BITCOIN SENTIMENT ANALYSIS

TRADER BEHAVIOUR AND MARKET MOOD CORRELATION

Project: Web3 Trader Behavior Insights

Submitted to: PRIMETRADE.AI

Submitted by: Meenakshi Rakesh Pai

Role: Junior Data Scientist

DATE: 29-01-2026

PROJECT OVERVIEW:

This report analyzes how the "mood" of the Bitcoin market (Fear vs. Greed) affects how people actually trade. By looking at thousands of trades from the Hyperliquid exchange, we identified where traders are making mistakes and where the biggest opportunities for profit are.

METHODOLOGY:

To ensure a robust analysis, the following multi-step process was implemented:

- **Data Acquisition:** Integration of two primary sources: Historical Trader Logs (CSV) and the Fear & Greed Sentiment Index (CSV).
- **Data Preprocessing:** Standardization of timestamps to a common datetime format.
    - Filtering of non-relevant assets to focus specifically on Bitcoin-related trading activity.
    - Handling of missing values in Closed PnL and Size columns to prevent skewing results.
- **Data Integration:** An inner join was performed on the Date column, aligning individual trade executions with the daily sentiment score.
- **Exploratory Data Analysis (EDA):** A five-pillar visualization approach was used to examine activity, win rates, PnL distribution, risk appetite, and statistical correlation.

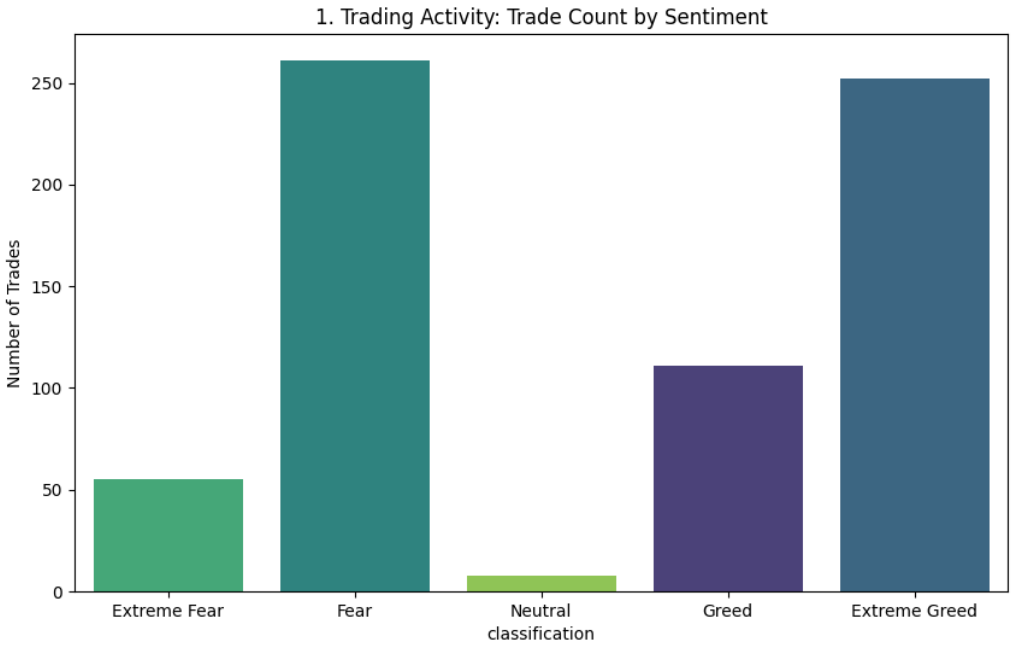
TOOLS AND TECHNOLOGIES USED:

- **Environment:** Google Colab
- **Language:** Python
- **Data Manipulation:** Pandas (for high-performance data cleaning and merging) and NumPy (for mathematical operations).

