MARKET NEUTRAL STRATEGY

MOMENTUM TRADING STRATEGY

EFFORTS BY

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Notebook Link: https://colab.research.google.com/drive/1CwBQRT1utovPHi54929vP5W_YXQe7062?usp=sharing

INDEX

MOMENTUM SCORING CRITERIA

This momentum scoring strategy uses a combination of the RSI, Moving Averages, and MACD indicators to compute a composite momentum score for stocks. Each indicator is assigned a specific weight in the overall score

RSI (weight : 35%)

$$\text{RSI Score} = \frac{(\text{RSI Value} - 50)}{50} \times 35$$

- If RSI is above 50, it contributes positively to momentum (up to a maximum of 35).
- If RSI is below 50, it contributes negatively to momentum (down to a minimum of -35).

SMA(weight : 40%)

$$\text{Moving Average Score} = (\text{Price vs. SMA50} + \text{Price vs. SMA200} + \text{SMA50 vs. SMA200}) \times \frac{40}{150}$$

- +50 if Price > SMA50.
- +50 if Price > SMA200.
- +50 if SMA50 > SMA200.
- The final score contribution from moving averages is capped between -75 and +75
- Maximum contribution: +40 for bullish configurations.
- Minimum contribution: -40 if all moving averages are neutral or bearish.

MACD(weight : 25%)

$$\text{MACD Score} = \frac{(\text{MACD Line vs. Signal Line}) \times 25}{100}$$

- +100 points if the MACD Line > Signal Line (bullish signal).
- -100 points if the MACD Line < Signal Line (bearish signal).
- Maximum contribution: +25 for bullish MACD configuration.
- Minimum contribution: -25 for bearish MACD configuration.

Final Momentum Score Calculation

$$\text{Final Momentum Score} = \text{RSI Score} + \text{Moving Average Score} + \text{MACD Score}$$

TRADING STRATEGY

Multi-Factor Approach

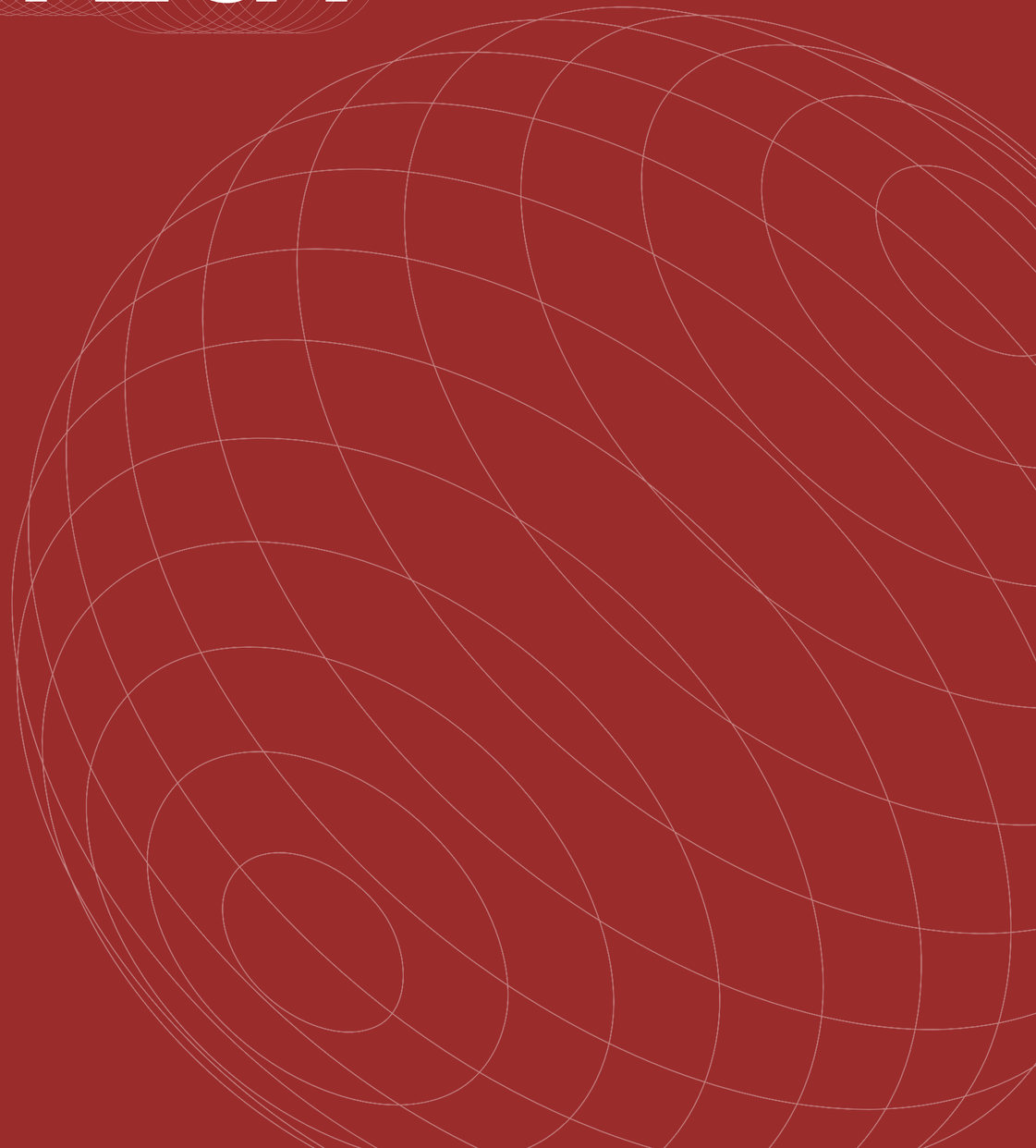
The strategy combines trend-following (using moving averages), momentum (using RSI), and trend strength (using MACD) indicators. This multi-faceted approach increases the robustness of the trading signals by incorporating diverse market perspectives.

