

Exploratory Data Analysis (EDA) of Trader Behavior and Market Sentiment

1. Introduction

This section presents an exploratory analysis of trading patterns from the `historical_trader_data.csv` dataset, combined with market sentiment information from `fear_greed_index.csv`. The goal is to understand how market sentiment influences trader profitability and coin preferences.

2. Data Overview

After merging the trading and sentiment datasets, the combined dataset has **211,224 records** and **20 features**. Out of these, **26,961 records** had missing sentiment labels and were excluded from sentiment-specific analyses.

The distribution of trades across sentiment categories is summarized below:

Market Sentiment Number of Trades

Fear	133,871
Greed	36,289
Neutral	7,141
Extreme Greed	6,962

It is evident that trading activity is highest during periods of **Fear**, while **Extreme Greed** days experience the fewest trades.

3. Trader Profitability vs. Market Sentiment

Trader profitability was analyzed across different sentiment categories using the `closed_pnl` metric. To improve visualization clarity, extreme outliers were trimmed within the range of -5000 to 5000 USD.

The analysis shows that trader profits are highly variable and tend to decrease during **Fear** periods. Profit distribution is relatively higher during **Greed** and **Neutral** conditions.

Visualization: `profitability_vs_sentiment.png`

4. Top Coins Traded Under Different Sentiments

The top 5 coins traded were identified for each sentiment category by aggregating trade counts per coin. Bar plots were generated to highlight coin preferences under varying market conditions:

- **Extreme Greed Days:** `top5_coins_Extreme_Greed.png`
- **Fear Days:** `top5_coins_Fear.png`
- **Greed Days:** `top5_coins_Greed.png`

This analysis reveals that certain coins dominate trading activity during specific market sentiments, indicating trader preference patterns influenced by market mood.

5. Key Insights

1. **Dominant Sentiment:** Fear is the most common market condition, suggesting that traders are more active in cautious market environments.
 2. **Profitability Patterns:** Trader profits are highly sensitive to sentiment, with losses more frequent during Fear periods.
 3. **Coin Preferences:** Different coins experience heightened trading activity under distinct sentiment categories, which can inform strategic trading decisions.
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6. Data Sources

- historical_trader_data.csv
- fear_greed_index.csv