

Genetic Programming-based trading system: An application on the NASDAQ 100 stock index

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Extended Abstract

Nowadays, the vast amount of socio-economic and market information play an important role in the formation of any financial market's characteristics and overall behavior. As a consequence, the uncertainty and complexity of the financial markets immensely increase. Based on the aforementioned, a crucial task for potential traders is to identify market trends and detect potential investment opportunities. What is more, individually traditional trading strategies based on technical indicators, such as certain statistical and econometric forecasting methods, have proven inadequate to adapt to the rapidly evolving market conditions. Conversely, when combining such indicators, there is a higher possibility of more promising results. The field of Artificial Intelligence provides a range of metaheuristic algorithms for dealing with complex tasks, as the abovementioned. Specifically, in this study an intelligent algorithm based on the principles of Darwinian evolution, namely Genetic Programming, is proposed.

The main aim of the study is to combine a number of technical indicators and other financial heuristics, with the use of Genetic Programming, in order to detect potential market signals for trading. One of the main characteristics of Genetic Programming is its ability to manipulate complex technical rules/heuristics in a way that optimizes the investor's expected outcome. The proposed trading system is applied to the NASDAQ 100 stock index. Particularly, the dataset comprises daily adjusted closing prices of the stock index, for the period January 1985 to December 2011. Regarding the experimental set-up, the entire dataset is divided into three sub-

periods: training, validation and forecasting (trading) interval. The algorithmic trading system is applied to the training interval in order to provide a number of technical rules. The quality (fitness) of these rules is then tested in the validation period, based on the criterion of profit maximization. Finally, the 'fittest' rule is applied to the forecasting time period, which consists of unknown data.

The performance of the proposed trading algorithm is benchmarked to a number of known strategies, found in the literature. Preliminary results provide an indication of the superiority of the proposed scheme. More specifically, the Genetic Programming-based algorithmic system yield better results in terms of profit maximization. In order to have a better view of the method's overall performance, a number of benchmark techniques were applied to the problem at-hand. These heuristic techniques consisted of individual technical indicators such as MACD, Bollinger Bands etc., as well as other financial rules-of-thumb provided from financial experts. The main point of this comparison was to demonstrate the superiority of the intelligent technique's performance compared to simpler rules, as well as more intelligent strategies from financial experts. However, in order to provide a better insight on the proposed scheme, a statistical analysis of the results is going to be implemented.

The main implication of this study is related to the financial decision makers, who deal with complex financial markets and their basic concern lies in detecting investment opportunities in this uncertain environment.

Keywords: Genetic Programming, Trading System, Technical Indicators, Artificial Intelligence

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