Relative Strength Focus

By ranking stocks and generating signals based on percentiles (top/bottom 10%), the strategy emphasizes relative performance rather than absolute momentum. This allows for identifying outperformers and underperformers effectively.

Long-Short Positioning

The dual signal generation (long for top performers and short for bottom performers) enables the strategy to potentially maintain a market-neutral position, reducing overall exposure to market fluctuations while capturing relative performance opportunities.



TRADING STRATEGY

Adaptability to Market Conditions

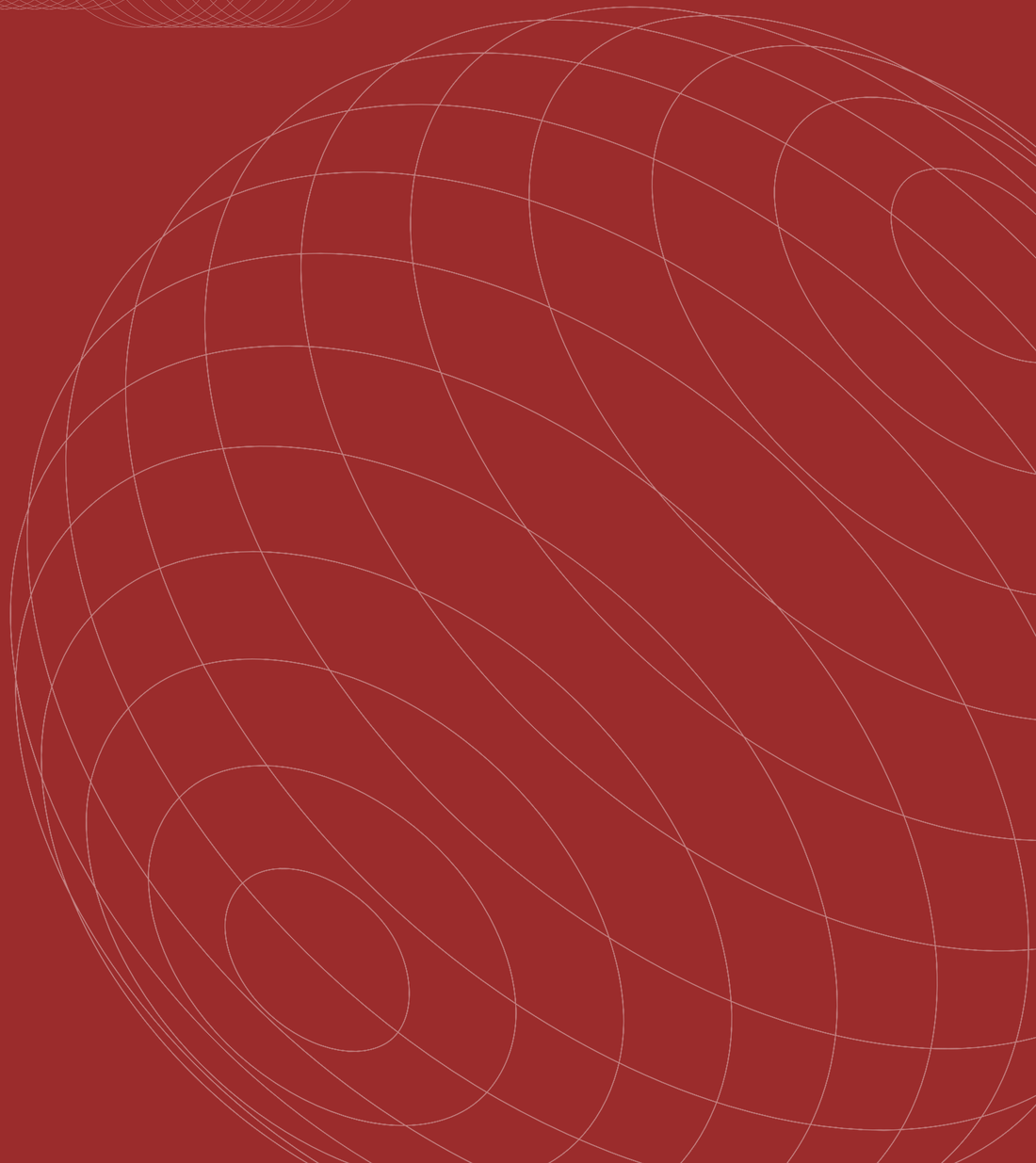
The use of percentiles for signal generation allows the strategy to adapt to varying market conditions, effectively identifying which stocks are outperforming or underperforming relative to their peers.

