SIGMAWEDGE

Extracting Data from Quantrocket:

Price data (daily close prices only) for Apple stock (sid='AAPL') for the year 2023 (01-01-2023 to 12-31-2023)data has been extracted from Quantrocket.

Importing Libraries and reading data:

Necessary libraries have been imported and the data read has been converted into a dataframe.

Model

Stock Trading Decision Model Inference:

This document outlines a Python class, Model, designed for making trading decisions based on stock price movements. Here's an overview of its functionality:

Initialization:

The class initializes with default values for portfolio value (value), current state (state), optimal buy indices (optimal_buy_indicies), and transition counts (transition_counts).

Return Calculation:

The calculate_returns method computes the returns based on the current and previous prices.

Portfolio Value Update:

The update_portfolio_value method updates the portfolio value based on the trading decision.

Transition Counts and Probabilities:

The update_transition_counts method updates the transition counts between different states. The calculate_transition_probabilities method computes transition probabilities based on transition counts.

Trading Decision:

The make_trading_decision method makes trading decisions based on transition probabilities and the current state. If the probability of price increase is higher, it suggests buying the stock; otherwise, it suggests not buying.

Stock Trading Decision Procedure:

This procedure outlines the steps involved in making trading decisions based on stock price movements:

Calculate Returns:

Calculate the returns based on the formula $r(d) = (p(d) - p(d-1))/p(d-1)$, where $p(d)$ represents the price on day d.

Classify States:

Classify states based on the threshold:

If $r(d) > 0.01$, $s(d) = +1$ (Bull).

Else if $-0.1 < r(d) < 0.1$, $s(d) = 0$ (Flat).

Else, $s(d) = -1$ (Bear).

Calculate Transition Probability Matrix:

Calculate the transition probability matrix in a streaming fashion until the previous state.

Use transition likelihoods to the additive state (positive price movement) and the reductive state (negative price movement) for decision-making.

Make Trading Decision:

If the likelihood of transitioning to the additive state is greater, buy the stock.

Update Portfolio Value:

When deciding to buy the stock on a particular day:

If $s(d+1) = 1$ and $s(d) = 0$, update the portfolio value as $V(d+1) = V(d) + 1$.

Else if s(d+1) = -1 and s(d) = 0, update the portfolio value as V(d+1) = V(d) - 1.

Increase Transition Count:

After updating the portfolio value, increase the transition count for the current state transition.