Data Science Report: Trader Performance vs Market Sentiment

Objective

To explore the relationship between trader performance and market sentiment (Fear–Greed), uncover hidden behavioral patterns, and deliver insights that can help design smarter trading strategies.

Dataset Overview

Two CSV files were analyzed and merged:
- historical_data.csv: Trade-level information including execution price, trade size, profit/loss, and order details.
- fear_greed_index.csv: Daily market sentiment scores categorized as Extreme Fear, Fear, Neutral, Greed, and Extreme Greed.

After Cleaning:
- Rows with missing classification, timestamp_ist, and date_only were removed.
- Numeric columns were filled or adjusted where needed.
- Final dataset is clean, structured, and ready for analysis.

Data Cleaning

Missing values were handled by removing rows with null classification, timestamp, or date columns. Numeric columns were filled appropriately. Data consistency between trading records and sentiment data was verified.

Exploratory Data Analysis (EDA)

Univariate Analysis

- Market Sentiment: Majority of trades occur during Fear and Greed phases.
- ClosedPnL (Profit/Loss): Left-skewed (skewness ≈ -3.48), showing small profits with a few large losses.
- Trade Size (USD): Right-skewed, indicating most trades are small with few high-value ones.

Bivariate Analysis

- Average ClosedPnL by Sentiment: Highest profits during Extreme Greed; minimal during Extreme Fear.
- Trade Size by Sentiment: Larger trade sizes in Greed and Fear phases.
- Trade Side (BUY/SELL) by Sentiment: Greed → more BUYs; Fear → more SELLs.

Multivariate Analysis

- Correlation Heatmap: Strong correlation between fee and size_usd (≈ 0.77). Weak correlation between closed_pnl and other numeric variables → sentiment-driven performance.
- Pair Plot: Low numeric correlation but clear sentiment clusters.

Key Insights

- Trader activity and profitability peak during Greed and Extreme Greed phases.
- Fear-driven markets show smaller trades and reduced profit.
- Numeric trade metrics (size, fee) do not directly drive profitability — sentiment and timing do.

Recommendations

- Develop sentiment-aware trading algorithms to anticipate trader behavior.
- Apply position-size limits during Greed to manage overconfidence risk.
- Introduce protective stop-loss policies during Extreme Fear to prevent panic losses.
- Monitor sentiment indices to adjust strategies proactively.

Conclusion

This analysis reveals that trader performance is deeply influenced by market emotions. Periods of Greed drive higher profits but also higher volatility, while Fear leads to lower activity. Understanding these behavioral trends enables smarter, sentiment-aware trading systems.