Time Frame Considerations

The strategy incorporates both short-term (RSI, MACD) and longer-term (200-day SMA) indicators, providing a balanced approach that caters to traders with different time horizons and risk tolerances.

Back-test strategy

Backtesting is the process of evaluating a trading strategy's performance using historical data. In the context of a stock, backtesting involves applying a specific trading strategy to historical stock price data to assess its potential effectiveness



TRADING SIGNALS

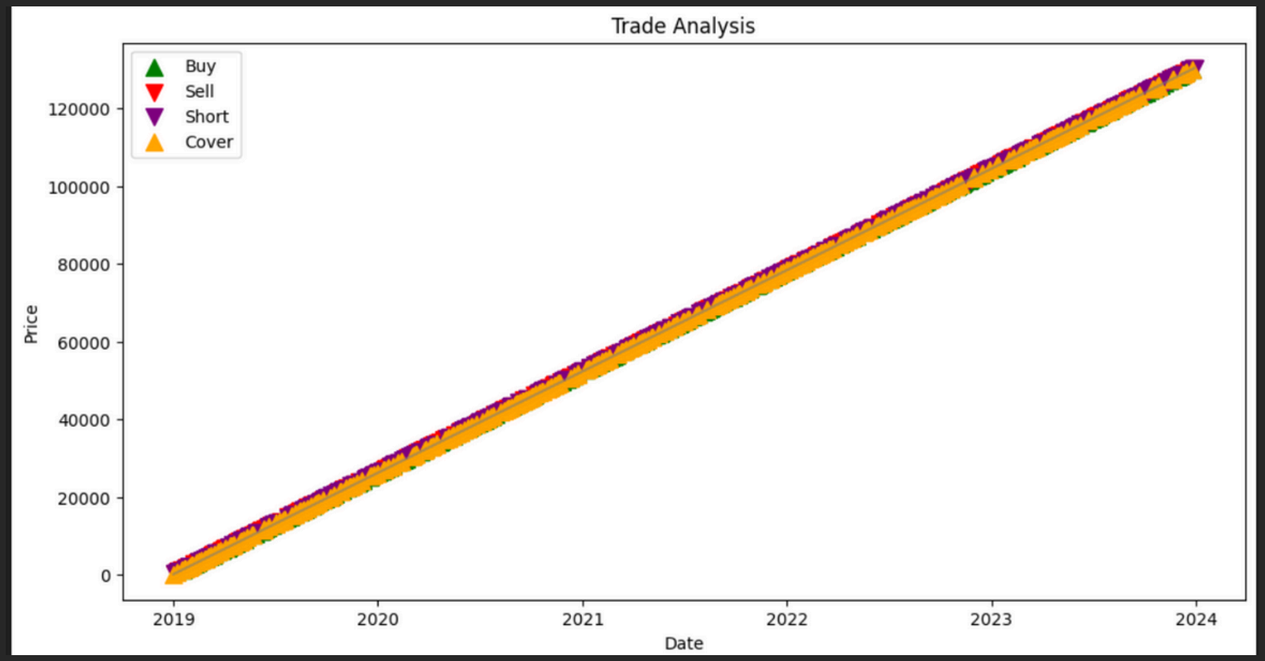
The get_momentum_signals method is used to generate trading signals for the NIFTY 50 stocks based on their calculated momentum scores

