Implementing Genetic Algorithms in Finance Applications

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Abstract

This project investigates the use of genetic algorithms in a financial application of portfolio optimization. Genetic algorithms have long been used in optimization problems as well as the financial sector. Banks and hedge funds pay millions of dollars to programmers who can develop the most accurate optimization algorithms. What this project does is try to replicate that development on a very small scale- using only three different companies and 8 total shares in the portfolio. The genetic algorithm considers a number of factors in coming up with the optimized solution. These factors include an evaluation of the price to earnings ratio of the stock, the yield on the stock, and a special weight determining how diversified the portfolio is. While the metrics used are to an extent crude, they serve the purpose of demonstrating how a concept such as genetic algorithms can be used in the field of finance.

What are Genetic Algorithms?

Search technique used to find exact and approx. solutions

Used in optimization and search problems

“Evolutionary algorithim”

Inheritance, Crossover, Mutation, Crossover

Four phases: initialization, selection, reproduction, termination

User Customization

User picks 3 stocks

Stocks are assigned “point value” based on 3 metrics

Metrics are P/E closeness to 16, yield, and diversification

Random combinations of 8 shares amongst 3 stocks are generated
Combinations are ranked, and bottom half are eliminated
Top half are crossed over and re-ranked
Process continues until one solution remains

Reading in Data

Source code is imported from the Internet

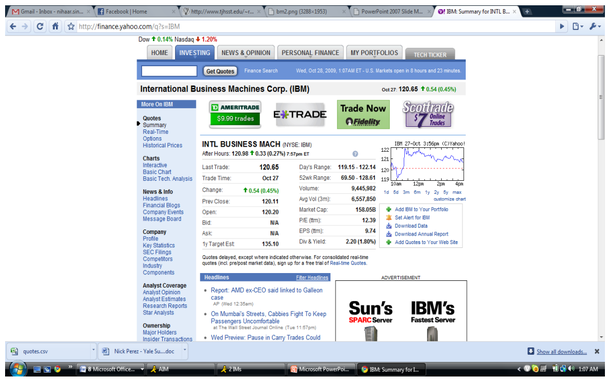
Data is parsed for keywords

Last Trade: “</small><big><b>

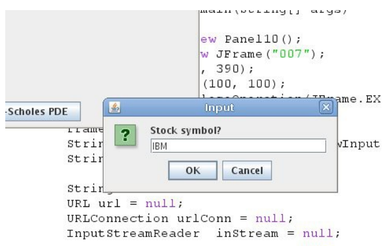
P/E :“:</th><td class="yfnc_tabledata1">

Parsing data means source must be permanent

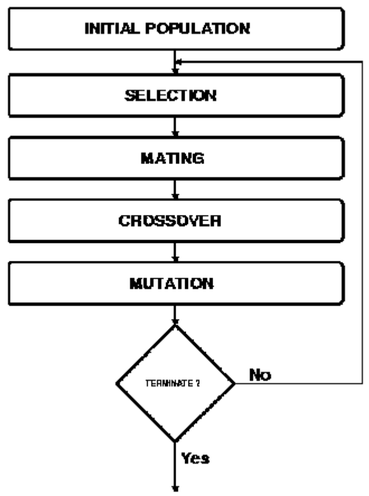
Source utilized is Yahoo! Finance



http://finance.yahoo.com/q?s=IBM



Genetic Algorithm



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Class Structure

The Main method prompts for the stock symbols and sends them to the Rank class for data mining and generation

Rank class imports data, calculates it, and formats it

Main method receives the data and runs the genetic algorithm