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Introduction to Algorithmic Trading Strategies

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ABSTRACT

In the past few decades, securities trading has experienced significant changes as more and more stages within the trading process have become automated by incorporating electronic systems. This Paper gives an overview of Algorithmic Trading and its benefits in the ever-advancing technology where industries are revolutionized by the automation and optimization of tedious manual processes. The trade management industry is no exception. The paper then talks about different commonly used Algorithmic Strategies used for Trading Execution illustrated with the help of examples. There are different market situations and trader's requirements depending on which different Algorithmic Strategies are used, and this paper will try to uncover those areas. We specifically would cover Market Order, Limit Order, Iceberg Order, Stop Order, Trailing Stop Order, Market-Not Held Order, and Momentum Strategy.

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Introduction

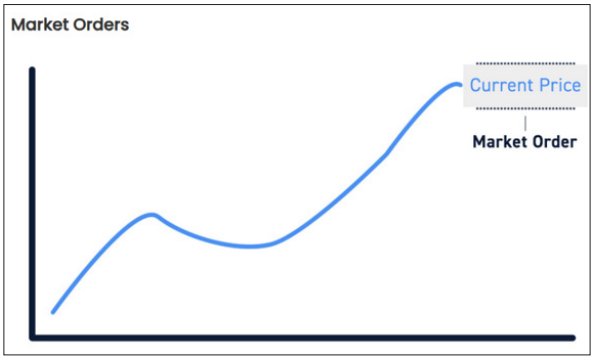
In the ever-advancing technology, Artificial intelligence, robo-advisors, and trade execution algorithms have dominated market strategies. Algorithmic Trading is one such example where computer programming combined with financial markets is used to execute trades automatically. Algorithmic trading is the computerized executions of financial instruments (e.g., stocks, bonds, options, currencies, etc.) in lieu of more traditional transactions via human intervention. It requires a networked connection to an electronic exchange, broker or counterparty, and a means of programmatically buying, selling and performing other tasks related to trading, such as monitoring price action and market exposure [1]. It provides investors with many benefits including anonymity, efficiency, reduced trading costs and risks, lower commissions, and full control of the order. Algorithmic trading can also take advantage of arbitrage in the Market, and in the same vein can also become a victim of Slippage. As the trading environment has become more competitive, investors have turned to efficient algorithmic trading strategies [2]. Overall, algorithmic trading strategies offer a range of benefits that appeal to traders and investors seeking to maximize efficiency, minimize risk, and capitalize on market opportunities in today's fast-paced financial markets.

This article is to give a brief on the most common different types of Algorithmic Trading Strategies being used by Traders/ Brokers to get the desired outputs they are looking for. We will try to understand what Algorithmic Trading Strategy suits the best for different situations with appropriate examples to understand the real working of the strategy. Let's dive into different Trading Strategies.

*Please note that for all the examples provided below, we are not taking into account any Brokerage Fees/ Commission that will be charged by Broker/ Trading Platform.

Market Order

A Market Order is a Trading Strategy in which securities like stocks, bonds, etc. are bought or sold at the current market price available at the Exchange. Market Orders help Investors quick execution of Trades at the prevailing Market Price [3].



Example: Mr Adam wants to Buy Stock Share of Apple Inc at the Price available on Exchange. If Apple Inc Stock Price is $165.25 and Mr Adam puts a "Market Order" to Buy 1000 Stocks, then 1000 Stocks will be Bought at $165.25.

Limit Order

A Limit Order is a type of order to buy or sell a security at a specified price or at better Price, called the Limit Price. Unlike Market Order, which is bought at the Current Trading Price of the Security, Limit Order will not be executed until the Limit Price is reached. Limit Orders help investors ensure they achieve a specific price target for their trades [3]. Limit Order is valid for the day. If the Limit Price is not reached for the Stock Share, then

Limit Order is cancelled at end of the day when Market Closes. There are 2 types of Limit Orders:

- **Buy Limit Order:** This is an order to buy security at a specified price or lower. The buy limit order will only be executed if the market price of the security falls to the limit price or below.
- **Sell Limit Order:** This is an order to sell a security at a specified price or higher. The sell limit order will only be executed if the market price of the security rises to the limit price or above

Example: Mr Adam wants to Buy Stock Share of Apple Inc. and has put a Limit Order to Buy 1000 Stocks at Limit Price of $160. The Current Price of the Stock is at $165.25. Trade will be executed when Stock Price falls to $160 or lower. If Stock Price does not go to $160 or lower during the day, then Limit Order will be Cancelled, and no Execution will take place.

