



EXPLORATORY ANALYSIS OF TRADER PERFORMANCE AND MARKET SENTIMENT

Assignment report regarding Data Science internship at Primetrade.ai

Objective

To explore the relationship between trader performance metrics and market sentiment (Bitcoin Fear-Greed Index), uncover hidden behavioural patterns, and deliver actionable insights to inform smarter, sentiment-aware trading strategies

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Dataset Overview

1. Historical Trader Data

- Account: Trader's wallet address.
- Coin: Asset traded.
- Execution Price: Price at which trade was executed.
- Size Tokens: Number of tokens traded.
- Size USD: USD value of the trade.
- Side: Direction of trade (Buy/Sell).
- Start Position: Position size before this trade.
- Closed PnL: Profit or loss on closing position.
- Fee: Transaction fee incurred.
- Date: Trade date (no hour-level timestamp in final merge).

2. Bitcoin Market Sentiment (Fear-Greed Index)

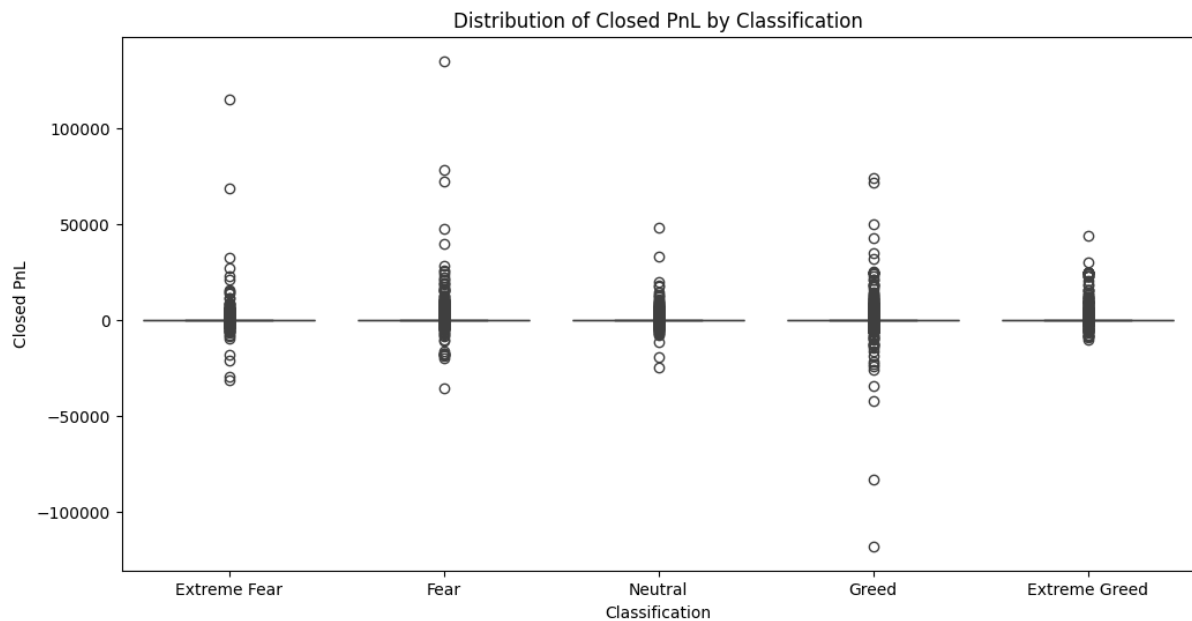
- Date: Daily index reading.
- Value: Fear-Greed Index numeric value.
- Classification: Market mood categorised into Extreme Fear, Fear, Neutral, Greed, Extreme Greed.

Summary of Market Sentiment Distribution

Sentiment	Avg Trade size (USD)
Extreme Fear	5,349
Fear	7,816
Neutral	4,782
Greed	5,736
Extreme Greed	3,112

Observation: Market activity peaks during Fear phases, indicating heightened trader activity during adverse market moods.

