

Stock Price Prediction using Genetic Algorithms

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Stock price prediction has attracted a lot of attention since the stock market foundation. The stock price of any company doesn't necessarily depend only on the economic situation of the country. Additionally, it is influenced by political events, natural disasters, company related news, etc. Fast data processing of these events has caused stock prices to fluctuate very rapid. Therefore the majority of banks, investors and stockbrokers have to sell and buy stocks within the shortest time frame. The time frame of a few hours between selling and buying a stock is not unusual.

For investing money in the stock market it is useful to have an idea whether the stock price will increase or decrease on the next day. The purpose of this experiment is to try to predict whether the highest price of a stock is going to increase or decrease on the next day by applying genetic algorithms.

Genetic algorithms are techniques to solve complex problems. The basis of these techniques relies on the natural processes of human evolution such as selection, reproduction and mutation. At the beginning, initial population of N chromosomes is randomly created. One evaluates its fitness and then does its reproduction to get better solutions with respect to the target problem. The chromosomes, which represent better solutions, are given more chance for reproduction than those which represent poorer solutions. This process continues for a number of generations after which an optimal solution is obtained.

The goal is finding connection weights of each attribute used for predicting the highest stock price. Each connection weight represents one binary composed chromosome. There are a total of six attributes used for each company since its first day on the market: Open price, Closing price, Highest price, Lowest price, Volume and Adjusted closing price. The summation of each attribute after multiplying by the

connection weight is given to the sigmoid function. This function is used to classify the next stock price into increasing or decreasing class. Table 1 shows the parameter settings for the genetic algorithm.

Parameters \ Values	
Population size	100
Crossover probability	1
Mutation probability	0.0253
Selection	Roulette Wheel
Stopping criteria	600 generations

Table 1. Parameter settings for the genetic algorithm

The fitness used in this problem is the number of times the connection weights result in predicting stock price correctly. So if it was able to predict the stock price correctly in 500 data points, then its fitness is 500. Two datasets are used for the experiment. One training dataset is used for finding the connection weights for each attribute while the testing dataset is used for verifying the result. Thus it can be checked if overfitting is occurring or not. Table 2 shows the accuracy of the algorithm to predict the highest stock price on both training and testing dataset for each of the eight companies.

Company \ Accuracy	Training data	Testing data
Adobe	52.7143%	61.3333%
Toshiba	58%	61%
Google	67.2269%	76%
Amazon	58.7143%	60%
Microsoft	63.8571%	62.6667%
IBM	67.1429%	62.6667%
Oracle	54.7143%	58.6667%
Facebook	60%	60%

Table 2. The accuracy with which the stock price was predicted for each company

The results obtained show that no overfitting occurred. The novel method of predicting stock prices using the genetic algorithm looks promising. Since the results obtained are above 55% in every case then we can test the performance on real-time data as well.

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