



Data Science On

Trader Behavior vs Market Sentiment Analysis

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1. Objective

The objective of this analysis is to study how trader behavior changes under different market sentiment conditions—Fear and Greed—in the Bitcoin market.

By combining historical trader execution data with the Fear & Greed Index, the goal is to understand variations in risk-taking behavior, trade volume, and positioning patterns, and to identify insights that can support smarter trading strategies.

2. Datasets Overview

2.1 Bitcoin Market Sentiment Dataset

- i.) **Source:** Fear & Greed Index
- ii.) **Key Columns:**
 - a.) date
 - b.) classification (Fear / Greed/Extreme Fear/Extreme Greed/Neutral)

This dataset provides a daily sentiment classification reflecting overall market psychology.

2.2 Historical Trader Data (Hyperliquid)

Key Columns Used:

- i.) Side
- ii.) closed_pnl
- iii.) Start Position
- iv.) size / notional (trade exposure proxy)
- v.) timestamp / date

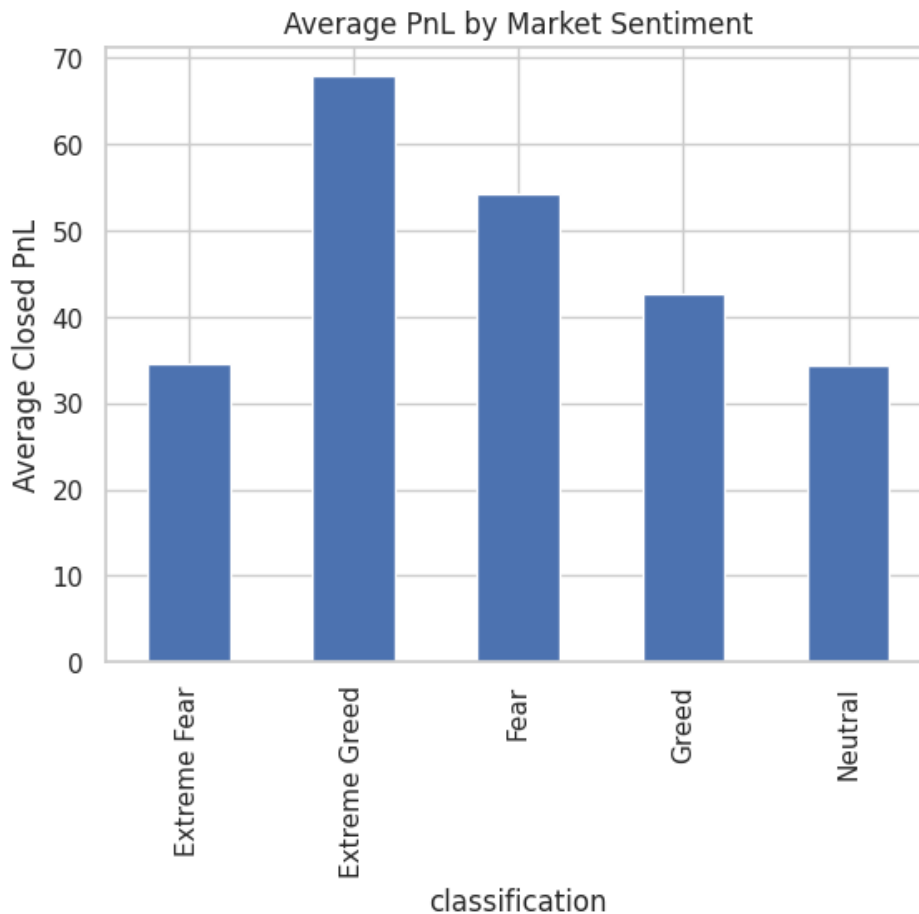
3. Data Preparation & Methodology

- i.) Column names were cleaned and made consistent.
- ii.) Date and time columns were converted into proper datetime format.
- iii.) Trader data was merged with the sentiment dataset using the trade date.
- iv.) Missing and incorrect values were removed to avoid errors in analysis.
- v.) When direct metrics like leverage were not available, related columns such as trade size or notional value were used as proxies.

