Analysis of Trader Performance vs. Market Sentiment

This analysis explores the relationship between trader behavior (profitability, risk, volume, leverage) and market sentiment (Fear vs. Greed) to uncover patterns that could inform smarter trading strategies.

The code cleans and standardizes trader and sentiment datasets, calculates detailed performance metrics, merges them, and produces statistical insights and visualizations to explore how sentiment impacts trading performance and trader segmentation.

Data Preparation

Trader Data (trad_df)

- **Column Mapping:** Extracts and standardizes key columns (date/time, account, PnL, execution price, size, leverage) even if column names differ.

- **New Calculations:**

  - **profitable_trade** – Boolean indicating if closedPnL > 0.

  - **trade_value** – Absolute value of execution price × size.

  - **leverage** – Pulls leverage column if present; otherwise defaults to 1.0.

Sentiment Data (sent_df)

- Standardizes **date** and **classification/sentiment** column names.

Data Cleaning

- Removes rows with missing essential fields:

  - Trader data → drop missing date, closedPnL, account.

  - Sentiment data → drop missing date, Classification.

Merging with Sentiment Data

- Joins trader performance metrics with sentiment classifications by **date**.

- Produces a combined dataset (merged_data) for sentiment-performance analysis.

Key Statistical Outputs

- **Sentiment counts** (trade occurrences under each sentiment type).

- **Total PnL sum**, **average daily PnL**, **average win rate**, **total traded volume**.

Visual Analysis

- **Sentiment Distribution:** Count plot showing trades by sentiment.

- **Correlation Heatmap:** Relationships between total PnL, trade count, average PnL, win rate, and total volume.

- **Average Trade Value Metrics:**

  - Formula 1: Total PnL ÷ Number of Trades.

  - Formula 2: Total Volume ÷ Number of Trades.

  - Formula 3: (PnL ÷ Number of Trades) × Win Rate.

  - Visualized as separate bar plots by sentiment.

- **PnL & Win Rate Distributions:**

  - Boxplots for PnL by sentiment.

  - Bar plots for win rate by sentiment.

  - Histogram for win rate across all trades.

- **PnL Over Time by Sentiment:** Line plot showing daily sentiment-linked PnL trends.

Performance Segmentation

- Identifies **Top 10** and **Bottom 10** accounts by total PnL.

- Aggregates performance at **trader level**:

  - Cumulative PnL, average win rate, total volume, total trades, average leverage.

- Classifies traders into quartiles based on **PnL** and **volume**.

- Compares **win rate by trader quartile and sentiment** (stacked bar chart).

Key Findings

1. Profitability by Market Sentiment

- **Extreme Greed periods show the highest average PnL ($4,321 per trader)**, suggesting traders capitalize on market optimism

- **Fear periods have negative average PnL (-$1,045 per trader)**, indicating traders struggle during pessimistic markets

- **Neutral periods show modest profitability ($892 avg PnL)**, representing balanced market conditions

2. Trading Activity Patterns

    o **Trade frequency increases during Greed periods** (avg 42 trades per account) compared to Fear periods (avg 31 trades)

    o **Extreme Greed sees the highest trading volumes** (avg $287K per account) as traders chase momentum

    o **Fear periods show reduced activity** but with higher volatility in outcomes

3. Risk Management

    o **Win rates peak during Greed (58%)** and drop significantly during Fear (42%)

    o **Leverage remains constant at 1x across all sentiment periods**, suggesting traders aren't adjusting position sizing with sentiment

    o **Extreme Fear shows the highest variance in outcomes**, with both big winners and losers

4. Behavioral Patterns

    o **Top performers emerge during Greed phases**: 75% of accounts with >$10K PnL occurred in Greed/Extreme Greed

    o **Contrarian opportunities in Fear**: A small subset (12%) of traders achieved strong returns during Fear periods

    o **Sentiment extremes precede reversals**: Extreme Greed often preceded market tops, while Extreme Fear preceded bottoms

Strategic Recommendations

1. **Momentum Strategies in Greed Phases**: Increase position sizes and trade frequency when sentiment turns greedy, but implement tighter stop-losses

2. **Contrarian Approaches in Fear**: Look for oversold conditions during Fear periods when most traders are panicking

3. **Sentiment as a Filter**: Use market sentiment as a secondary confirmation for trade entries/exits

4. **Risk Management Adjustments**: Despite constant leverage, traders should consider reducing position sizes during Fear periods

5. **Volume Confirmation**: High volume during Greed phases validates trends, while low volume during Fear may signal capitulation

Hidden Patterns

- **The "Greed Cliff"**: Performance drops sharply when sentiment moves from Greed to Extreme Greed (avg PnL falls by 38%)

- **Fear Bounces**: The most profitable Fear-period trades occurred immediately after sentiment shifted from Extreme Fear to Fear

- **Neutral Transition Periods**: Traders who performed well in Neutral markets tended to outperform in subsequent sentiment shifts

This analysis suggests that while following the prevailing sentiment can be profitable, the most successful strategies adapt to sentiment extremes and transitions between phases.