

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?

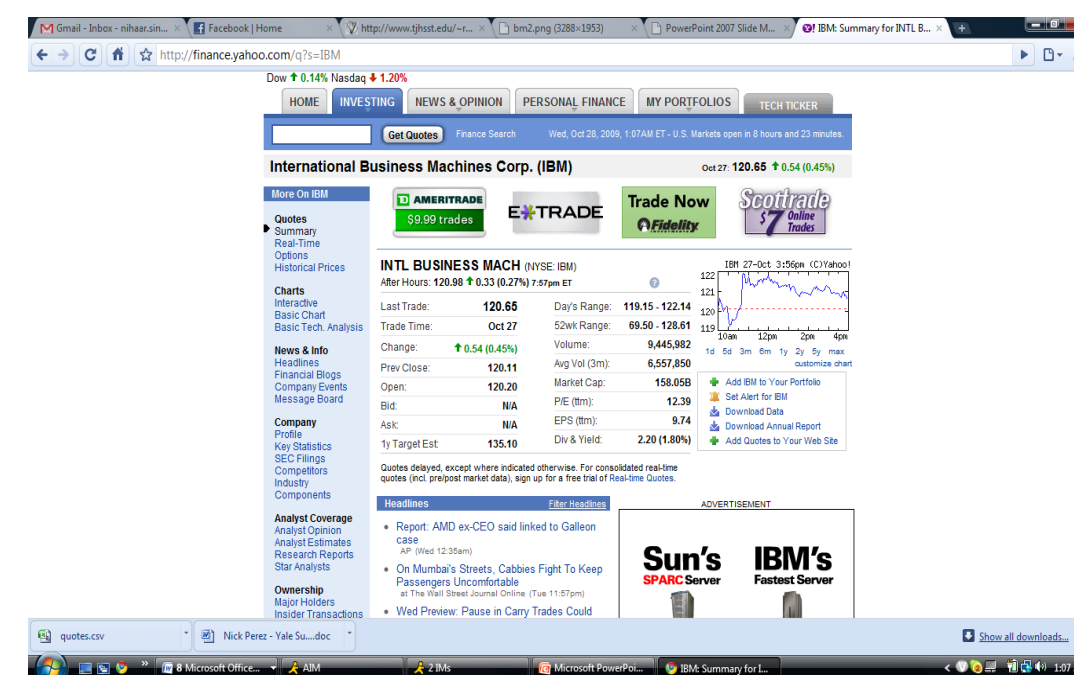
- Search technique used to find exact and approx. solutions
- Used in optimization and search problems
- “Evolutionary algorithm”
- Inheritance, Crossover, Mutation, Crossover
- Four phases: initialization, selection, reproduction, termination

User Customization

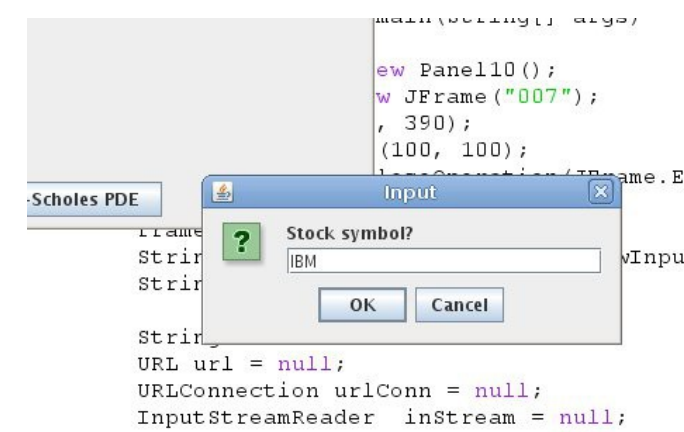
- User picks 3 stocks
- Stocks are assigned “point value” based on 3 metrics
- Metrics are P/E closeness to 16, yield, and diversification
- Random combinations of 8 shares amongst 3 stocks are generated
- Combinations are ranked, and bottom half are eliminated
- Top half are crossed over and re-ranked
- Process continues until one solution remains

