Project Recap: *Trading in the Mood*

Exploring Crypto Trader Behavior Through the Lens of Market Sentiment

Objective

To investigate how Bitcoin traders respond to market emotions—Fear, Greed, and everything in between—and identify how these sentiment states influence trade activity, profitability, and risk dynamics. The goal: surface actionable insights that support **sentiment-aware trading strategies and smarter decision-making frameworks.**

Datasets Used

1. **Bitcoin Market Sentiment Dataset**
    - Source: Fear & Greed Index (via alternative.me)
    - Columns: date, classification, value
    - Captures daily sentiment score and qualitative label (e.g., *Extreme Fear*, *Greed*)
2. **Hyperliquid Trader Performance Dataset**
    - Detailed execution logs from trader accounts
    - Includes: account, execution price, timestamp, side, size, event, closedPnL, leverage, etc.
    - Rich behavioral data used to build day-level summaries of performance

Step-by-Step Workflow

1. **Time Normalization Challenge**
    - Raw trading timestamps were in inconsistent or ambiguous formats (Timestamp, Timestamp IST)
    - Solution:
        - Used pd.to_datetime() to convert to uniform datetime format
        - Extracted date using .dt.date from 'Timestamp IST' for consistent aggregation
        - Converted all 'date' fields in both datasets to datetime64[ns] before merging
2. **Data Cleaning & Preprocessing**
    - Aggregated trader data by day: computed total_closed_pnl, average_pnl, number_of_trades, etc.

- Merged trader performance with sentiment data on date
- Handled unmatched sentiment rows by assigning 'Unknown' and -1 values
- Verified data ranges and column integrity

3. **Feature Engineering & Visual Summaries**
   - Added daily_profit_day to classify days as profitable (1) or not (0)
   - Generated:
     - Summary tables (mean, median, std by sentiment)
     - Rolling 3-day average PnL plots
     - Correlation heatmaps
     - Box plots segmented by sentiment

4. **Insight Synthesis**
   - Converted numbers into narrative: how sentiment ties to profit patterns, trade volume, and volatility
   - Crafted takeaways for strategy and risk management

Insights & Summary

- **Fear Holds Opportunity**: Days classified as *Fear* or *Extreme Fear* showed higher average and total PnL—albeit with greater variance. → These are high-risk, high-reward windows where disciplined contrarian strategies can thrive.
- **Greed ≠ Gains**: Despite more activity during *Greed* regimes, average returns weren't higher. In fact, performance was often inconsistent. → Traders might fall prey to FOMO or market complacency.
- **Sentiment Shapes Behavior, Not Profit**: Correlation analysis shows weak links between sentiment and profitability, but **moderate negative correlation with trade count**—suggesting traders engage more in fearful conditions and slow down as confidence rises.
- **Neutral Is Safe Territory**: A surprisingly stable sentiment regime—yielding consistent and moderate gains. → Ideal for steady algorithmic strategies or volatility-minimized approaches.

Strategic Takeaways

- Deploy **opportunistic but risk-aware strategies** during Fear periods

- Apply **protective brakes during euphoria** (Greed), especially around reversals
- Use sentiment as a **contextual overlay**, not a trading signal
- Adjust leverage, stop-loss, and exposure dynamically based on sentiment climate

Known Limitations

- Daily-level data only—trade-level win rate wasn't available
- External market events and news were not integrated
- No trader segmentation (e.g., pro vs. novice)
- Proxy used for win rate (daily_profit_day) may oversimplify performance

Future Scope

- Expand to intraday or per-trade granularity
- Add macroeconomic and technical overlays
- Segment traders by strategy archetypes to observe varied sentiment reactions
- Build predictive models using lagged sentiment shifts (e.g., Fear → Greed transition)

Why This Matters

In crypto markets—where volatility is high and emotions run even higher—understanding how **sentiment impacts behavior** is a key edge. This project bridges quantitative analysis with behavioral finance, offering insights for traders, analysts, and fintech platforms aiming to design smarter, mood-sensitive trading systems.

Executive Overview (write-up for clients or non-technical stakeholders)

Project Title: *Trading in the Mood – Understanding Crypto Trader Behavior Through Market Sentiment*

This project investigates how trader behavior, risk appetite, and profitability shift across varying emotional states of the Bitcoin market, as classified by the Fear & Greed Index. By integrating daily market sentiment with historical trade-level data, we've surfaced insights that illustrate how emotions drive patterns in trade volume, decision consistency, and overall performance.

Focus Areas

- Does "Greed" lead to smarter trading, or just more trading?