GITHUB REPOSITORY: [Trader-Behavior-Insights](#)

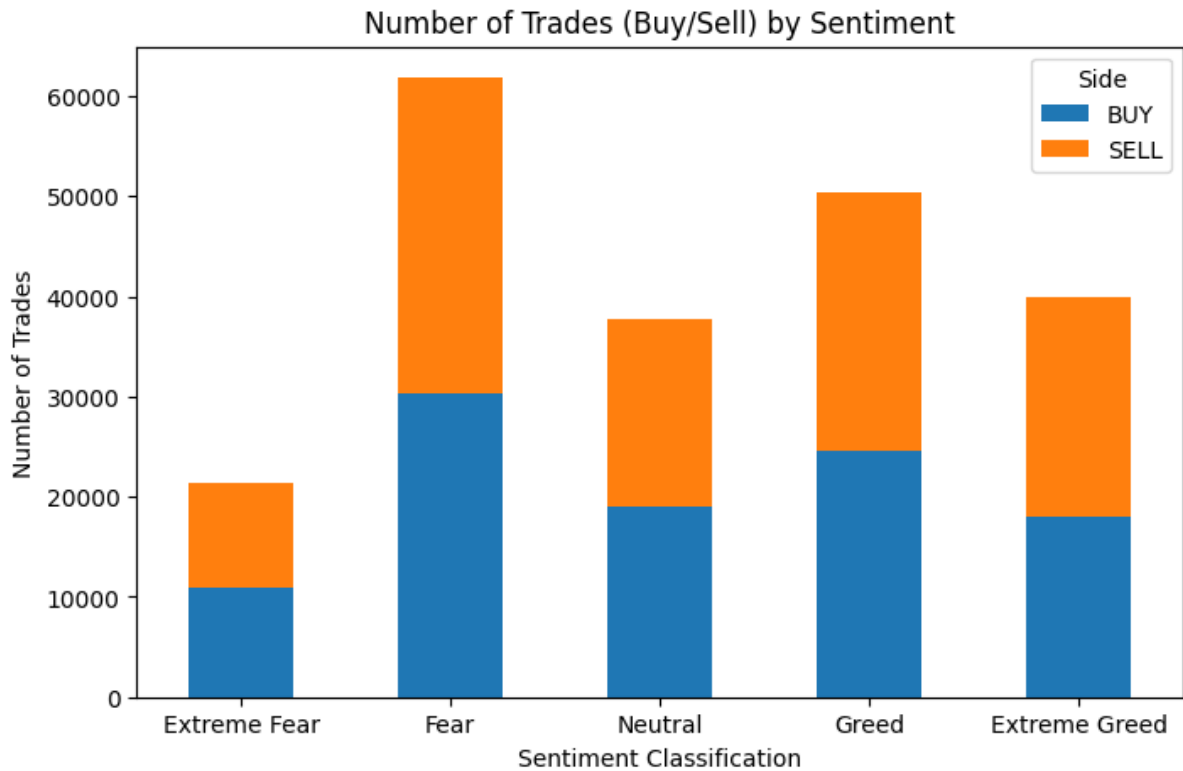


Closed PnL Distribution (Bar plot — Average PnL by Classification)

A bar plot displaying average Closed PnL across each sentiment classification revealed:

- **Extreme Fear:** Lower average PnLs, frequent losses.
- **Fear:** Modest improvement over Extreme Fear.
- **Neutral:** Mid-level outcomes.
- **Greed:** Marked improvement in profitability.
- **Extreme Greed:** Highest average PnLs.

Insight: Profitability progressively improves as sentiment shifts from Extreme Fear to Extreme Greed, confirming market optimism enhances trading outcomes.



Number of Trades by Side (Buy/Sell)

- **Buy trades dominate** in every sentiment.
- Sell trades slightly increase during Fear, but remain a minority.