Iceberg Order

An iceberg order, also known as "hidden order," is a large order to buy or sell a security that is divided into smaller, undisclosed quantities, also called Blocks. These smaller orders or the Blocks are released into the market gradually over time, hiding the full size of the order from other market participants.

The purpose of an iceberg order is to avoid impacting the market price of the security by preventing other traders from detecting the full size of the order and adjusting their own trading strategies accordingly. By concealing the true size of the order, the trader can potentially minimize price movements caused by the execution of large trades. They are typically executed using algorithmic trading systems that automatically release portions of the order into the market according to predefined parameters set by the trader [4]. Overall, iceberg orders help traders execute large transactions more efficiently while minimizing their market impact.

Example: Mr Adam wants to Buy Stock Share of Apple Inc. and has put an Iceberg Order to Buy 1,000,000 Stocks. There can be different ways different Platforms can use Iceberg Order to be executed.

a) Iceberg Order with Equal Blocks at Market Price
Total Stocks – 1,000,000
Iceberg Order with Block Size – 200,000
Price - Market Price

In this case, 1,000,000 Stocks will be executed in the Block Size of 200,000 each at Market Price. So, 5 Trades will be Done of 200,000 each at Market Price to fully execute 1,000,000 Stocks. Market Price (MP) can be different for each of the Block Size executed.

Let's say, below are the Market Prices when 5 Blocks are Executed: MP1= $162.25, MP2= $162.15, MP3= $162.1, MP4= $162.15, MP5=$162.2

Overall, Price at which 1,000,000 Stocks are Executed in this case will be:

{(200,000 * 162.25) + (200,000 * 162.15) + (200,000 * 162.1) + (200,000 * 162.15) + (200,000 * 162.2)}/1,000,000 = $162.17

b) Iceberg Order with Random Blocks at Limit Price
Total Stocks – 1,000,000
Iceberg Order with Block Size Range – 100,000 - 200,000
Price - Limit Price of $160

In this case, 1,000,000 Stocks will be executed with random Block Size within the range of 100,000 - 200,000 generated by the system at Limit Price of $160. There could be a different number of smaller Iceberg Orders generated depending on the Block Sizes. Let's say, randomly generated Block Size are 120,000; 140,000; 200,000; 110,000; 130,000; 200,000, 100,000. So, 7 Trades will be created to execute 1,000,000 Stock Shares at a Limit Price of $160. Similarly, there could be different Block Sizes generated by the system and in that case number of Trades required to execute 1,000,000 Stoc Shares could be different.

There could also be more variations to Iceberg Strategy with random/ Fixed Block Size and Market/ Limit Orders for the Price.

Stop Order

A Stop order is a type of order placed with a broker to buy or sell a security once the price of the security reaches a specified Stop Price. Once the Stop Price is reached, the Stop order becomes a market order or a limit order, depending on the type specified, and it is executed at the best available price [3].

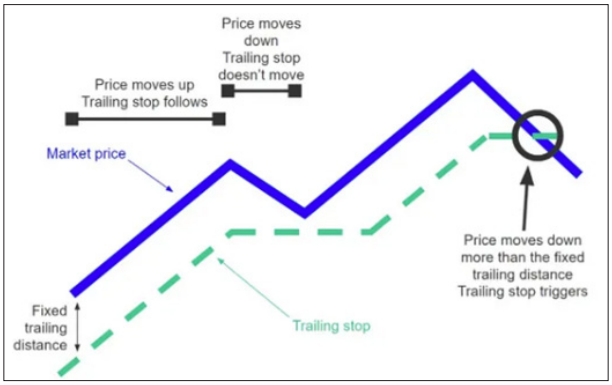
A Stop order is always executed in the direction that the price is moving. For instance, if the market is moving lower, the stop order is set to sell at a pre-set price below the current market price. Alternatively, if the price is moving higher, the stop order will be set to buy once the security reaches a pre-set price above the current market price [5]. This is to ensure Trader is Buying or Selling the stock according to market sentiments and in the direction, price is moving.