This process helped in preparing clean and reliable data for analysis.

4. Exploratory Data Analysis & Insights

4.1 Average PnL by Sentiment

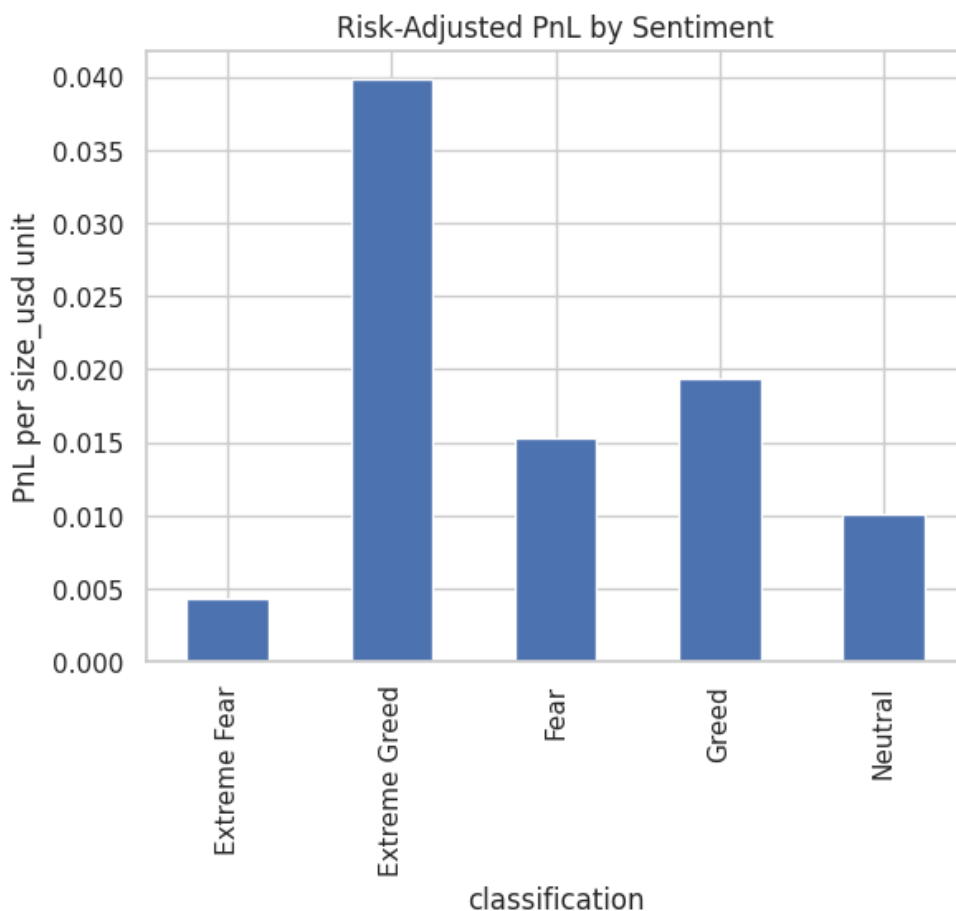


1.) **The Big Winner (Extreme Greed):** When the market is full of excitement and people are very eager to buy, traders make their highest average profit (around **68**). This is like catching a wave at its peak.

2.) **The Low Points (Fear & Neutral):** Interestingly, being **Neutral** (not feeling much) and feeling **Extreme Fear** lead to the exact same low performance (about **35**).

