Momentum Strategy in Algorithmic Trading

Theoretical Explanation

Momentum Strategy is based on the idea that securities that have performed well in the past will continue to perform well in the near future, while those that have performed poorly will continue to lag. This strategy is grounded in the observation that trends often persist over time, and it aims to capitalize on these trends.

Key Concepts:

1. **Momentum Effect:** The core of momentum trading is the belief that asset prices exhibit persistence. For example, if a stock has been rising steadily, the momentum strategy assumes that it is likely to keep rising, and conversely for falling stocks.
2. **Trend Following:** Momentum strategies are designed to identify and follow trends. By analyzing historical price movements, traders can generate buy or sell signals to enter or exit trades.
3. **Time Window:** The length of the time window over which momentum is measured can significantly affect the strategy's performance. Common time windows include 10, 20, or 60 days.

Mathematical Formulation

1. **Momentum Calculation:**

   Momentum can be calculated in various ways. One common method is to compute the difference between the current price and the price from a specified number of periods ago:

   $$\text{Momentum}_t = P_t - P_{t-n}$$

   where P_t is the current price, and P_{t-n} is the price n periods ago.

2. **Signal Generation:**
   - **Buy Signal:** If the momentum is positive (i.e., the current price is higher than the price n periods ago), it indicates that the asset is in an uptrend, and a buy signal is generated.
   - **Sell Signal:** If the momentum is negative (i.e., the current price is lower than the price n periods ago), it indicates that the asset is in a downtrend, and a sell signal is generated.
3. **Risk Management:**
   - **Stop-Loss Orders:** To mitigate risk, stop-loss orders can be set at a predetermined price level to automatically exit a position if the price moves against the trader.
   - **Take-Profit Orders:** Take-profit orders are placed to lock in gains when the price reaches a certain level.
4. **Performance Measurement:**
   - **Cumulative Returns:** This measures the total return of the strategy over time, taking into account all buy and sell signals and their respective performance.