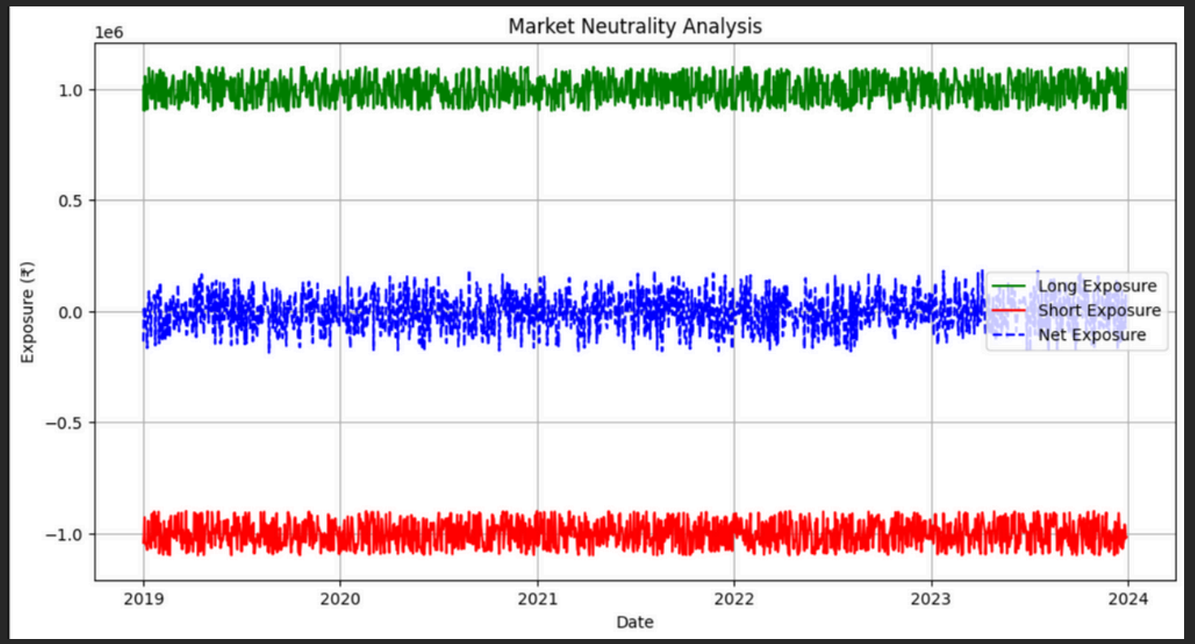
Calculate Momentum Scores:

Each stock's momentum score is calculated using the specified criteria (RSI, Moving Averages, and MACD).

