

On the Use of Preference-based Evolutionary Multi-objective Optimization for Solving a Credibilistic Portfolio Selection Model

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Abstract

The portfolio selection problem tries to identify the assets to allocate the capital, and the proportion to be devoted to each asset, for maximizing the returns at the minimum risk. By nature, this is a multi-objective optimization problem. In this work, we propose a three-objective model for portfolio selection, in which the uncertainty of the portfolio returns is modelled by means of LR-power fuzzy variables. We consider as criteria the credibilistic expected return (to be maximized), the below-mean absolute semi-deviation as a risk measure (to be minimized), and a loss function which evaluates the credibility of achieving a non-positive return (to be minimized). The uncorrelation among the risk and loss measures concludes that they provide different information. Budget, cardinality, and diversification constraints are considered. To generate non-dominated portfolios fitting the investor's expectations, preference-based evolutionary algorithms are applied. The preferences are given by aspiration values to be attained by the objectives and profiles representing aggressive, cautious, and conservative investors are analysed. The results for data of the IBEX35 show that portfolios improving the preferences are found in the cautious and aggressive cases, while portfolios with objective values as close as possible to the expectations are obtained in the conservative case. In the generation process, the credibilistic loss has played an important role to find diversified portfolios.

Keywords: Fuzzy portfolio selection, Preference-based evolutionary multi-objective optimization, Decision Making, Credibilistic loss, Reference point.