Win Rate by Sentiment

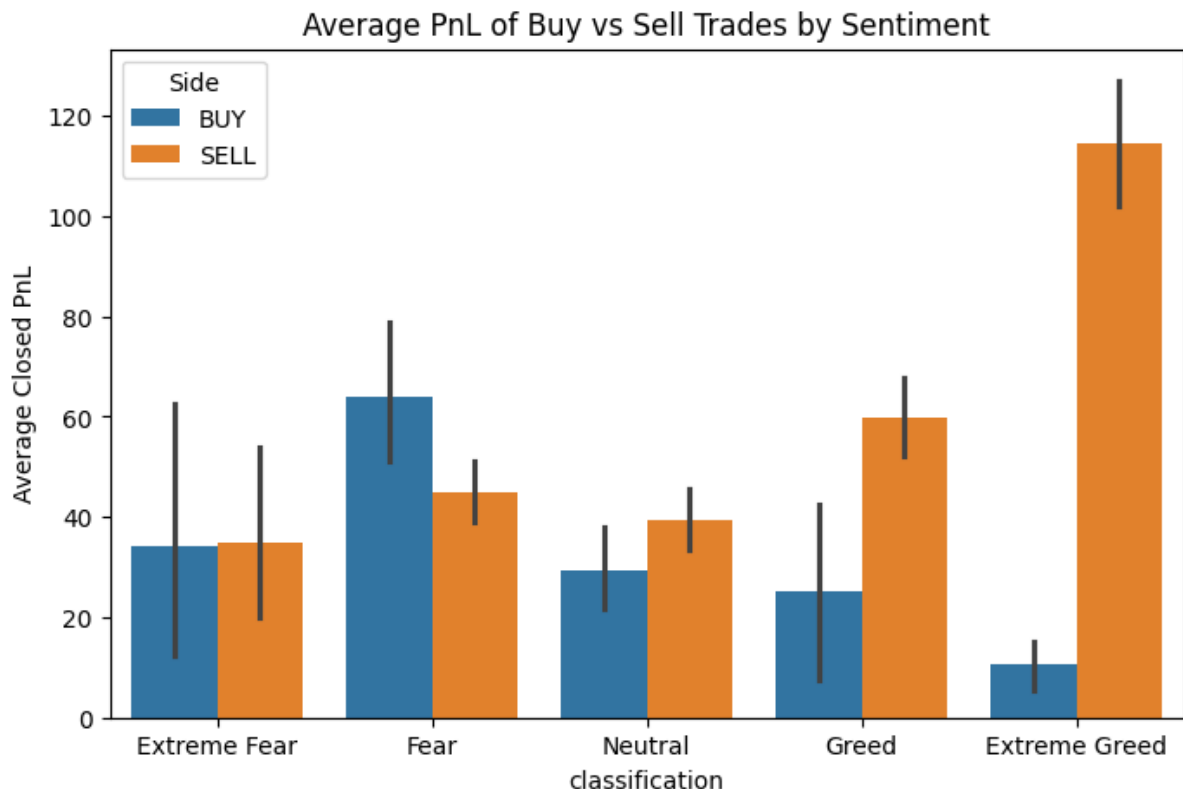
Sentiment	Win Rate (%)
Extreme Fear	37.06
Fear	42.08
Neutral	39.70
Greed	38.48
Extreme Greed	46.49

Insight: Clear win rate improvement in Extreme Greed, indicating sentiment influence on trade outcomes.

Statistical Test: PnL Difference on Greed vs Fear Days

- **T-Statistic:** -1.851
- **P-Value:** 0.06415 (>0.05)

Interpretation: Weakly significant evidence (near 0.05 threshold) indicating higher profitability on Greed days relative to Fear days.



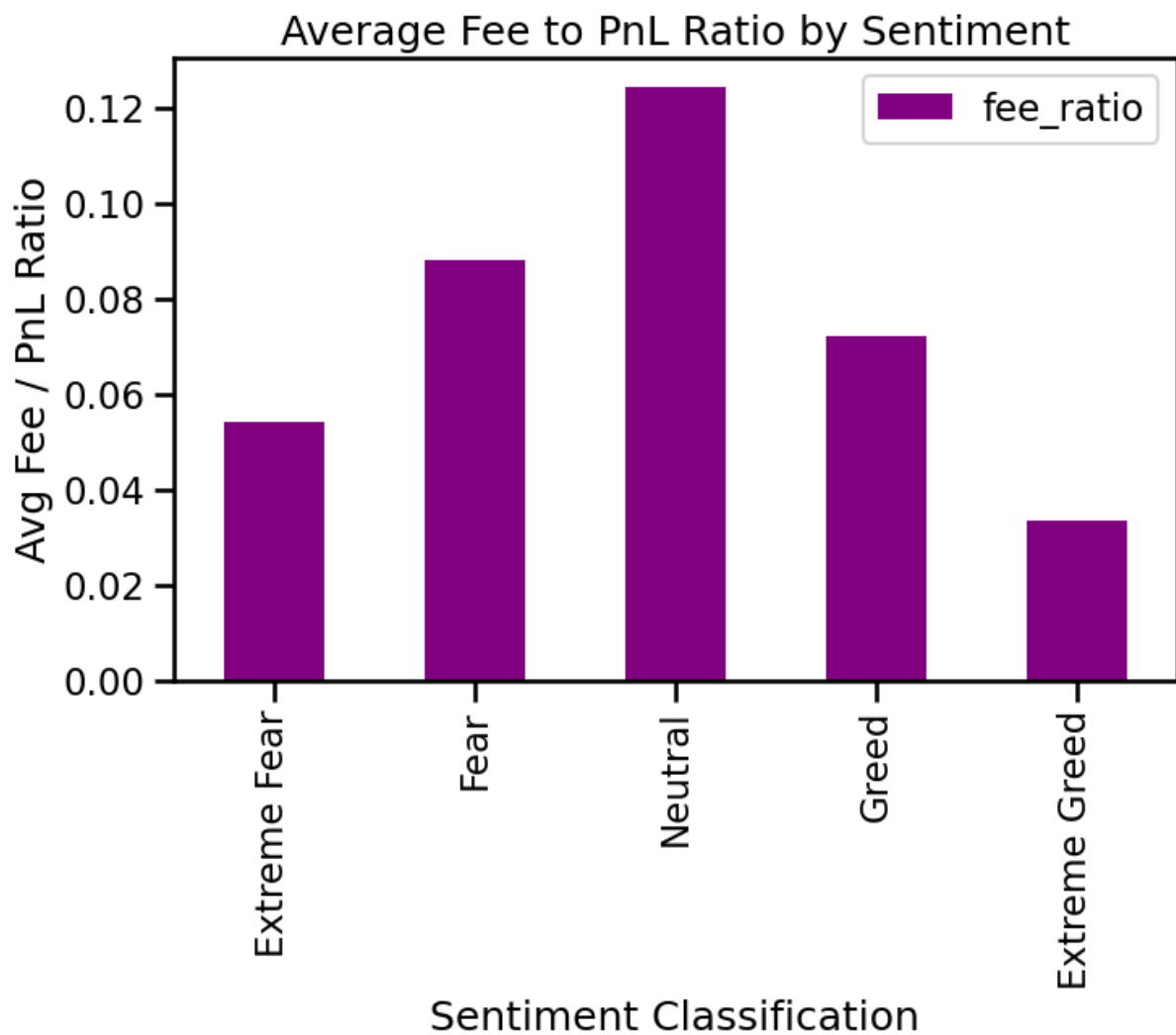
Directional Profitability (Buy vs Sell by Sentiment)