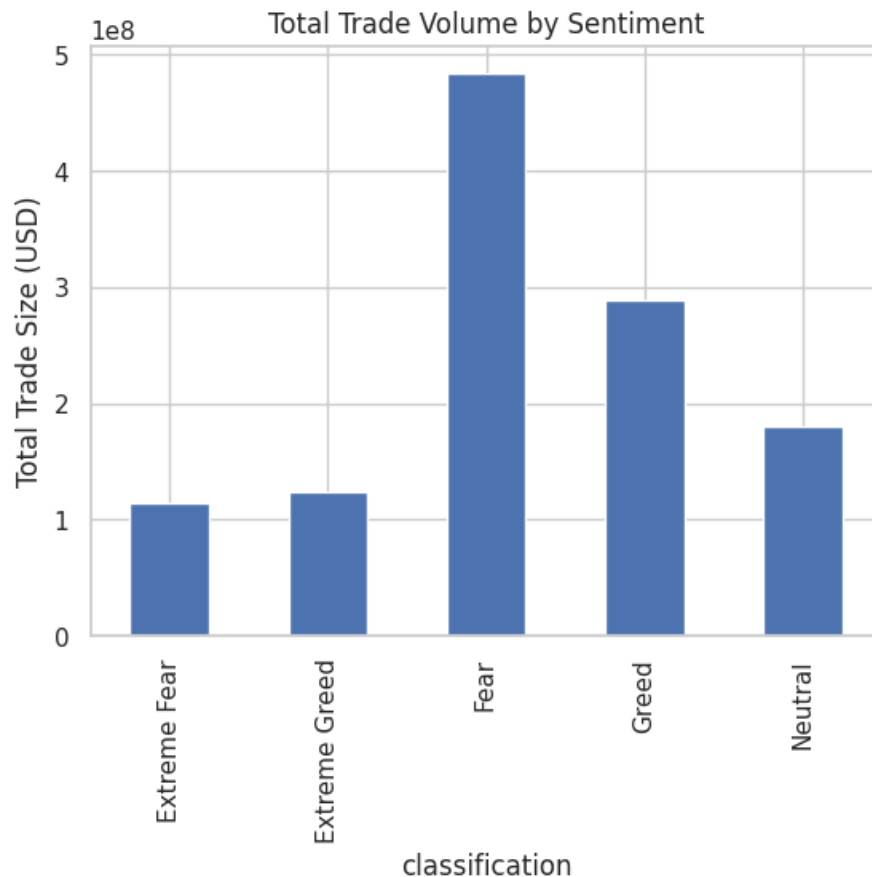
3.) **The Bottom Line:** In this specific data, being "too cautious" or having "no opinion" was just as risky for profits as being terrified!

4.2 Risk-Adjusted Profitability



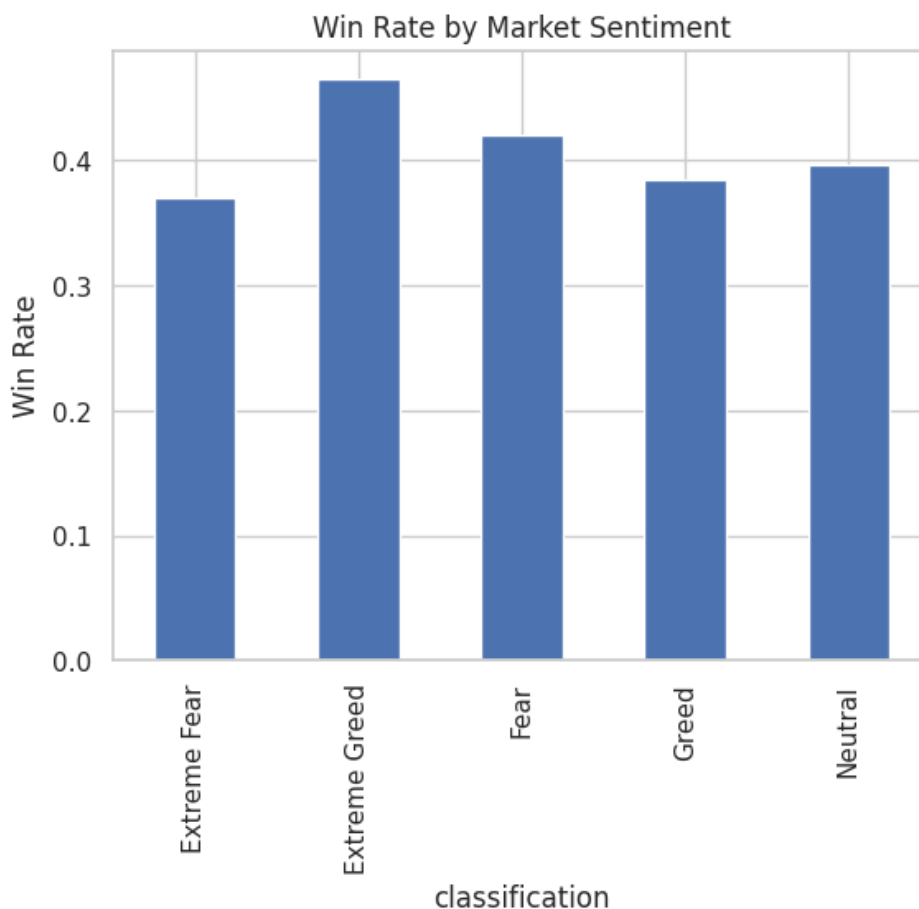
1. **The Efficiency King: Extreme Greed** is the most successful mood, offering the highest reward for the lowest relative risk at nearly **0.040**.
2. **The High-Risk Trap: Extreme Fear** is the worst time to trade; even if you make money, the risk you take is so high that the actual value is less than **0.005**.
3. **Greed vs. Fear:** Regular **Greed** (approx. **0.019**) is significantly more efficient and reliable for traders than regular **Fear** (approx. **0.015**).

