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ALGORITHMIZATION OF STOCK MARKET STRATEGIES

Trading robots are computer systems which specialize in stock trading. Such kind of robots perform the same tasks as brokers: buy low, sell high. They account for a significant part of the trade turnover, and in certain periods, they completely dominate the market, especially in a situation of large price spikes requiring an instant reaction, which is unattainable for a person.

Nevertheless, algorithmic trading systems remain vulnerable, as people, who are prone to errors, create them. These errors are minimized by modeling the behavior of these robots, conducting various stress tests and performing checks based on historical data.

The aim of this work is to create an author's trading algorithm that meets the requirements of stability, flexibility and high profitability.

As the basis of development, Bank of America stocks were chosen as the stocks with average volatility in selected period. Such level of volatility is required because algorithmic trading does not provide sufficient margins for stock market participants during low volatility periods.

As a technical indicator for the algorithm, ADX (Average directional movement index) was chosen. This indicator does not reflect the direction of the price movement of the selected security, but reflects the strength of the trend under the influence of sellers and buyers.

ADX can be valued from 0 to 100. The decision-making method built into this algorithm is based on the method of Welles Wilder [1]. The main principal of his system is when the index takes values of more than 35, this indicates the presence of a trend in the movement of stock prices. Based on this rule, a decision-making algorithm was created.

The moving average method was used as an averaging method. That has been made to make the data more valuable. The indicators were averaged by the exponential method, which gave more weight to the stock session's data closer to the present.

The algorithm makes a decision every business day at a market close. The strategy assumes the possibility of opening one position per day and the algorithm

cannot change this decision during this day, since it is based on indicators determined not immediately, but according to the results of the last trading session.

After the analysis of the data of each trading day from January 2019 to February 2020, shortcomings of this algorithm were revealed, and a more detailed output of its decisions was obtained. Stock volatility during the time remained average. Some other decision-making mechanisms were implemented to improve the algorithm. For example, optimal transaction volume determining mechanism was implemented by calculating the potential risk of opening a position and capital on the day the transaction is to be completed. Based on the chosen strategy and analysis results, we decided to establish a stop-loss[1] limit of 0.1% of the closing price. Thus, we deprived ourselves of potential profit on those days when the price fluctuated in the reverse direction of the opened position by more than 0.1%, but maximized profit on other days. New version of the algorithm refuses to open a position on days with a low trend strength, because detailed analysis showed that the algorithm loses the most on these days. The price on this day remains too unpredictable for the stable work of the algorithm.

According to the results of the test, verified with historical data, the yield on operations with Bank of America shares using the algorithm was 98.84% per annum. The average growth for each month was 5% compared to the previous month. Tests conducted on other papers also showed decent result:

Tesla – 402,82% per annum; Apple – 109,7% per annum; Google – 46,96% per annum.

This profitability demonstrates the sufficient efficiency of the algorithm on a long-term basis, as the algorithm makes a decision once a day and the mechanics of its work do not provide possibility for short-term trading.

Thus, as the result of the study, the author's algorithm for stock trading has been developed. It has flexibility, due to the presence of built-in variable parameters, profitability and stability for the required length of time. According to the final test, the financial result of the algorithm is stable in the context of each month. The created algorithm showed high efficiency for a number of randomly selected securities and can be used as an algorithm for assisting with the decision-making process on the market. However, the biggest efficiency can be achieved by integrating it with another algorithm that evaluates stocks and distributes available capital among them based on multivariate analysis. At the same time, this algorithm cannot be used to make decisions during the trading session. As an alternative, it can be used as a mechanism for determining the intraday trend of the stock price, based on which another mechanism will carry out trading during the day.

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[1] Stop-loss is an order to sell an asset when it reaches a certain price level.