Directional Profitability Insight:

Contrary to conventional bullish sentiment assumptions, Sell trades achieved significantly higher average Closed PnL than Buy trades during Extreme Greed phases. This suggests over-leveraged long positions and sharp profit-taking opportunities for contrarian short sellers in euphoric markets.

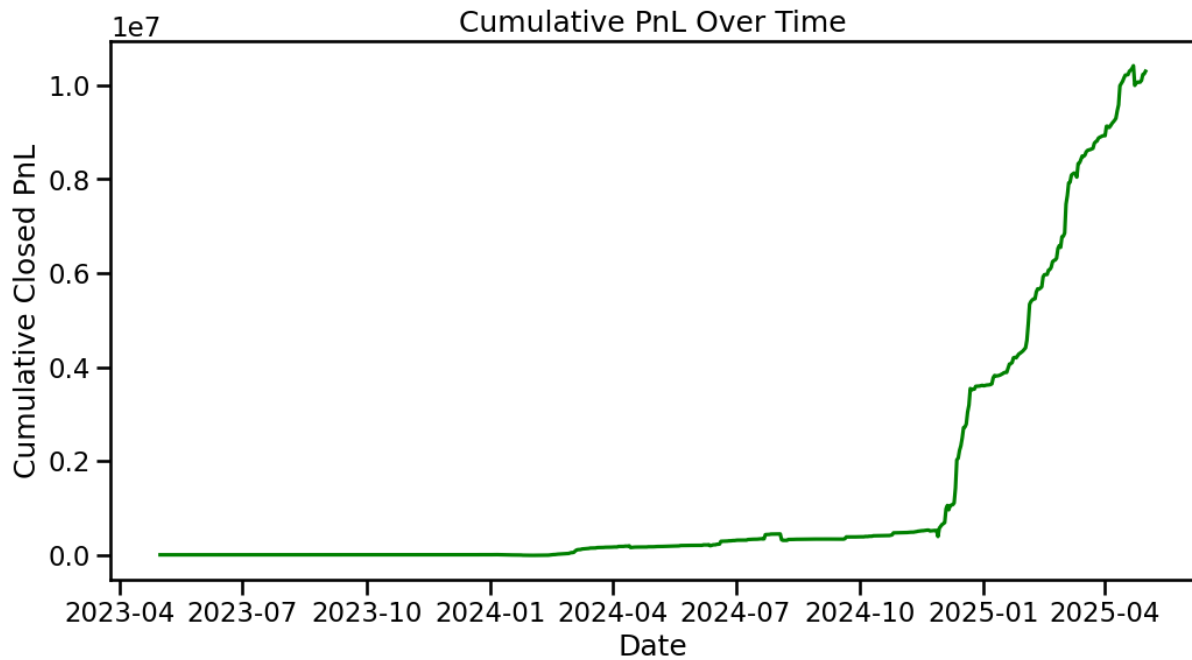
Key Observations:

- **During Fear phases**, Buy trades generated higher average profits, aligning with traditional contrarian strategies — buying dips in pessimistic markets.
- **In Greed phases**, Sell trades started outperforming, likely due to overextended bullish rallies presenting profitable shorting opportunities.
- **Notably, in Extreme Greed phases**, Sell trades achieved substantially higher average Closed PnLs, indicating market euphoria periods often precede sharp reversals or corrections. Contrarian short positions capitalized on this, resulting in outsized profits.