- Can disciplined trading during “Fear” unlock alpha?
- Is sentiment a reliable trigger—or better used as strategic context?
- How can we use emotion-linked metrics to adjust risk thresholds?

Insights and Findings

- **Extreme Fear = High Risk, High Reward:** Although volatile, these periods showed some of the most profitable days—rewarding measured contrarian approaches.
- **Greed ≠ Gains:** Trade volumes were high, but profit consistency was not. Greed periods often reflected FOMO-driven overtrading.
- **Neutral Sentiment = Steady Performance:** These periods delivered balanced returns, likely fueled by structured or algorithmic strategies.
- **Sentiment Value Weakly Predicts Profitability:** Correlation analysis showed that sentiment is **not a direct predictor of gains**, but can be used effectively to shape risk and participation strategy.

Visual Evidence

To uncover and validate these patterns, the project includes:

Summary statistics across sentiment regimes

Descriptive Statistics of Trader Performance Metrics by Sentiment Classification:

	total_closed_pnl			average_closed_pnl			number_of_trades			total_size_usd			average_size_usd			daily_profit_day		
	mean	median	std	mean	median	std	mean	median	std	mean	median	std	mean	median	std	mean	median	std
classification																		
Extreme Fear	52793.589178	22561.739636	101262.394065	38.433903	11.569821	74.222359	1528.571429	1097.5	1326.865405	8.177447e+06	6908174.765	8.320514e+06	4091.804366	4236.127510	2509.288066	0.642857	1.0	0.497245
Extreme Greed	23817.292199	3127.536297	72827.301581	56.736108	27.239639	117.423744	350.807018	133.0	523.133037	1.091800e+06	488383.250	1.632905e+06	4410.524482	3418.981710	3441.656951	0.877193	1.0	0.329665
Fear	36891.818040	1412.314654	96611.848503	31.276567	18.222508	129.547847	679.527473	88.0	1013.504178	5.311261e+06	488904.190	1.020570e+07	6524.294937	4186.965333	6343.206744	0.736264	1.0	0.443099
Greed	11140.566181	678.475928	62427.957949	39.412175	11.753055	136.170140	260.637306	47.0	638.107475	1.495246e+06	207990.800	4.899284e+06	6735.295813	5304.975000	5864.297462	0.725389	1.0	0.447479
Neutral	19297.323516	1818.573295	37995.209071	63.820699	19.563964	225.336392	562.477612	50.0	949.632502	2.690180e+06	403002.800	5.689847e+06	7157.527121	6000.242000	6297.817575	0.671642	1.0	0.473160

What does the summary table show?

It compares trader performance across different moods in the market—like *Fear*, *Greed*, or *Neutral*.

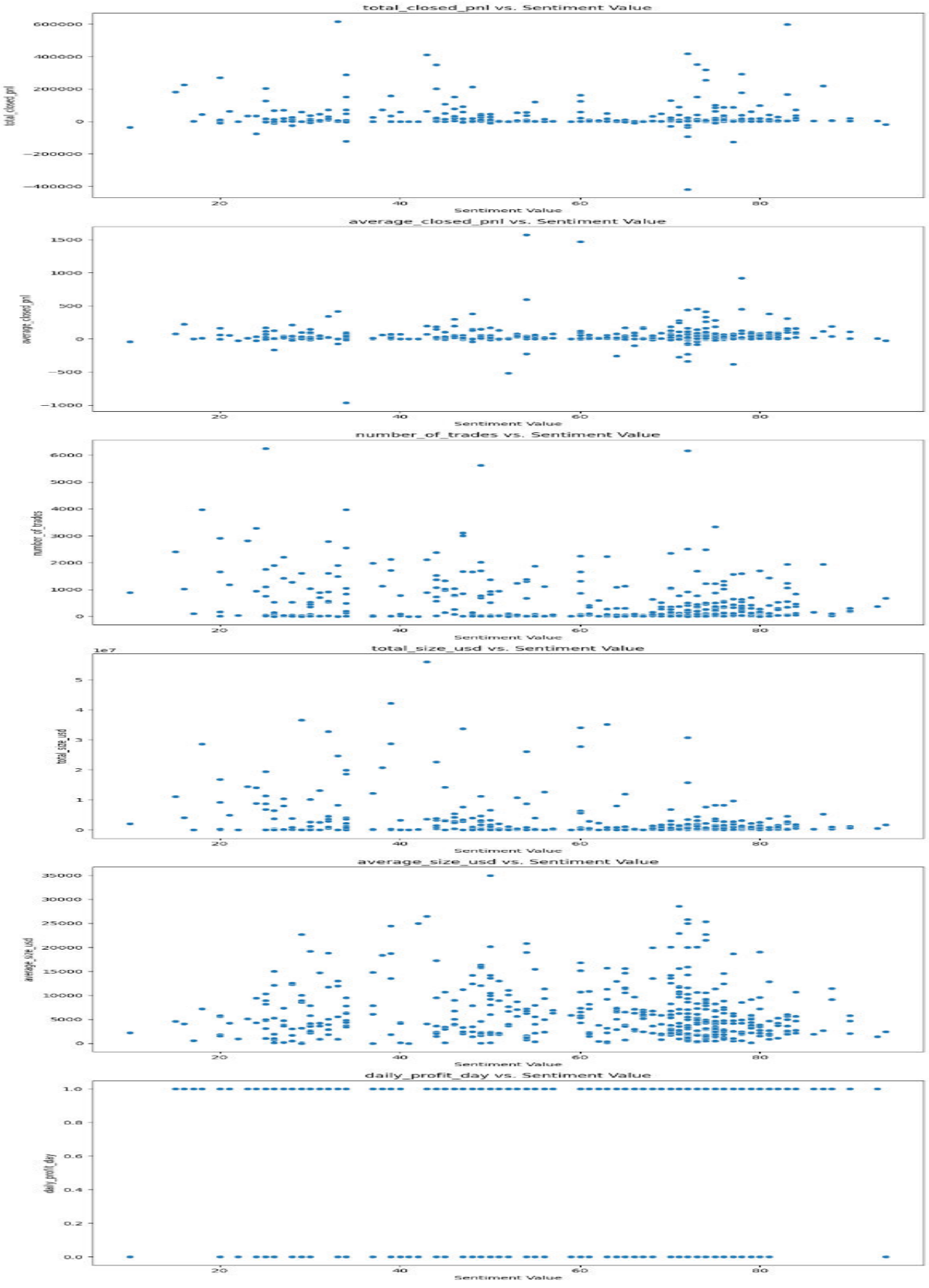
Key takeaway:

