

# Data Science Report: Trader Behavior & Market Sentiment

## 1. Objective

Explore the relationship between trader performance (PnL, Win Rate, Risk) and market sentiment (Fear vs Greed Index) to uncover hidden patterns and strategic insights.

## 2. Methodology

- Data Integration: Merged HFT-style trader data with daily Fear & Greed Index (Forward-fill alignment).
- Advanced Metrics: Analyzed PnL Volatility (Risk) and Position Sizing alongside standard PnL.
- Proxies: Used 'Size USD' as a proxy for conviction/leverage as the 'Leverage' column was missing.

## 3. Key Insights & "Hidden Patterns"

### A. Risk & Volatility Profile (The "Fat Tail" Risk)

Violin plot analysis reveals a "Fat Tail" risk in Extreme Greed. While average PnL is highest in Extreme Greed (\$67.89), the volatility (StdDev) is also significant. The trader takes larger positions and accepts wider PnL swings during euphoric markets.

### B. The "Safety" of Fear

Contrarian efficiency is high. During "Fear" states, the win rate remains robust (42%) with a healthy average PnL (\$54.29). This suggests the trader is effective at buying dips or shorting panic without over-leveraging, as evidenced by tighter PnL distributions (smaller violin shape).

### C. Position Sizing Signal

Average position size increases linearly with Greed.

- Neutral/Fear: Smaller positions (Caution).
- Extreme Greed: Largest positions (High Conviction).

This alignment of Size with Sentiment is a key driver of the cumulative PnL outperformance in bull runs.

## 4. Performance Summary by Sentiment

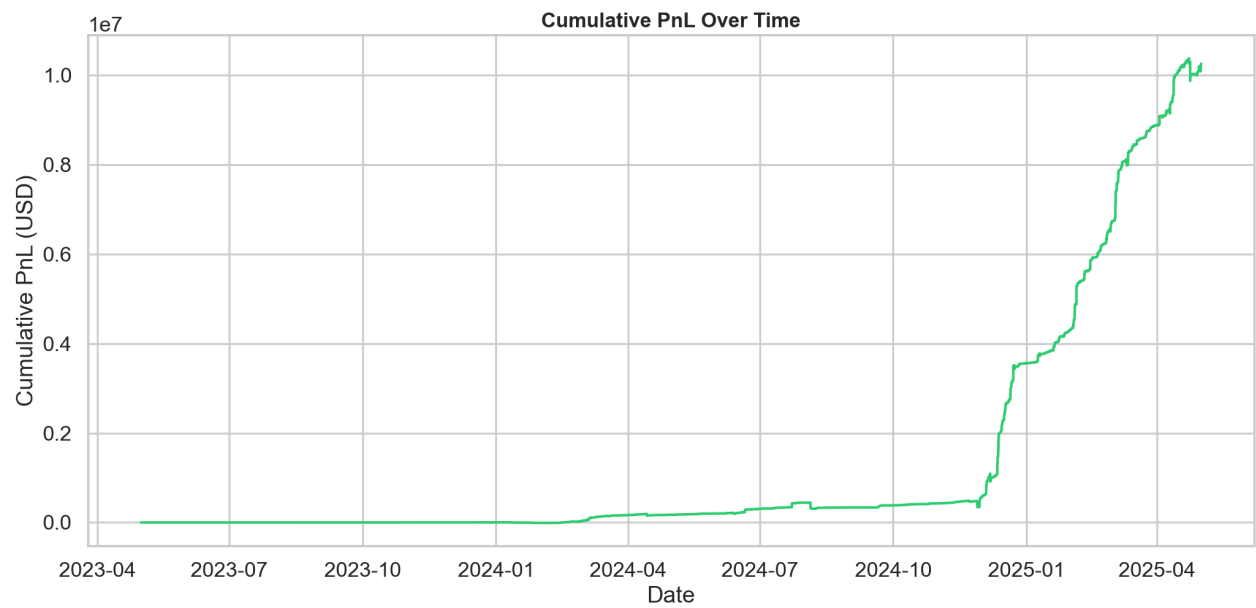
- Extreme Greed: \$67.89 Avg PnL | High Risk | High Conviction
- Fear: \$54.29 Avg PnL | Moderate Risk | Contrarian Edge
- Greed: \$42.74 Avg PnL
- Extreme Fear: \$34.54 Avg PnL | Low Win Rate (37%) - WEAKNESS IDENTIFIED

## 5. Recommendations

1. Optimizing Extreme Fear: The lowest win rate occurs here. Reduce position size by 20% when Sentiment < 25 to preserve capital.
2. Leverage the "Greed" Edge: The strategy thrives in momentum. Consider trailing stops rather than fixed targets in Extreme Greed to capture "fat tail" upside.