Rank Stocks:

Stocks are ranked based on their calculated momentum scores, allowing for identification of relative performance among peers.



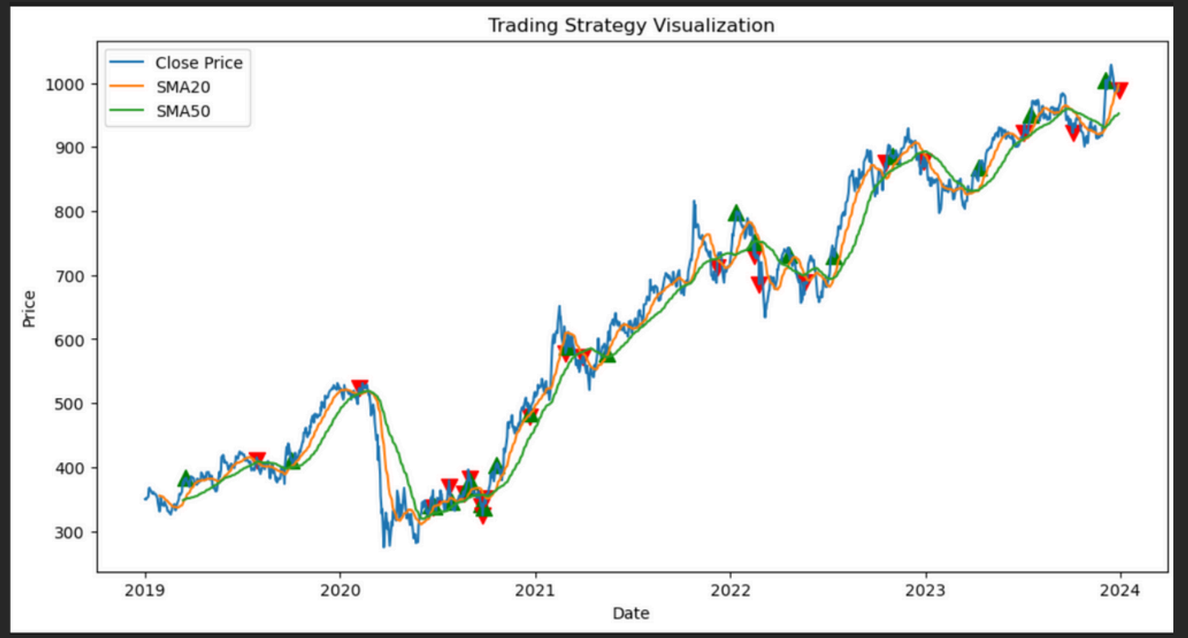


TRADING SIGNALS

Generate Trading Signals:

- Long Signals (1): Generated for the top 10% of stocks based on momentum scores. This indicates strong bullish momentum, signaling a potential buying opportunity.

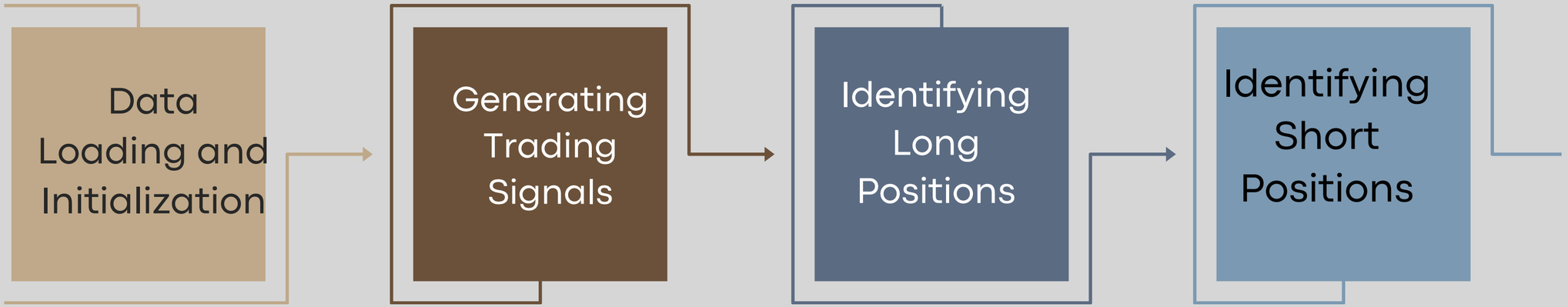
- Short Signals (-1): Generated for the bottom 10% of stocks based on momentum scores. This indicates strong bearish momentum, signaling a potential selling or shorting opportunity.