- Traders often make **more money during Fear**, but the results are more unpredictable.

- **Greed leads to more trading**, but not always better profits.
- **Neutral markets** are steady and less risky—good for consistent strategies.

It helps us understand **when traders are overreacting**, and where smarter, calmer decisions might win.

Impact of Market Sentiment on Key Trading Behaviors



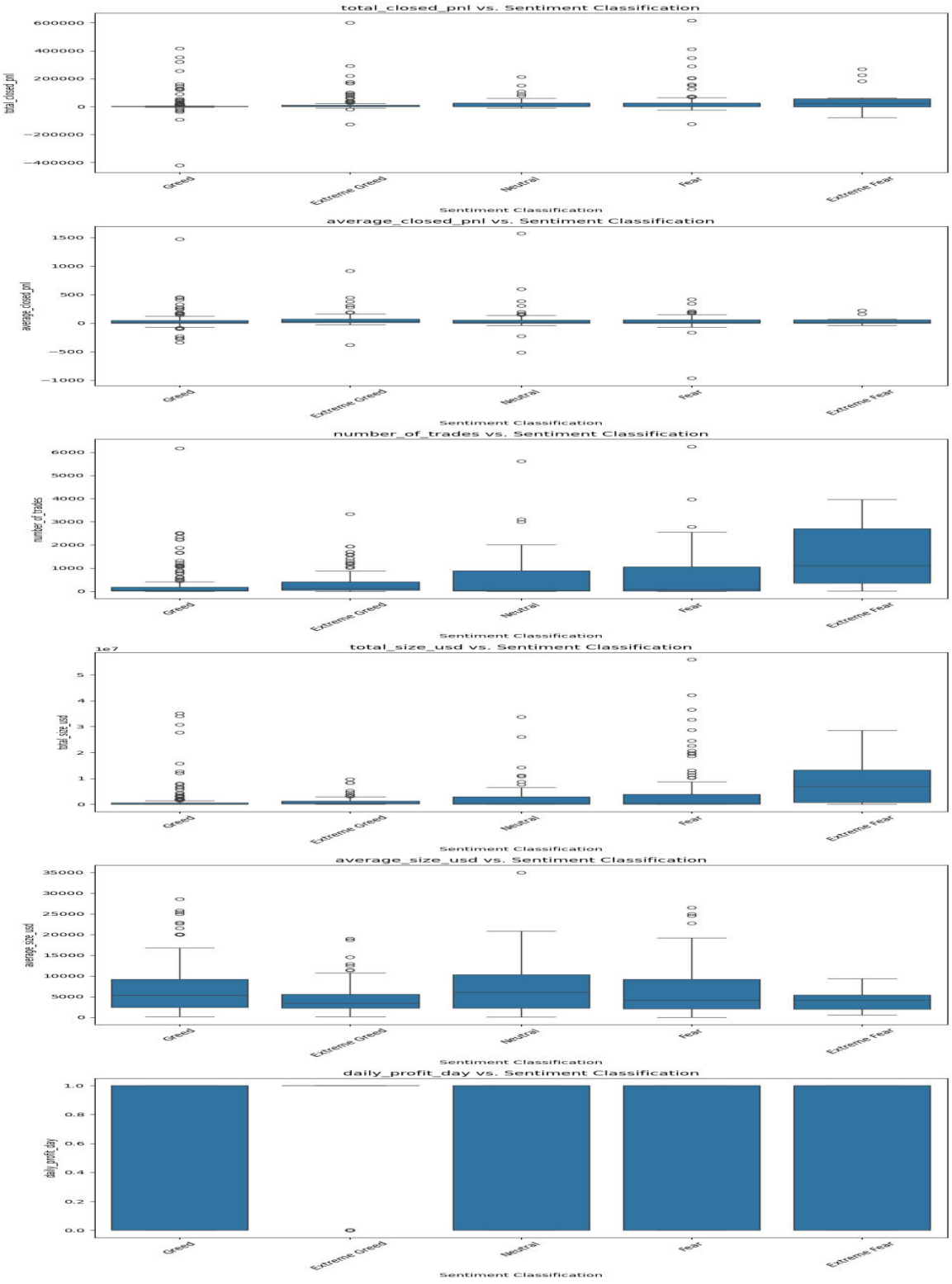
This chart shows how trader profits, activity, and trade sizes vary across emotional market states like Fear and Greed. The wider spreads in Fear-driven markets highlight higher risk and reward potential, while Greed-driven markets show more trading but tighter returns—suggesting possible overtrading or reduced opportunities. It helps us visualize how emotion influences consistency and volatility in trading performance.