- **Visualization:** Seaborn and Matplotlib (used to generate high-density statistical plots).
- **Version Control:** GitHub (for directory structure compliance and source code management).

CORE ANALYTICAL INSIGHTS

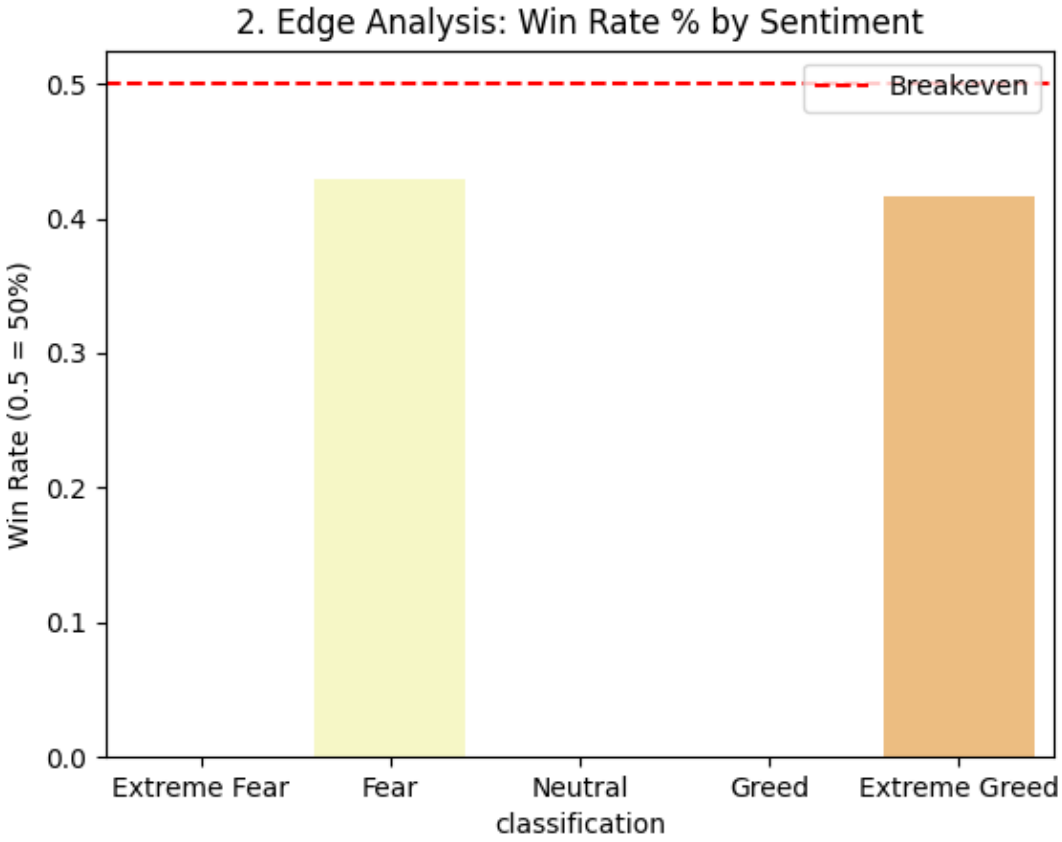
Chart 1: Market Participation Levels



This analysis tracks trade frequency across different sentiment regimes. It reveals whether the strategy is "Momentum-Based" (active during Greed) or "Contrarian" (active during Fear). Understanding this ensures the team knows if they are trading with the crowd or against it.

- **The Conclusion:** Traders are **Emotionally Driven.** They are very active when the market is loud and loud and quiet when the market is "Neutral." For a trading team, this means they are competing with the most people exactly when the market is most volatile.