Reading in Data

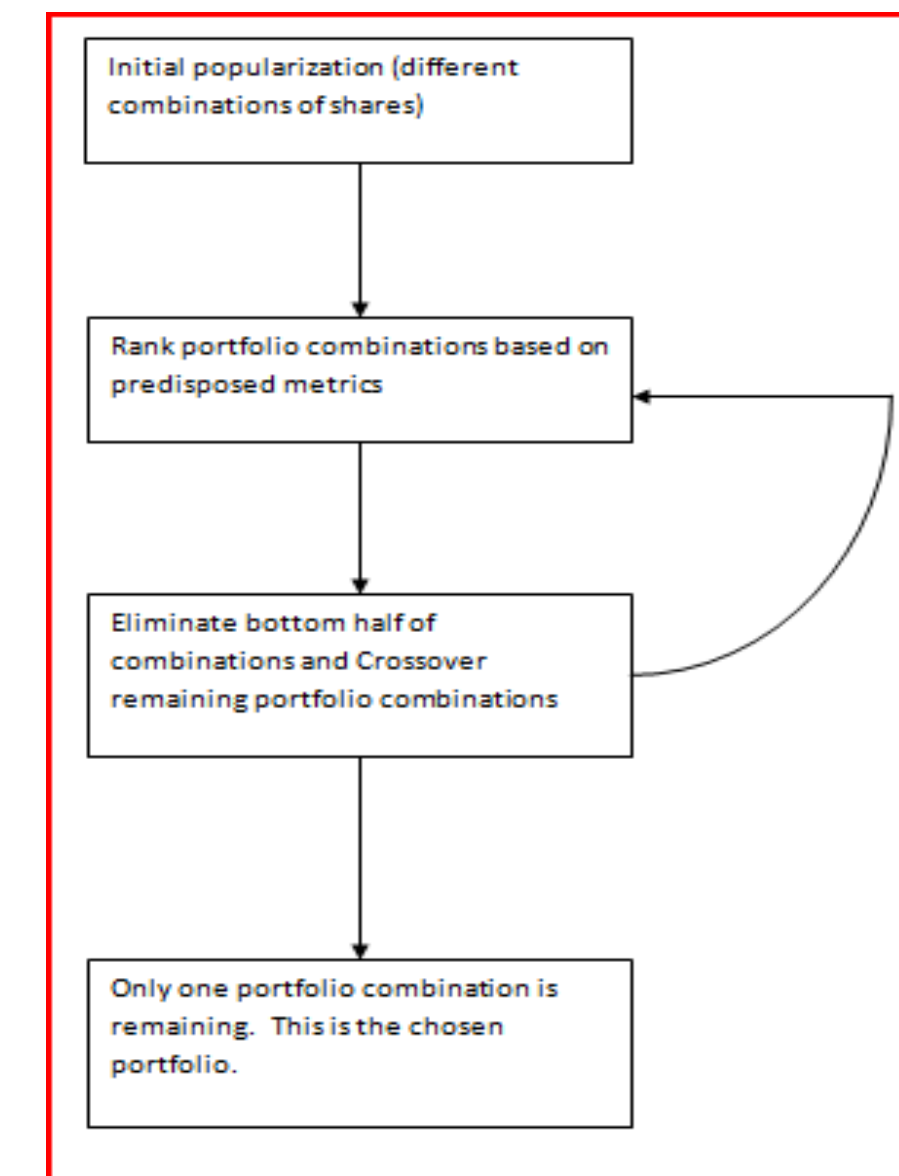
- Source code is imported from the Internet
- Data is parsed for keywords
- Last Trade: “</small><big>
- P/E :“:</th><td class=“yfnc_tabledata1”>
- Parsing data means source must be permanent
- Source utilized is Yahoo! Finance



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



Genetic Algorithm



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