Non-linear Stochastic Optimization Using Genetic Algorithm for Portfolio Selection

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Abstract⎯Portfolio optimization is an important research field in modern finance. The most important characteristic within this optimization problem is the risk of the returns. In this paper, a non-linear stochastic optimization algorithm named Stochastic Portfolio Genetic Algorithm (SPGA) is proposed to determine a profitable portfolio selection planning plan under risk. The algorithm improves a conventional two-stage stochastic programming by integrating a genetic algorithm into a stochastic sampling procedure to solve this large-scale portfolio selection optimization. The tradeoff between returns and risks is evaluated under different settings of algorithmic and hedging parameters. Finally, the historical data from Taiwan Stock Exchange are used to evaluate SPGA's performance. Results show that a practical problem can be efficiently solved and the expected return of SPGA outperforms the one in the market.

Keywords⎯Genetic algorithm, Portfolio selection, Stochastic programming