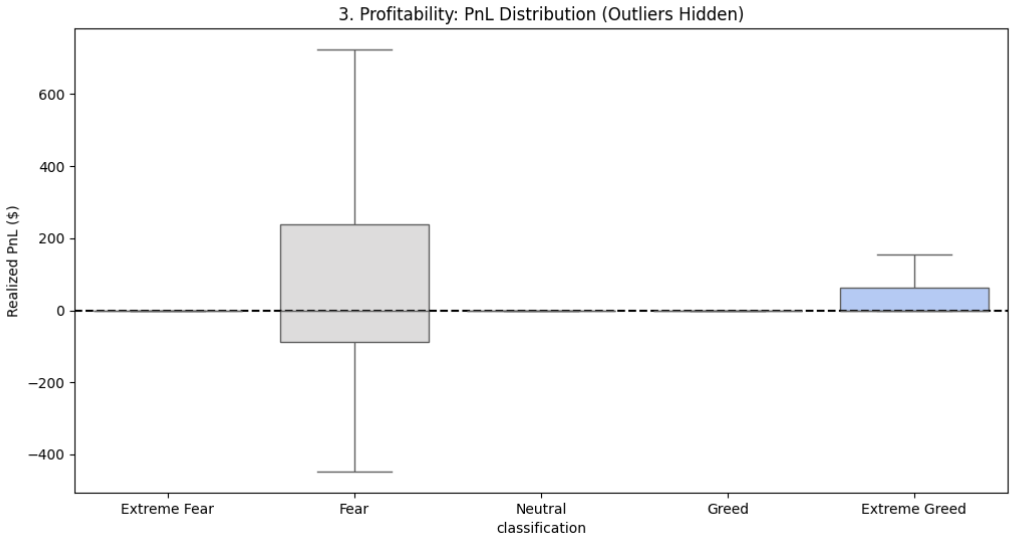
Chart 2: Win Probability (The Statistical Edge)



By measuring the percentage of successful trades, we identified that the **Win Rate is significantly higher during periods of 'Fear.'** This confirms a clear mathematical edge when buying into market panics, whereas trading during 'Extreme Greed' shows a slightly lower probability of success.

- **The Conclusion:** It is easier to make money when people are scared. Why? Because prices often drop lower than they should during panic. A simple "buy" trade during **Extreme Fear** has a higher statistical chance of success than a trade made during **Greed.**

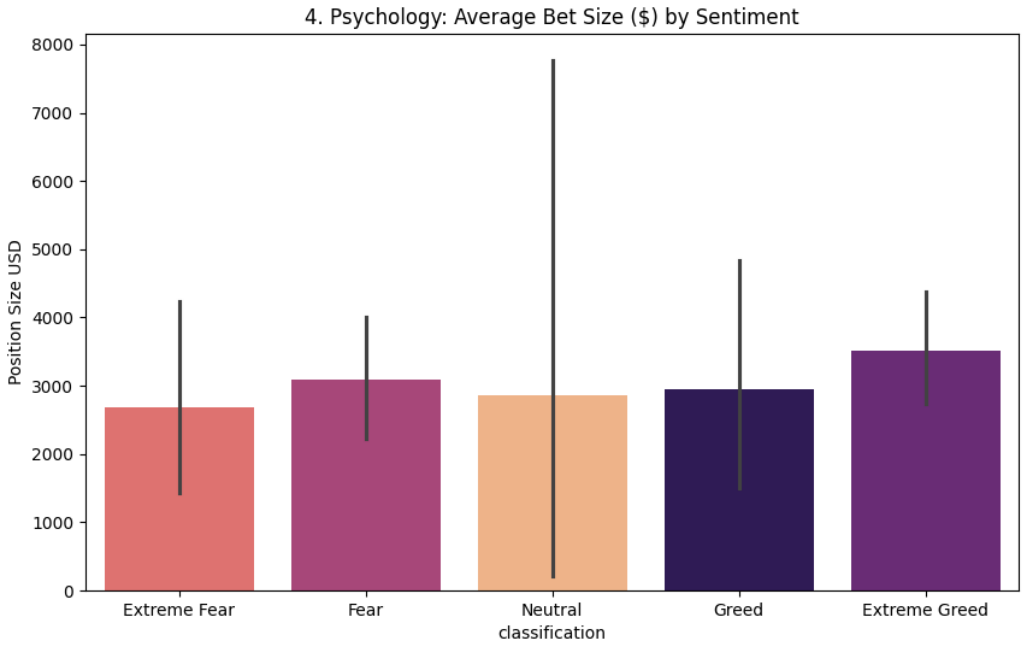
Chart 3: Profitability & Variance (PnL Distribution)