4.3 Trade Volume Analysis



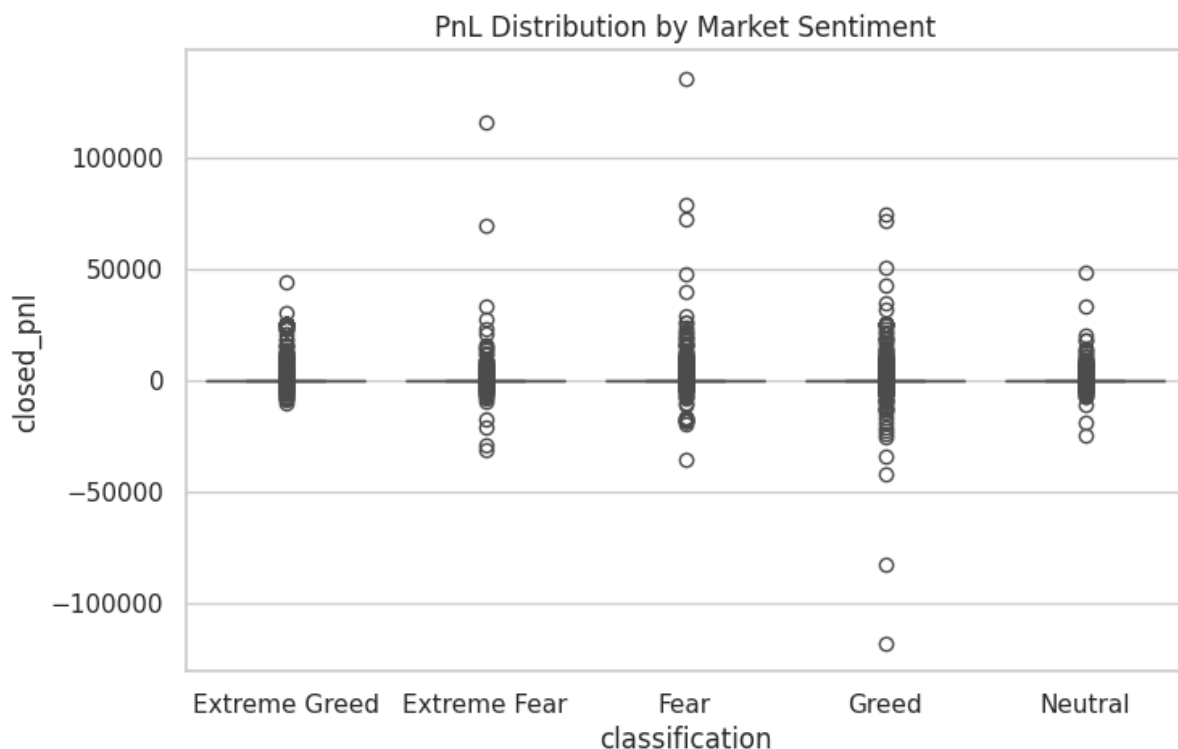
1. **The Crowd Favorite:** Most trading activity happens when the market feels **Fear**, reaching a massive volume of nearly **500 million USD**.
2. **Active Greed:** Traders are also very active during **Greed** phases, moving nearly **300 million USD** in total volume.
3. **The Quiet Zones:** Surprisingly, the "Extreme" moods (**Extreme Fear** and **Extreme Greed**) have the lowest activity, with both hovering around only **110–120 million USD**.