LONG/SHORT POSITION

The process of obtaining current long and short positions involves several steps, utilizing the Technical Indicators class and its methods.

1. The selection is dynamic and relative. On each day, the stocks are re-ranked, and positions may change based on their relative momentum scores.
2. The signals DataFrame contains historical signals for all dates. By selecting signals.iloc[-1], we get only the most recent day's signals.
3. The top and bottom 10% of stocks by momentum score are selected for long and short positions, respectively.
4. Stocks with a signal 1 are Long Position and stocks with a signal -1 are Short Position



RISK MANAGEMENT

RISK MANAGEMENT

CLASS STRUCTURE

The main class is RiskManager, which handles various aspects of risk management for a trading portfolio.

TRADE EXECUTION

Handles buying, selling, shorting, and covering positions
It ensures trades comply with risk parameters (e.g., not exceeding max position size)

PORTFOLIO MONITORING

Provides current portfolio status (capital, drawdown, positions)
Displays a formatted summary of the portfolio

DEMONSTRATION

Opens long positions in RELIANCE and TCS
Opens a short position in HDFCBANK
Simulates price changes to trigger stop losses

KEY RISK PARAMETERS

Initial Capital
Maximum position size
Max drawdown
Stop loss percentage

POSITION MANAGEMENT

The positions dictionary keeps track of all open positions
Each position stores entry price, number of shares, stop loss price, and position type (long/short)

RISK CALCULATIONS

Determines the number of shares to buy based on the maximum allowed position size
Monitors if the current drawdown exceeds the maximum allowed

PORTFOLIO P&L

Cumulative Profit and Loss (P&L)

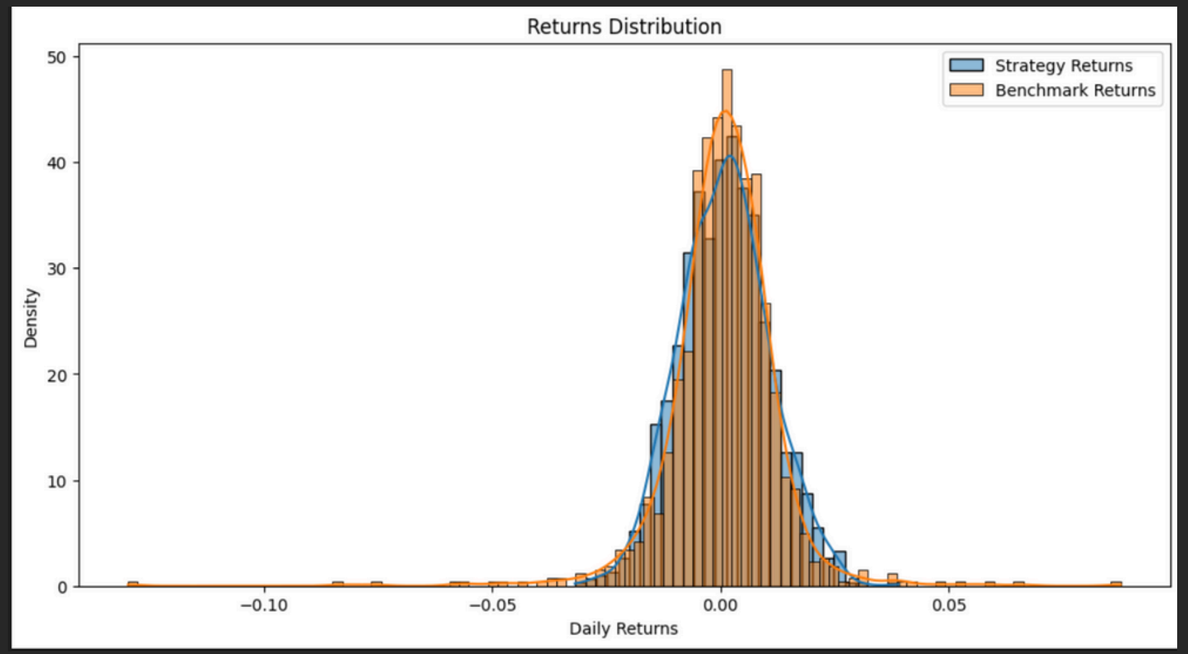
The cumulative P&L represents the net gains or losses of the portfolio over time. As stock prices fluctuate, the portfolio's value changes, and the cumulative P&L tracks these changes.