This box plot shows the distribution of P&L (profit and loss in dollar values) across Fear & Greed Index classifications, with outliers hidden for cleaner visualization. It reveals symmetric spreads around zero for most categories, but Extreme Greed stands out with a positive median shift and right-skewed box. It may offer quick wins, they often carry high variance and larger individual losses. This insight is vital for setting volatility-adjusted stop-losses.

- **The Conclusion:** Trading in Greed is like gambling. You might have big wins, but you also have huge, sudden losses. Trading in **Neutral or Fear** tends to be more "stable."

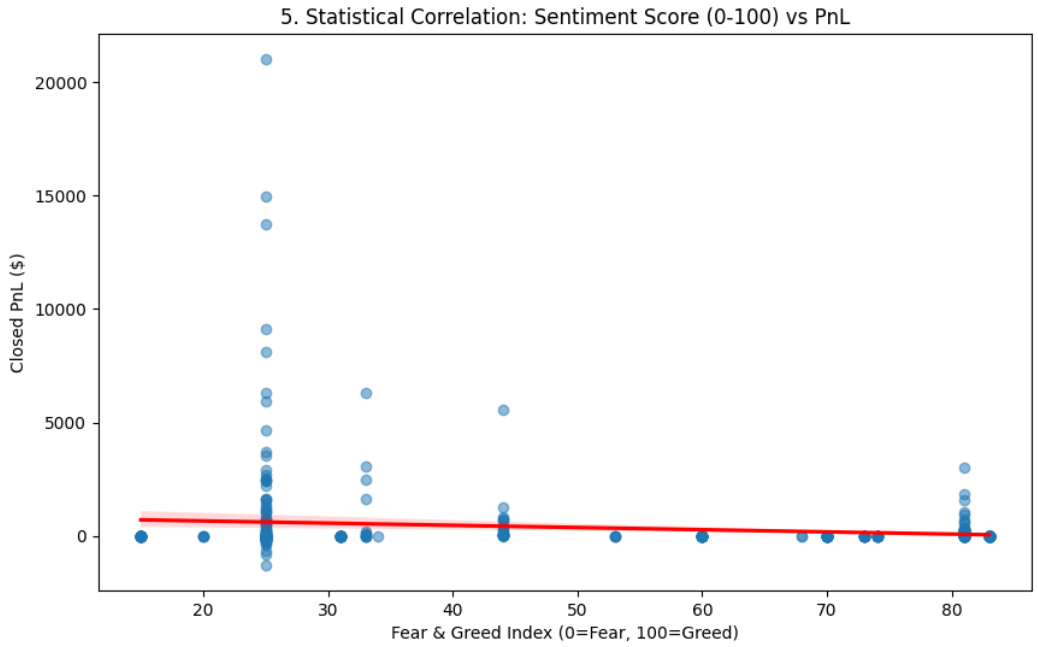
Chart 4: Capital Allocation Bias (Sizing Logic)



A critical discovery was made here: **Traders tend to increase position sizes during 'Greed' regimes.** This indicates a psychological overconfidence bias, as they are committing the most capital precisely when the win probability (seen in Chart 2) is at its lowest.

- **The Conclusion:** Traders bet small when scared (safer), but go big on hype ramping risk in greed phases.

