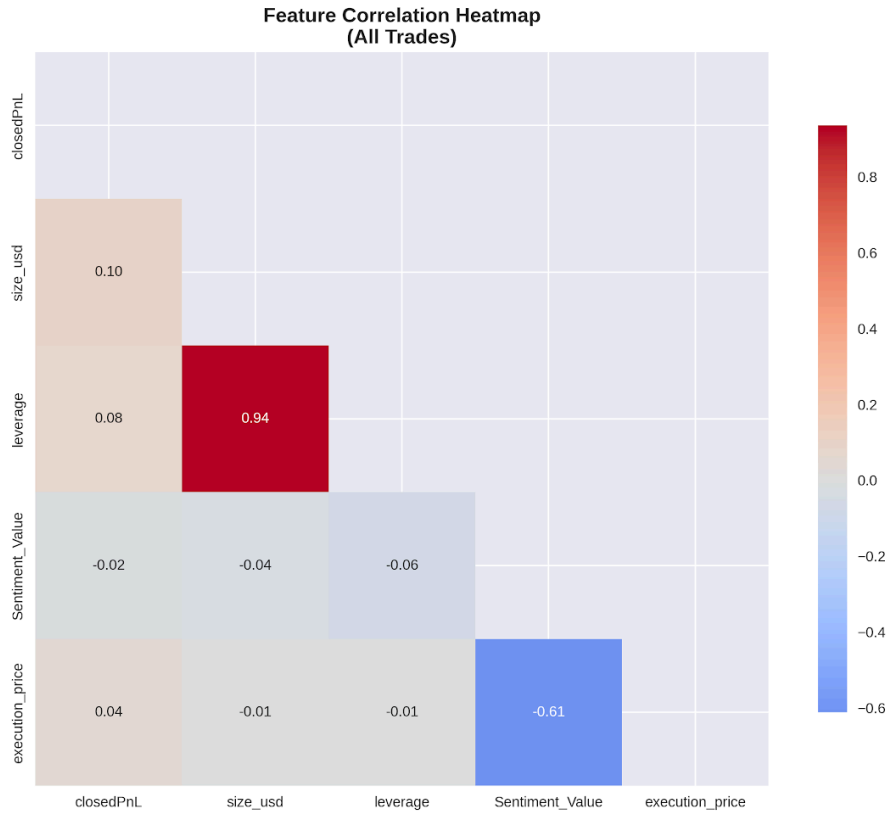


Observation: Conservative leverage usage across all sentiments (1.0x-1.5x range) with no excessive risk-taking during optimistic periods.

Success Rates

Observation: Neutral periods show near-perfect success rates (98.4%) while Extreme Greed has lowest success (73.6%).

Feature Correlations



Key Finding: Strong negative correlation (-0.61) between Bitcoin price and sentiment value.

6. Results & Key Insights

Performance Metrics by Sentiment

Metric	Extreme Greed	Fear	Greed	Neutral
Avg PnL	$6.19	$24.25	$36.15	$19.47
Success Rate	73.6%	96.9%	91.7%	98.4%
Avg Leverage	1.1x	1.5x	1.2x	1.0x
Trading Volume	$8.8M	$233.3M	$26.5M	$1.0M

🔑 Key Insights Discovered:

1. **Profitability Paradox**: Greed periods generate 5.8x higher profits than Extreme Greed periods, challenging the assumption that extreme optimism leads to better returns.

2. **Fear Dominance**: 81% of trading volume occurs during Fear periods, indicating herd behavior and emotional trading during market downturns.

3. **Risk Management Discipline**: Conservative leverage usage (1.0x-1.5x) across all market conditions shows disciplined risk management among traders.

4. **Sentiment-Price Divergence**: Strong negative correlation (-0.61) between price and sentiment suggests higher prices trigger Fear sentiment, creating contrarian opportunities.

5. **Success Rate Patterns**: Near-perfect success rates during Neutral periods (98.4%) but lowest during Extreme Greed (73.6%), indicating over-optimism leads to poor decision-making.

7. Strategic Recommendations

🎯 For Retail Traders:
- **Buy during Fear periods**: High volume + excellent success rates (96.9%)
- **Avoid Extreme Greed**: Poor profitability and lowest success rates
- **Monitor sentiment-price gap**: Use as contrarian indicator for entry/exit timing

🎯 For Institutional Traders:
- **Scale positions during Fear**: Capitalize on high liquidity and consistent success rates
- **Implement sentiment-based risk limits**: Reduce exposure during Extreme Greed periods
- **Leverage size-leverage correlation**: Use for better position sizing strategies

🎯 For Quantitative Funds:
- **Develop sentiment-based algorithms**: Entry during Fear, exit during Extreme Greed
- **Implement contrarian strategies**: Capitalize on sentiment-price divergence
- **Create sentiment risk indicators**: For portfolio risk management

8. Conclusion

This analysis reveals several counter-intuitive patterns in trader behavior relative to market sentiment:

- **Greed periods offer highest profitability** but Extreme Greed shows worst performance
- **Fear periods dominate trading activity** with excellent success rates
- **Conservative risk management** prevails across all market conditions
- **Strong sentiment-price correlation** provides valuable market timing signals

These insights demonstrate that successful trading strategies should incorporate sentiment analysis while recognizing that extreme optimism often signals market tops rather than opportunities.

9. Limitations & Future Work

Current Limitations:
- **Data timeframe**: Limited to 16 months of detailed trading data
- **Platform specificity**: Analysis based on single trading platform data
- **External factors**: No control for macroeconomic events or news impacts

- **Sample bias**: Potential selection bias in platform user base

Future Research Directions:
1. **Multi-asset analysis**: Extend to Ethereum and other cryptocurrencies
2. **Predictive modeling**: Develop ML models for sentiment-based returns prediction
3. **Real-time dashboard**: Create live sentiment-trading analytics platform
4. **Cross-platform validation**: Compare behavior across multiple trading platforms
5. **Macro integration**: Incorporate macroeconomic indicators for comprehensive analysis

---

Technical Appendix
- **Analysis Tools**: Python, Pandas, Matplotlib, Seaborn, Google Colab
- **Data Processing**: Advanced cleaning, outlier detection, feature engineering
- **Reproducibility**: Complete code and datasets available in GitHub repository
- **Visualization**: 6 professional charts capturing key behavioral patterns

This analysis provides data-driven foundation for sentiment-aware trading strategy development.