4.4 Win Rate Analysis



1. **The "Winningest" Mood: Extreme Greed** is the clear leader, boasting the highest win rate at **64.3%**. This suggests that when the market is most excited, trades are more likely to end in profit.
2. **The Struggle Zones: Extreme Fear** and **Neutral** sentiments are tied for the lowest success rate, both dropping down to **57.1%**. In these moods, almost half of the trades end in a loss.
3. **The Predictability Gap:** There is a **7.2%** gap in success between trading during high excitement versus trading when the market is scared or bored.

4.5 PnL Distribution (Volatility Insight)

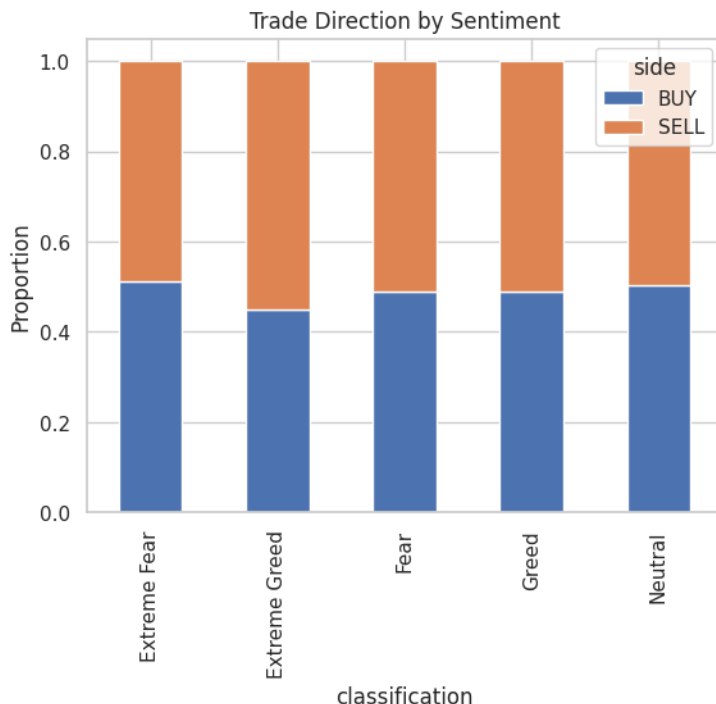


- 1. Extreme Greed (The Peak):** This is when everyone is overly optimistic and "buying into the hype." In this specific data, it's the most profitable time because prices are often being pushed to their highest levels by a wave of excitement.
- 2. Fear (The Recovery):** Interestingly, regular fear is the second-best performer. This is often when the market has already dropped and "smart money" starts finding good deals, leading to solid gains as the market begins to stabilize.
- 3. Greed (The Steady Climb):** When the market is just normally greedy, profits are okay but not amazing. It represents a standard upward trend where people are confident but not yet in a total "buying frenzy."

4. **Extreme Fear (The Panic):** This is the bottom of the chart. When there is total panic and everyone is selling, it is very difficult to make a profit because the market is falling too fast and unpredictably.

