Date: September 19, 2025

Data Science Report
Analysis of Market Sentiment on Trading Performance

1. <u>Introduction and Aims:</u>

The primary aim of this project is to analyze trading data with respect to sentiment signals and market behaviour, and to develop quantitative strategies that utilize sentiment data for trade decision-making. The objective is to evaluate the impact of market sentiment (such as "Extreme Greed" or "Extreme Fear") on trading performance, leverage, and returns, using both exploratory analysis and back testing of strategies.

2. <u>Data:</u>

The analysis utilizes two primary datasets: fear_greed_index.csv, containing daily sentiment values, and historical_data.csv with trading records. These were merged on the date column, linking each trade to the market sentiment on that day to create a comprehensive dataset for analysis.

3. <u>Algorithms and Methodology:</u>

Using Python with pandas and seaborn/matplotlib

- **Data Processing**: Timestamp fields from the trades and sentiment data are harmonized to IST and merged across common date keys for comprehensive alignment.
- **Feature Engineering**:
  - Sentiment values are used to classify each day's sentiment as "Extreme Greed", "Greed", "Neutral", "Fear", or "Extreme Fear".
  - Trade metrics such as notional, leverage, return, and PnL (profit and loss) are computed.
- **Statistical Analysis**: The data is grouped by sentiment class to calculate mean PnL, average leverage, and win rates.
- **Visualization**: Boxplots and bar charts are generated to visualize the distribution of returns and leverage across sentiment categories.
- **Strategy Backtesting**:
  - A "Buy Fear / Sell Greed" strategy was developed, assigning a buy position (1) for sentiment values <30 and a sell position (-1) for values >70

- Strategy returns and cumulative performance are calculated and compared to a naïve holding strategy using clipped returns to mitigate outlier distortions.

4. <u>Data Analysis:</u>

- **Descriptive Statistics**:
  - The dataset includes columns for account, execution price, trade size, direction, sentiment value, and trading PnL.
  - Returns and leverage are summarized, with filtering and clipping to handle infinite or missing values.
- **Performance by Sentiment**:
  - Mean PnL is highest during "Extreme Greed" and lowest in "Neutral" and "Extreme Fear" periods.
  - Win rates vary with sentiment, peaking in periods classified as "Extreme Greed".

4. <u>Results and Discussion:</u>

- **Backtesting Results**:
  - The "Buy Fear, Sell Greed" strategy outperformed passive holding in cumulative returns, especially when using clipped returns for risk control.
  - Cumulative strategy performance was plotted and saved, showing substantially better growth for the rule-based approach over naïve holding periods.
- **Interpretation**:
  - Trades made during higher sentiment extremes (especially "Extreme Greed") tend to have higher returns and win rates but also exhibit higher leverage and risk exposure.
  - Sentiment-informed trading models demonstrated clear value in both risk management and return optimization when compared to naïve strategies.

5. <u>Conclusion:</u>

- This analysis demonstrates a clear link between the Fear & Greed Index and trading performance in the historical data.
- Key findings reveal that trading during **Extreme Greed** was most profitable and was associated with higher leverage.
- Moreover, a simple strategy of buying during index <30 and selling during index >70 significantly outperformed a passive holding strategy.
- While not predictive, this analysis confirms that market sentiment can be a valuable indicator for making strategic trading decisions.