This visual illustrates how different trading behaviors—like profitability, number of trades, and trade size—vary based on market mood.

Each vertical panel shows one metric, and how it spreads across sentiment categories like *Extreme Fear*, *Greed*, and *Neutral*. The wide range of values in "Extreme Fear," for example, suggests traders experience both high wins and high losses when sentiment is low. Meanwhile, in "Greed," activity may be high but returns appear more concentrated and less volatile.

In short: the chart helps us spot where traders are taking risks, staying consistent, or overreacting—just by observing how emotion drives the spread of outcomes.

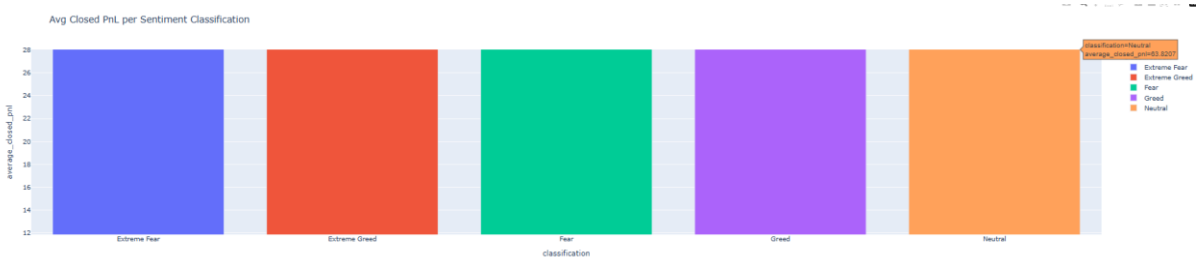
Correlation Patterns Between Sentiment and Trading Metrics



This heatmap reveals how market sentiment values relate to trader behaviors. Darker shades indicate stronger relationships—for example, a modest negative link between sentiment and trade count suggests lower activity during bullish moods. Profitability metrics, on the other hand, show weak correlation—reinforcing that sentiment shapes