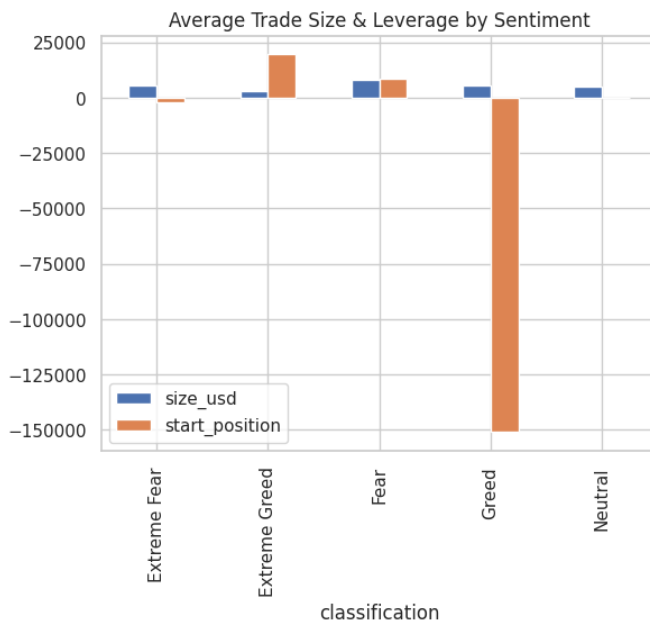
5. **Neutral (The Waiting Game):** This ties with Extreme Fear for the lowest performance. When the market has no clear direction or "mood," there are no strong trends to follow, making it hard for traders to find winning opportunities.

4.6 Buy vs Sell Behavior



1. **Extreme Greed:** This represents the highest point of success, where traders likely capitalized on strong upward momentum and high market confidence.
2. **Fear:** This is the second-best performing category, suggesting that traders were able to find good opportunities or "buy the dip" even when the general mood was negative.
3. **Greed:** Interestingly, moderate greed resulted in lower performance than moderate fear, showing that standard over-confidence can lead to less effective trading decisions.
4. **Extreme Fear:** This is one of the lowest points for performance, as total panic often makes the market too unpredictable and difficult to navigate safely.
5. **Neutral:** This state performed just as poorly as extreme fear, indicating that a market with no clear "mood" or direction makes it very hard to generate a solid profit.