Example: Mr Adam wants to Buy Stock Share of Apple Inc. and has put a Stop Order to Buy 1000 Stocks at Stop Price of $160. The Current Price of the Stock is at $158.25. Stop Order will not be activated and Trade will not be executed even when the current Price is better than the Stop Price. However, Trade will be executed when Price of the Stock Share reaches Stop Price of $160.

Trailing Stop

A Trailing stop is a popular stop-loss that automatically adjusts the stop price based on the movement of the market price of a security. For a long position, an investor places a trailing stop loss below the current market price. In this case, Trailing Stop Price only move up or remain at the same Price, if Market is falling. This means, if the price of a security is rising, stop price will trail behind it to the specified value and will always keep those increasing profits. Similarly, for a short position, an investor places the trailing stop above the current market price. In this case, Trailing Stop Price only move down or remain at the same Price, if Market is rising. This means, if the price of a security is falling, stop price will trail behind it to the specified value.

Trailing stops are commonly used by traders and investors to protect profits and limit losses while allowing for potential further gains. They are particularly useful in trending markets, where prices can continue to move in the same direction for an extended period. Trailing-stop strategies are commonly used for stock trading, and many investors believe it is a good strategy to balance return and risk [6]. Trailing stops provide efficient ways to manage risks and traders use them as a part of their exit strategy.



Example: Mr Adam bought Stock Shares of Apple Inc. at $160 per share and has put a Trailing Stop Order with Trailing Stop distance at $5. If Apple Inc. Price rises to $180, then Trailing Stop Price adjusts to &175 per share ($180 - $5). If the stock price continues to rise, the trailing stop price will continue to adjust accordingly, maintaining a $5 distance from the highest price reached. If the stock price, then declines and hits $175 per share, then trailing stop order is triggered, and Apple Inc. stock shares are sold to lock in profits.

Market-Not Held

A Market-not held trading strategy is a type of order instruction given to a broker or trading desk, where the broker is given discretion in executing the order but is not held to specific instructions regarding price or timing. Instead, the broker is empowered to use their judgment to execute the trade in a manner that they deem most advantageous to the client, considering prevailing market conditions, liquidity, and other factors.

Market-not held trading strategies are often used in situations where the client trusts the broker's judgment and expertise and is willing to delegate some discretion in order execution. This approach can be particularly useful when trading large orders or in illiquid markets, where the broker's expertise and ability to navigate market conditions can help achieve a more favorable outcome for the client [7].

Momentum Strategy

Momentum trading is a strategy that involves buying or selling assets based on recent price trends. The core idea is to capitalize on the continuation of existing trends, assuming that assets that have performed well in the past will continue to perform well in the future (positive momentum), or assets that have performed poorly will continue to perform poorly (negative momentum). Brokers use technical analysis tools like moving averages and relative strength index (RSI) to identify stocks that have been steadily rising in price with increasing trading volume. In the foreign exchange market, momentum in spot exchange rates has been widely exploited in trading strategies used by currency fund managers and commodity trading advisors [8].

Conclusion

In conclusion, algorithmic trading strategies offer numerous advantages for traders and investors in financial markets. By leveraging automation, quantitative analysis, and predefined rules, these strategies can capitalize on market opportunities, manage risk, and execute trades with speed and precision. Overall, algorithmic trading strategies have become indispensable tools for traders and investors seeking to gain a competitive edge in today's fast-paced and increasingly complex financial markets. However, it's essential to conduct thorough research, testing, and monitoring to develop effective strategies and mitigate potential risks associated with algorithmic trading.

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