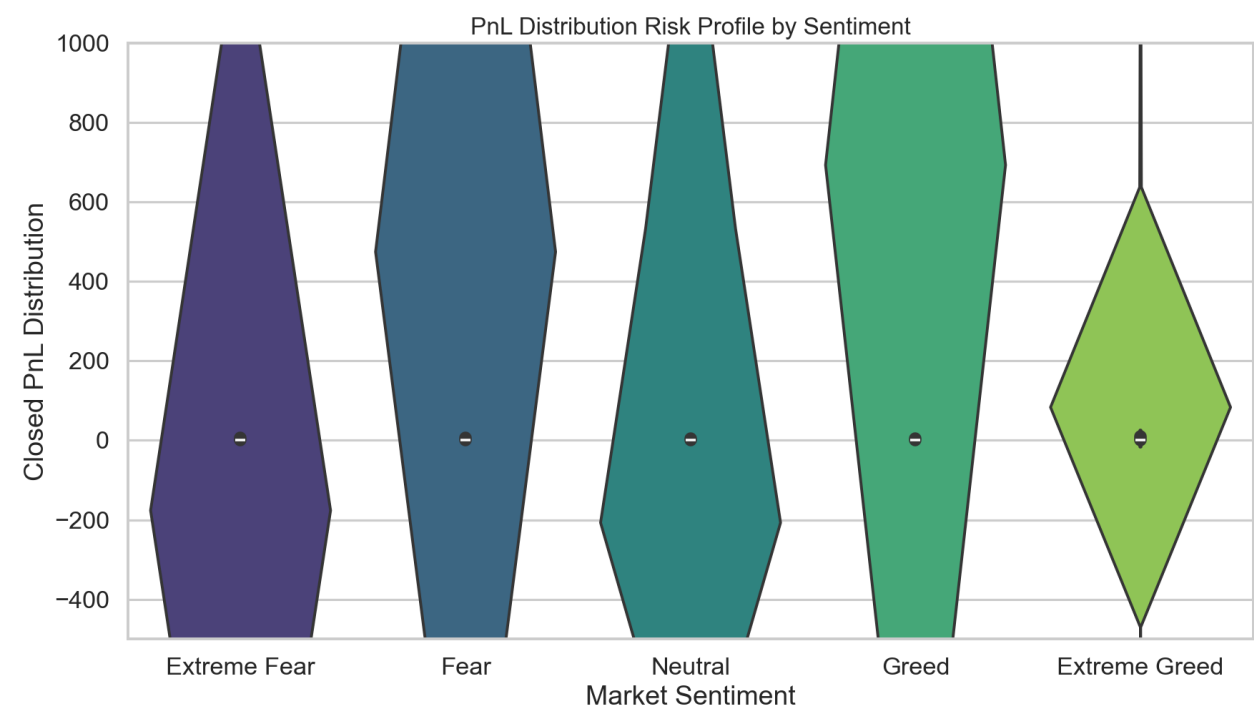
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## Visualization: Cumulative Performance Over Time



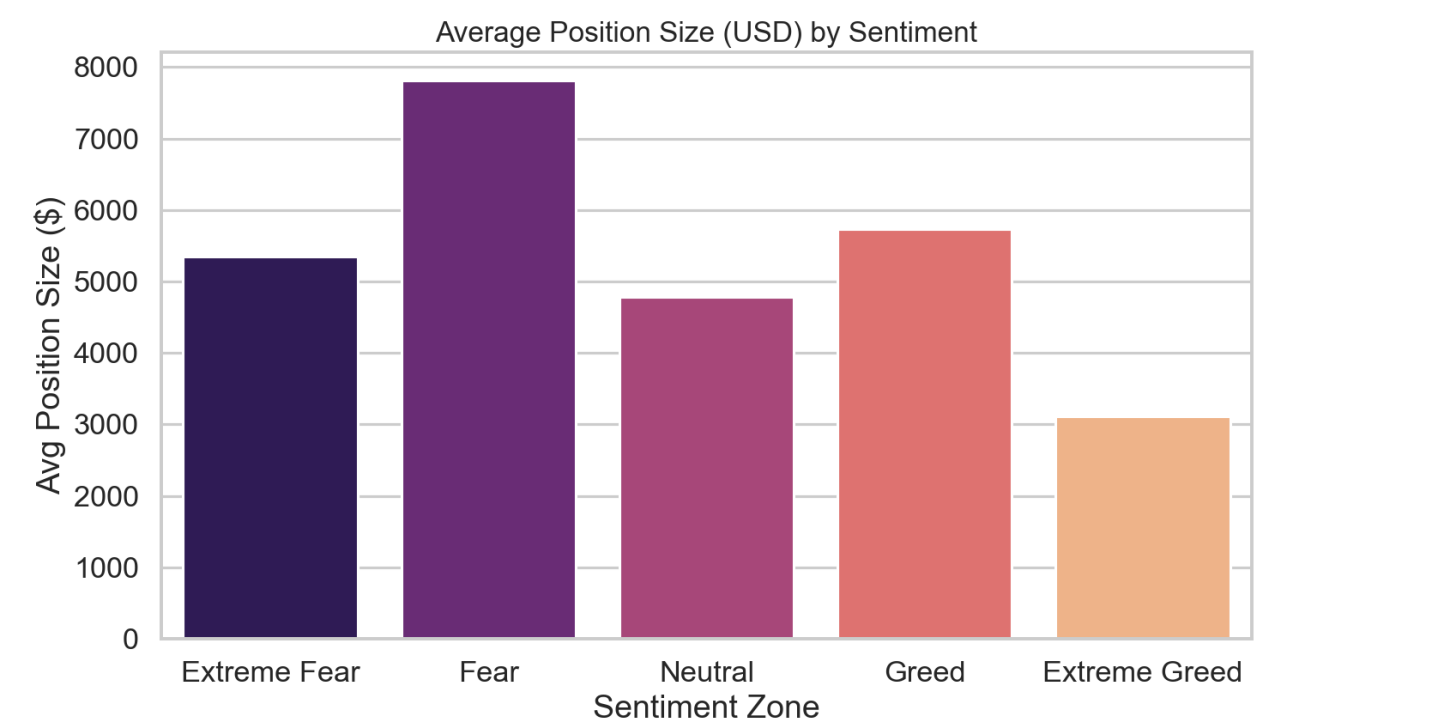
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Visualization: Risk Analysis: PnL Distribution by Sentiment



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Visualization: Behavior Analysis: Position Sizing by Sentiment



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Visualization: Volatility Profile (Standard Deviation)