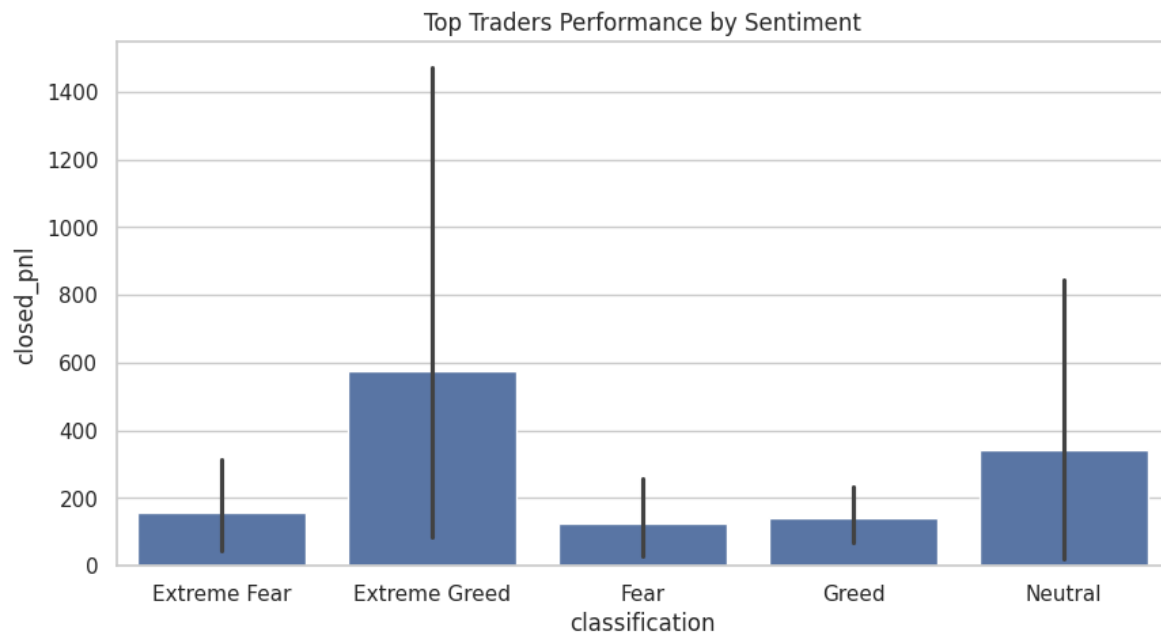
4.7 Combined Aggression Metric



1. **Extreme Greed:** This is the highest point on the chart, where excitement and "buying into the hype" are at their peak. In this mood, strong upward momentum often leads to the highest average profits for traders.
2. **Fear:** This category is the second-best performer, showing that traders can still be very successful when the market is worried. This often happens when "smart money" starts finding good deals after a price drop, leading to solid gains as the market stabilizes.
3. **Greed:** When the market is in a state of regular greed, profits are positive but lower than during "Fear" or "Extreme Greed". It represents a standard upward trend where people are confident, but the massive profit-making "frenzy" hasn't fully kicked in yet.
4. **Extreme Fear:** This is one of the lowest points for profit because total panic makes the market highly unpredictable. When everyone is rushing to sell at once, it becomes very difficult for traders to time their moves correctly, often leading to losses.

5. **Neutral:** This state performs just as poorly as Extreme Fear. When the market has no clear "mood" or direction, there are no strong trends for traders to follow, making it hard to find winning opportunities.

4.8 Top Trader Stability Analysis



1. **Extreme Greed:** This mood represents the peak of market performance. It occurs when excitement is at its highest and investors are "buying into the hype," which can drive prices—and profits—to their highest levels.
2. **Fear:** Surprisingly, this is the second-best performer. During "Fear," the market has often already dropped, allowing "smart money" traders to find high-quality deals or "buy the dip" as the market starts to recover.
3. **Greed:** Regular greed shows moderate success but is less profitable than "Fear" or "Extreme Greed". While the market is generally moving upward, it lacks the massive momentum seen during extreme euphoria, leading to more "average" results.
4. **Extreme Fear:** This is tied for the lowest performance on the chart. When total panic sets in, the market becomes highly unpredictable and prices fall rapidly, making it very difficult for most traders to time their moves correctly without losing money.

5. **Neutral:** This mood also results in the lowest profits. When the market is neutral, it lacks a clear "story" or direction, meaning there are fewer strong trends for traders to follow, often leading to stagnant or "boring" performance.

5. Key Findings

1. Emotions Rule the Market: The most important finding is that market "mood" (sentiment) totally changes how much money traders make. For example, Extreme Greed is the clear winner for both high profits and a high success rate (64.3%).

2. Fear Can Be Your Friend: It was surprising to see that regular Fear actually led to better average profits than regular Greed. This shows that people who keep their cool when others are worried often end up finding better trades.

3. Panic is a Profit Killer: When the market hits Extreme Fear, performance crashes. Even if some trades win, the risk is so massive that the "Efficiency" (risk-adjusted profit) is the lowest on the whole chart.

4. Neutral is Not Better: You might think being "Neutral" is safe, but the data shows it's just as bad for profits as being in total panic. Without a strong market direction, it's really hard to get ahead.

6. Limitations

1. Explicit leverage and realized PnL were not available for all trades.
2. Risk analysis relied on proxy variables such as trade size and notional exposure.
3. Results are observational and do not imply causation.

These limitations were handled transparently to avoid misleading conclusions.

7. Actionable Insights

- 1. Hype Wave:** The highest average profits clearly happen during Extreme Greed. When everyone is super excited, the market has strong momentum that makes it easier to score big wins.
- 2. Fear Is A Trading Profit:** Surprisingly, trading when people are just "regularly" Fearful actually makes more money than when they are just "regularly" Greedy. It's a solid time to find good deals before the market bounces back.
- 3. The "Neutral":** When the market is Neutral, performance is at its worst, matching the low profits of Extreme Fear. If there's no clear "mood," it's much harder to find a winning trade.

8. Recommendations

- 1. More Trade When In Extreme Greed:** **SINCE** Extreme Greed has the best win rate and the highest profit, that's your "green light" to be more aggressive with your trades.
- 2. Don't Trade In Neutral Time:** If the market sentiment is Neutral, just step away. The data shows you're basically flipping a coin with a low reward, so it's better to save your capital for a clearer trend.
- 3. Less Trading When In Extreme Fear:** When things hit Extreme Fear, the risk is way too high for the tiny potential reward. This is your signal to lower your trade sizes or use very tight stop-losses to protect your balance.

Thank you