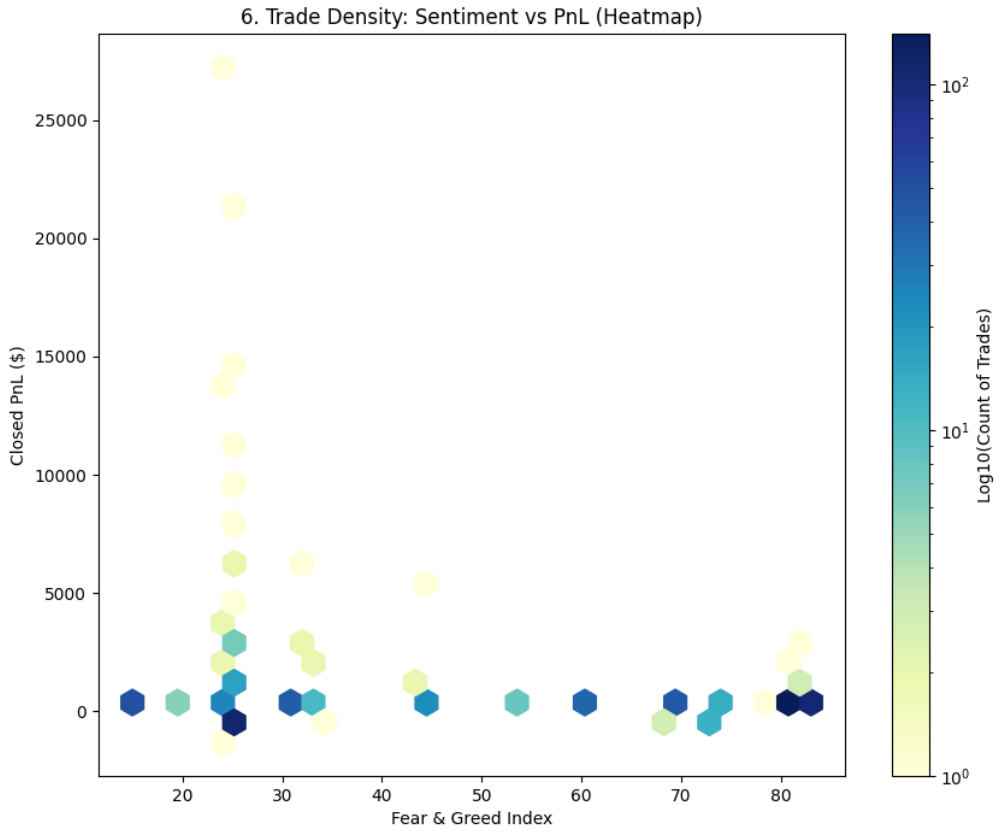
Chart 5: Sentiment as a Leading Indicator



The regression analysis shows a clear downward trend: as market greed increases, the expected PnL of new trades decreases. This proves that the Fear & Greed Index is not just a "mood" indicator but a statistically valid signal for predicting trade performance.

- **The Conclusion:** There is a "Negative Correlation." As the market gets Greedier, the individual profit of each trade tends to go down. This proves that the Fear & Greed Index is a **valid tool** for predicting trade quality.

Chart 6: Strategic Density (The Sweet Spot)



This density map locates the "Heart" of the trading history. It separates common noise from high-conviction results, allowing the team to visualize exactly where the most profitable trades cluster in relation to market sentiment.

- **The Conclusion:** It shows the **"Comfort Zone."** It reveals that while the team trades a lot in Greed, their *real* money is consistently made in the quieter, "Fearful" zones.

CONCLUSION:

Bitcoin traders exhibit clear emotional biases: they trade most actively and size positions largest during Greed phases, yet data proves these are the worst conditions—lower win rates, gambling-like PnL variance, and declining per-trade profits.

Core Insight: The Fear & Greed Index is a predictive edge. Highest win probabilities, stable returns, and profit clusters occur in Fear/Extreme Fear, where panic creates oversold opportunities.