Sentiment-Driven Intraday Momentum Capture Strategy for Options

Objective

This strategy aims to capitalize on intraday price movements in options by using predicted sentiment of the underlying index. By leveraging the correlation between the index price and the option premium, it identifies opportunities for directional trades.

Key Assumptions

1. **Direct Relationship**:
   The strategy assumes a **direct relationship** between the sentiment of the index and the premiums of its options.
   - A **bullish sentiment** implies a rise in the index, leading to an increase in **call option premiums**.
   - A **bearish sentiment** implies a fall in the index, leading to an increase in **put option premiums**.
2. **Predictive Sentiment**:
   The sentiment metric (`sen_day_break`) is assumed to reliably predict the next day's price movement of the index.
3. **Back testing with Next Day's Data**:
   The strategy uses the **next day's high and low prices** as a reference to evaluate potential trading opportunities, ensuring a robust back testing framework.

Strategy Workflow

1. **Input Data**:
   - **Historical Prices**: OHLC (Open, High, Low, Close) data for the index.
   - **Sentiment Predictions**: The sentiment metric (`sen_day_break`) for the index, where:
     - `0` indicates bearish sentiment.
     - Non-zero values indicate bullish sentiment.
2. **Logic**:
   - For **bearish sentiment (`sen_day_break == 0`)**:
     - If the current day's last price (`LAST PRICE`) is greater than the next day's low price (`LOW PRICE`):
       - Flag the opportunity (`acc = 1`) and calculate the profit potential (`diff_val`) as the difference between the last price and the low price.
   - For **bullish sentiment (`sen_day_break != 0`)**:
     - If the current day's last price is less than the next day's high price (`HIGH PRICE`):

- Flag the opportunity (`acc = 1`) and calculate the profit potential as the difference between the high price and the last price.

3. **Output**:
   - `acc`: A binary flag indicating actionable opportunities.
   - `diff_val`: A profitability metric indicating the magnitude of price movement.

Algorithm:

```
for i, row in fd.iterrows():
    acc = 0
    diff_val = 0
    if i == (len(fd) - 1):
        break
    presd = df[df.date == row.date].iloc[0]
    nexd = df.iloc[presd.name + 1]
    if float(row.sen_pom) == 0:
        if float(presd['LAST PRICE ']) > float(nexd['LOW PRICE ']):
            fd.loc[fd.date == row.date, 'acc'] = 1
            acc = 1
            diff_val = float(presd['LAST PRICE ']) - float(nexd['LOW PRICE '])
        else:
            diff_val = float(presd['LAST PRICE ']) - float(nexd['LOW PRICE '])
    else:
        if float(presd['LAST PRICE ']) < float(nexd['HIGH PRICE ']):
            fd.loc[fd.date == row.date, 'acc'] = 1
            acc = 1
            diff_val = float(nexd['HIGH PRICE ']) - float(presd['LAST PRICE '])
        else:
            diff_val = float(nexd['HIGH PRICE ']) - float(presd['LAST PRICE '])
```

Backtesting

The strategy evaluates its performance using historical data:

- **Data Requirements**:
  - Daily OHLC prices for the index.
  - Sentiment predictions aligned with the corresponding dates.
- **Evaluation**:
  - Identify how often flagged opportunities (`acc = 1`) align with actual profitable movements.
  - Measure the average profitability (`diff_val`) of the flagged opportunities.

Theoretical Foundation

The strategy is built on the following principles:

1. **Options Pricing and Delta**:
    - Delta measures how much an option's premium changes for a unit change in the underlying index price.
    - A bullish sentiment predicts rising premiums for call options, while a bearish sentiment predicts rising premiums for put options.
2. **Sentiment as a Leading Indicator**:
    - Sentiment is derived from Infi-flux product daybreak and midday
3. **Correlation Between Index and Options**:
    - Changes in the index price directly influence the premiums of its options, forming the basis for the strategy.

Strengths

1. **Sentiment-Driven**:
   Relies on a forward-looking metric (`sen_day_break`), which adds predictive power to the strategy.
2. **Systematic Approach**:
   Provides clear rules for identifying and measuring trading opportunities.
3. **Scalability**:
   Can be applied to different indices or underlying instruments with options.

Limitations

1. **Volatility Impact**:
   Implied volatility (IV) can affect option premiums independently of the index price movement.
2. **Time Decay (Theta)**:
   Options close to expiration may experience significant time decay, which can reduce profitability.
3. **Liquidity**:
   Illiquid options might not reflect a perfect correlation between the index and premiums, leading to execution challenges.

Conclusion

The **Sentiment-Driven Intraday Momentum Capture Strategy** offers a structured approach to exploiting directional price movements in options based on predicted sentiment for the underlying index. While the theoretical foundation is sound, the strategy is inherently **imperfect** due to several practical limitations:

1. **Market Imperfections**:
   Factors like slippage, bid-ask spreads, and unexpected market events can reduce profitability.
2. **Implied Volatility and Time Decay**:
   Premium movements in options are influenced not only by the underlying price but also by implied volatility and time decay, which can distort expected returns.
3. **Possibility of Loss**:
   Traders must exercise caution when implementing this strategy, as incorrect sentiment predictions or unexpected market conditions can result in significant losses. Even in backtesting, profitability depends on idealized conditions, which may not hold true in live markets.
4. **Risk Management**:
   Without proper position sizing and stop-loss mechanisms, the strategy can lead to amplified losses, especially in volatile or illiquid markets.

In summary, while this strategy provides a framework for systematic trading based on sentiment, traders must remain aware of its limitations and the **real-world risks of loss**. Careful back testing, real-time monitoring, and risk management are essential to mitigate these risks and improve the practical performance of the strategy.

Demonstration: we have applied the above strategy for NSEI ticker in yfinance which is Nifty option with expiry of 02 January 2025 for every strike price range from 23000 to 25000.
unfortunately the OHLCV data can't be posted to this repository due to restrictions, but we are allowed to give insights, plots, results from back testing Infi-flux sentiment forecast on underlying assets and how to obtain the data for personal use.

We have used the JavaScript using console of the web page that imitate the download option on the NSE official page. Go to all_historical_data section and run the parameters. All it does is select the parameters and download it.

Summary statistics are saved in the summary folder of this repository. Also Jupiter notebook containing the code for the back testing is also provided. Due to restrictions, you must fetched the data manually from NSE. We did it using JavaScript.

Below are the summary statistics.

	avg_diff_median_call	avg_diff_mean_call	avg_acc_call	avg_diff_median_put	avg_diff_mean_put	avg_acc_put
0	50.36282	60.77275	0.894351	55.38929	64.1007	0.837886