

Abstract: Portfolio optimisation is a major issue in the investment theory. The main issue in portfolio optimisation is selecting an optimal combination of securities according to risk and return. Due to diversity of stocks traded on the stock exchange as well as various criteria, decision problem is considered as a complex and hard problem. Thus, it is necessary to employ a combination of optimisation models, multiple attribute decision-making (MADM) and data mining for dealing with the complexity and difficulty of the problem. Accordingly, the present study aims to form a final portfolio in Tehran Stock Exchange using the hybrid approach of data mining and multiple-criteria decision-making (MCDM). According to this approach, the candidate stocks are first classified using C5 data mining algorithm based on the risk target. Then, the classes are ranked using the grey relation analysis. The final portfolio is formed through a multi-objective mathematical programming model based on the firefly algorithm which minimises the risk coefficient while maximising the rank.

Keywords: expert systems; portfolio optimisation; multicriteria decision making; MCDM; firefly algorithm; C5 algorithm; multiattribute decision making; MADM; metaheuristics; stock selection; securities; risks; returns; stocks; data mining; grey relational analysis; GRA.