

Detailed Strategy for Backtesting with Technical Indicators and Market Momentum

This strategy aims to use technical indicators such as the Exponential Moving Average (EMA), Relative Strength Index (RSI), MACD, and Bollinger Bands to generate buy and sell signals for a portfolio of stocks. It incorporates market momentum by analyzing the Nifty 50 index to adjust the long-short allocations accordingly.

The strategy is implemented in Python using the `yfinance` library for fetching historical data, and the `ta` library for calculating technical indicators. It also applies a 10% stop-loss rule and calculates portfolio performance over time, including Sharpe and Sortino ratios, maximum drawdown, and cumulative returns compared to the Nifty 50 index.

The backtest runs from 2019 to the end of 2023.

Technical Indicators:

1. EMA (Exponential Moving Average):

- 12-period EMA and 26-period EMA are calculated for each stock.
- A buy signal is generated when the 12 EMA crosses above the 26 EMA, and a sell signal is triggered when the reverse occurs.

2. RSI (Relative Strength Index):

- RSI is calculated for each stock to identify overbought ($RSI > 65$) and oversold ($RSI < 35$)

conditions.

- The RSI is also used as part of the buy and sell signals.

3. Bollinger Bands:

- Bollinger Bands are used to determine price volatility by plotting upper and lower bands at two standard deviations above and below a 20-period moving average.

4. MACD (Moving Average Convergence Divergence):

- The MACD is used to capture the strength of the trend by comparing the short-term and long-term moving averages.

Momentum Scoring:

Each stock is given a momentum score based on its technical indicators:

- RSI Score: Measures how strongly overbought or oversold a stock is.
- MACD Score: Measures the difference between MACD and its signal line to detect positive or negative momentum.
- Bollinger Band Score: Determines how far the stock price is from the middle of the Bollinger Bands.
- Volatility Adjustment: Higher volatility reduces the impact of momentum by adjusting scores.

These scores are combined to create a composite momentum score, which is then used to rank the stocks.

Market Momentum Adjustment:

The Nifty 50 index is used to determine the overall market momentum. EMAs of 20, 50, and 200 are

calculated:

- If $EMA\ 20 > EMA\ 50$ and $EMA\ 50 > EMA\ 200$, the market is considered bullish, and more allocation is made to long positions.
- If the reverse is true, more weight is given to short positions.

Signal Generation and Portfolio Management:

Signals are generated for stocks based on the EMA crossover and RSI levels:

- Buy signals are generated when the 12-period EMA crosses above the 26-period EMA, and $RSI > 50$.
- Sell signals are triggered when the 12-period EMA crosses below the 26-period EMA, and $RSI < 50$.

The strategy allocates funds between long and short positions, adjusting based on market conditions (bullish or bearish).

Backtesting Process:

1. Data is downloaded for the selected tickers and technical indicators are calculated.
2. Momentum scores are evaluated for each stock in 5-day intervals, with buy and sell signals generated based on the technical analysis.
3. Portfolio management rules, including a 10% stop-loss, are applied to each trade.
4. Performance metrics such as Sharpe Ratio, Sortino Ratio, and Maximum Drawdown are calculated over the testing period.

Results and Metrics:

- The portfolio is rebalanced every 10 days based on the signals.

- Sharpe Ratio and Sortino Ratio are used to measure risk-adjusted returns.
- The strategy's returns are compared with the Nifty 50 index, and the cumulative returns over time are visualized.