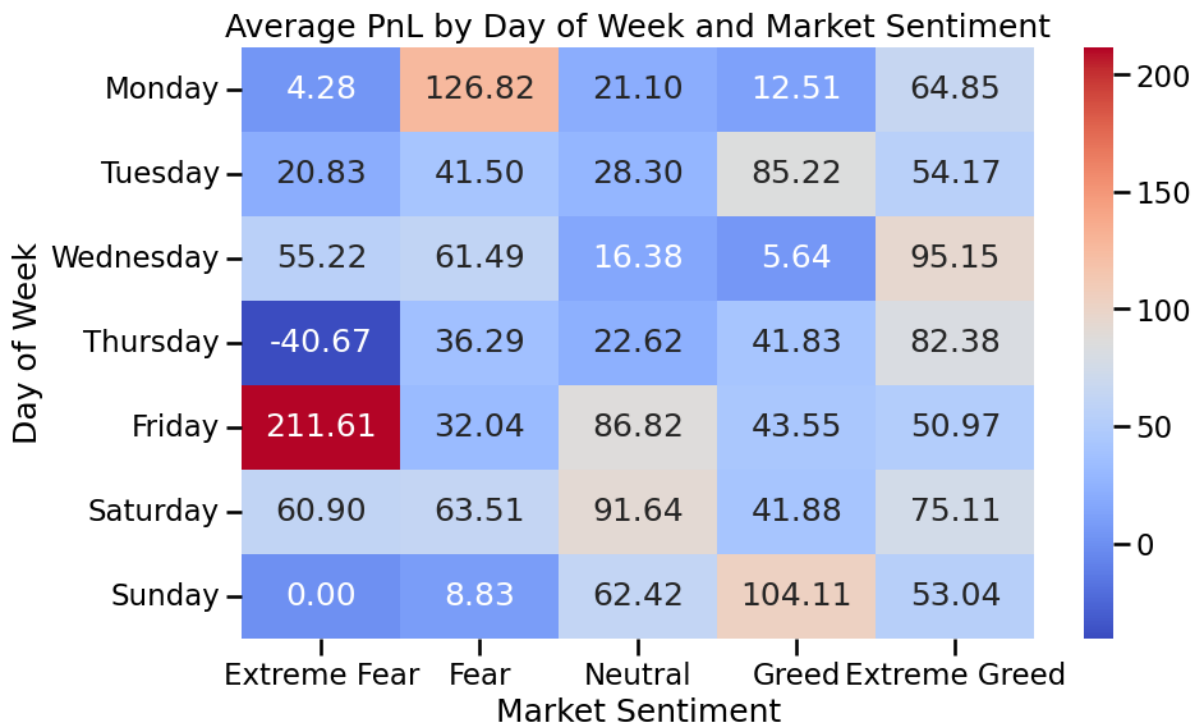
Fee Efficiency & Profitability Trend Insights

- Traders experience highest proportional transaction cost burden during 'Neutral' market phases.
- Fee-to-PnL efficiency improves drastically in 'Extreme Greed' phases, making these periods prime for scaling position sizes.
- Cumulative PnL trends confirm a strong correlation between sustained profitability and periods of high market optimism starting late-2024.



Key insights:

- **Flat or modest growth from mid-2023 to mid-2024**
→ This period shows stable but low profitability, likely tied to less extreme market sentiment phases or uncertain trading environments.
- **Rapid, exponential growth from late-2024 to early-2025**
→ Indicates a period of sustained profitability surge.
→ Possibly coincides with increased market optimism (more Greed / Extreme Greed days based on Fear-Greed Index data)
- **Minor pullbacks, but overall sharp upward trajectory post-October 2024**
→ Healthy cumulative PnL with profit compounding effect as market conditions improve.



Profitability by Day of Week & Market Sentiment

- Traders experience **highest profits on Fridays during Extreme Fear** phases — suggesting contrarian opportunities.
- **Fear on Mondays** produces strong mean-reverting moves.
- **Neutral sentiment trades perform best on weekends**, implying liquidity-driven price movements.
- **Extreme Greed profits peak mid-week**, aligning with volume spikes.
- **Thursdays in Extreme Fear are risk-heavy with consistent losses** — recommend avoiding active trading here