FUZZY APPROACH TO PORTFOLIO SELECTION USING GENETIC ALGORITHMS

RASHAD ALIEV
Eastern Mediterranean University
Gazimagusa, Turkish Republic of Northern Cyprus
Mersin 10

RAHIB ABIYEV
Near East University
Department of Computer Engineering
Lefkosha, Turkish Republic of Northern Cyprus
Mersin 10

MUSTAFA MENEKAY
Department of Computer Information Systems
Lefkosha, Turkish Republic of Northern Cyprus
Mersin 10

ABSTRACT—The portfolio construction problem usually has been viewed in the framework of risk-return trade-off. Using deterministic and stochastic portfolio models used to solve the problem lead to unrealistic results as both the expected return rate and the risk are vague. Moreover, the decision maker frequently deals with insufficient data when selecting a portfolio. Using fuzzy models allows removal of these drawbacks and permits the incorporation of the expert knowledge. However, the existing fuzzy portfolio selection models are mainly oriented to partial fuzzification of deterministic linear programming models (mainly modeling uncertainty in the return) without the incorporation of fuzzy risk. These models do not always allow effective management of the conflict between expected return and risk. They also suffer from high computational complexity resulting from the use of the classical fuzzy linear programming approach. In this paper we propose a fuzzy portfolio selection model based on fuzzy linear programming solved by genetic algorithm that provides for finding a global near-optimal solution with a reduction in computational complexity compared to the existing methods. The proposed model takes into account fuzzy expected return and investor’s fuzzy risk preference and gives chance of possibility trade-off between risk and return. This is obtained by assigning degree of satisfaction between criteria and constraints and defining tolerance for the constraints in order to obtain the goal value in the objective risk function. Experimental results demonstrate high efficiency of the proposed method.

Key Words: Portfolio selection, fuzzy portfolio optimization, fuzzy genetic learning