Trading Performance & Market Sentiment Analysis Report

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1. Introduction

This report presents an analysis of trader performance in relation to market sentiment using the *Fear & Greed Index*. The goal was to determine whether trader profitability shows any meaningful relationship to periods of fear or greed in the market.

The analysis was performed using Python in a Jupyter Notebook and included data cleaning, exploratory data analysis (EDA), and interpretation of patterns between trading performance and sentiment indicators.

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2. Data Sources & Preparation

Two primary datasets were used:

1. **Trading History (historical_data.csv)**
   Contains individual trade records including timestamps and profit or loss (Closed PnL).
2. **Market Sentiment (fear_greed_index.csv)**
   Provides daily sentiment scores categorized as *Fear* or *Greed*.

2.1 Data Cleaning & Validation

To ensure reliable results, the following steps were taken:

- **Date Parsing**
  All timestamps were converted to proper datetime objects to allow merging by calendar day.
- **Missing Values & Inconsistencies**
  Both datasets were checked for null or invalid entries. Columns such as *Closed PnL* were verified to contain numeric values.
- **Data Type Alignment**
  Ensured that the date formats matched between trading data and sentiment data to avoid merge errors.

2.2 Data Aggregation

The raw trading dataset contained thousands of rows, each representing a single transaction.
To compare performance with daily sentiment:

- **Daily Summarization** — All transactions for each day were grouped, and their *Closed PnL* values were summed to obtain a single profit/loss figure per day.
- **Inner Join on Date** — The summarized trading data was merged with the sentiment dataset using an *inner join*.
    - This ensured the final dataset contained only days where both trading data and sentiment scores existed.
    - Rows were reduced significantly (e.g., from thousands to ~158 days) due to this filtering.

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3. Exploratory Data Analysis (EDA)

EDA was performed to understand the data distributions and to identify any visible trends.

3.1 Distribution of Sentiment

- The *Fear & Greed Index* was categorized into **Fear** and **Greed** days.
- Counts were plotted to understand how frequently each market mood occurred during the trading period.

3.2 Profit & Loss (PnL) Distribution

- **Overall PnL**: A histogram of daily Closed PnL values showed how often traders made or lost money.
- **By Sentiment**: Distributions were split by *Fear* vs. *Greed* days to visually inspect performance differences under each sentiment condition.

3.3 Market Mood vs Trader Performance

- Boxplots and summary statistics were used to compare median and spread of PnL on *Fear* days vs *Greed* days.
- This provided an initial indication of whether trading results were sentiment-sensitive.

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4. Analysis & Key Insights

1. **Sentiment Occurrences**
   The market sentiment was not evenly distributed; some periods were dominated by *Fear* while others by *Greed*.
2. **PnL Characteristics**

- Daily PnL showed a skewed distribution, with a few extreme profit or loss days affecting the mean.
- Median PnL provided a better central tendency measure than the mean.

3. **Fear vs Greed Performance**
    - Preliminary plots suggested that trader performance may fluctuate depending on sentiment.
    - On some days classified as *Greed*, profits were slightly higher, while *Fear* days tended to show lower or more volatile performance.
    - However, the differences were not extreme and would require formal statistical testing for significance.

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5. Conclusions & Recommendations

- The analysis provided **initial evidence** that trading performance might be influenced by market sentiment, though the effect size was not strong.
- The dataset reduction (due to merging) highlights the importance of having aligned and complete data sources.
- **Next steps** for a more rigorous study:
    - Perform statistical tests (e.g., t-tests, Mann–Whitney U) to validate whether PnL differences between Fear and Greed days are significant.
    - Explore other sentiment indicators (news sentiment, social media data) to enhance prediction potential.
    - Consider modeling approaches (e.g., regression) to predict PnL based on sentiment and other market factors.

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6. Key Takeaways

- Clean data merging and proper aggregation are crucial for accurate financial analysis.
- Daily trading performance showed **skewness**, meaning average values can be misleading without visual checks.
- Sentiment analysis shows potential but is **not a sole predictor** of trading success; traders should use it alongside other indicators.