Drawdown and Maximum Losses

Drawdown is the peak-to-trough decline over a period, indicating the portfolio's maximum loss. Tracking maximum drawdowns shows how much value the portfolio lost during downturns, helping manage downside risk.

Performance Comparison with Benchmark

Comparing portfolio P&L to a benchmark (e.g., NIFTY 50) helps assess if the strategy outperformed the market. If included, the code calculates the return difference, providing a clearer evaluation of profitability.



PERFORMANCE METRICS

1. Momentum

- **Purpose**: Momentum measures the rate of change in stock prices over a specified period. It is a key factor in the strategy, where stocks showing the highest momentum are selected for investment.
- **Significance**: Momentum helps identify stocks that are trending upwards, and the strategy assumes that stocks with higher momentum will continue their upward trend.

$$\text{Momentum} = \frac{\text{Price today} - \text{Price lookback}}{\text{Price lookback}}$$

Explanation in Code: The notebook calculates momentum for each stock in the NIFTY 50 over a lookback period (e.g., 20 days). It ranks stocks based on their momentum values and selects the top performers.

PERFORMANCE METRICS

2.Sharpe Ratio

- **Purpose**: The Sharpe ratio is one of the most commonly used metrics to measure the performance of an investment, adjusting for its risk. It tells us how much excess return is generated per unit of risk (volatility).
- **Significance**: By using the Sharpe ratio, the strategy focuses on maximizing returns while keeping risk under control. It helps in identifying stocks that not only have good returns but also maintain a lower level of volatility.
- The Sharpe ratio is calculated for each stock to rank them based on risk-adjusted returns. Stocks with a higher Sharpe ratio are preferred since they offer better returns per unit of risk.

$$\text{Sharpe Ratio} = \frac{E(R) - R_f}{\sigma}$$

Where:

- E(R) = Expected return of the stock.
- Rf = Risk-free rate (which might be set to a constant, such as 0, if not specified in the code).
- σ = Standard deviation of the stock's returns (volatility).

PERFORMANCE METRICS

3.Return on Investment

- **Purpose**:ROI measures the profitability of an investment relative to its initial cost. It's a fundamental performance metric that helps determine how well the strategy is performing in terms of generating profit.
- **Significance**: Momentum helps identify stocks that are trending upwards, and the strategy assumes that stocks with higher momentum will continue their upward trend.

$$\text{ROI} = \frac{\text{Gain from Investment} - \text{Cost of Investment}}{\text{Cost of Investment}} \times 100$$

Explanation in Code: While the exact ROI formula may not be explicitly calculated in the notebook, the general approach of using returns (stock price appreciation) implies that ROI can be computed by tracking the percentage gain or loss on selected stocks.

PERFORMANCE METRICS

4.Sortino Ratio

- **Purpose**:The Sortino ratio is a variation of the Sharpe ratio, but it focuses on downside risk rather than total volatility. It is a more refined performance metric for investors who are more concerned about negative returns (i.e., losses) than overall volatility.
- **Significance**: The Sortino ratio provides a more risk-averse view of performance by penalizing only negative volatility. This metric is particularly important for conservative investors who want to avoid stocks with significant downside risk.

$$\text{Sortino Ratio} = \frac{E(R) - R_f}{\text{Downside Deviation}}$$

Where:

- E(R) is the expected return.
- Rf is the risk-free rate.
- Downside Deviation is the standard deviation of only negative asset returns (instead of using all returns like the Sharpe ratio).

REFERNECES

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THANK YOU

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