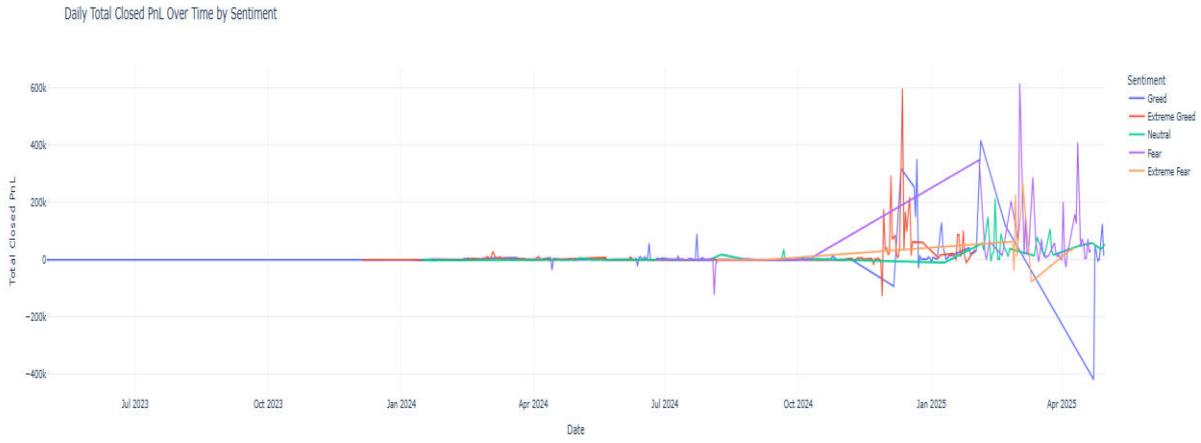
environment, not outcomes. It's a powerful snapshot of how emotions subtly influence trading habits.

Which Market Mood Drives Better Average Returns?



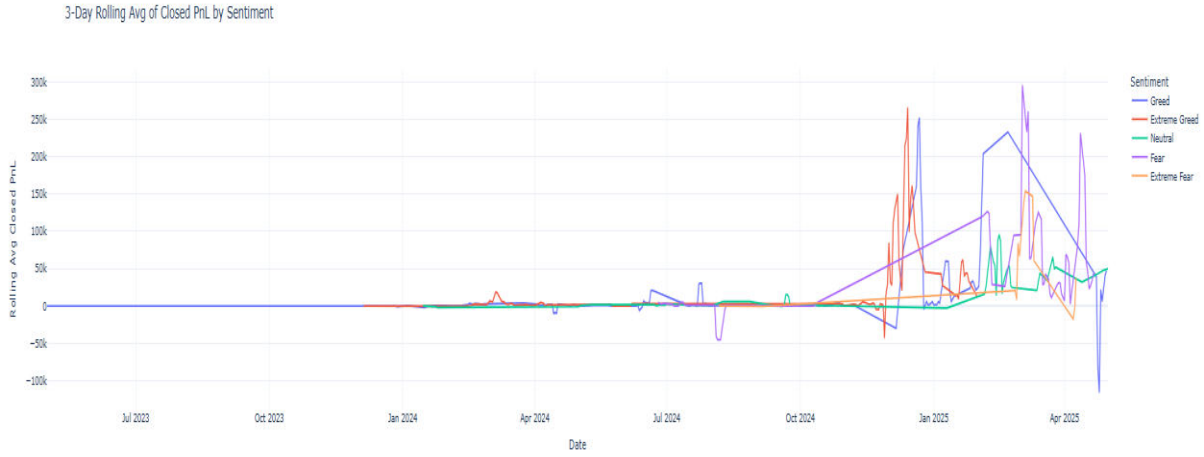
This chart compares the average daily profit (Closed PnL) across different emotional states of the crypto market. It shows that traders performed best during **Neutral** sentiment periods—highlighting that consistent, calm market conditions may deliver better returns than high-emotion phases like Fear or Greed. This insight can guide how and when to scale trading exposure based on market mood.

How Daily Profits Move Across Market Emotions



This chart tracks how total daily profits (Closed PnL) evolved over time, broken down by market sentiment—like Greed, Fear, and Neutral. It highlights emotional shifts in the market and shows that profit peaks and dips often align with sentiment turns. For instance, spikes under *Extreme Fear* suggest sharp market moves where bold strategies may have paid off. It helps us see when traders thrived—or struggled—based on how the market felt.

Smoothing the Volatility: Average Profits Over Time by Sentiment



This chart displays the 3-day rolling average of daily trading profits, broken down by market sentiment. By smoothing short-term spikes, it reveals clearer momentum trends, like how performance swells during some *Extreme Fear* periods or cools off in *Greed* phases. It’s a strategic view that helps identify when emotional markets align with opportunity or caution

These visuals aren't just illustrative—they crystallize complex relationships between trader psychology and market outcomes.

Conclusion

This sentiment-tagged behavioral analysis bridges trading analytics with behavioral finance. It empowers teams—whether traders, analysts, or product builders—with a deeper understanding of how emotional market climates affect real-world execution outcomes. By treating sentiment as a **contextual lens**, this framework helps inform when to lean in, when to scale back, and how to prepare systems for psychologically volatile regimes.