A Multi-population Algorithm for Multi-Objective Knapsack problem

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Résumé en anglais	Local search algorithms constitute a growing area of interest to approximate the Pareto sets of multi-objective combinatorial problem instances. In this study, we focus on the multi-objective knapsack problem and its optimization thanks to a multi-population based cooperative framework. The proposed approach, Wε-CMOLS, uses a multi-objective local search algorithm based on quality indicator (IBMOLS), initially presented by Basseur and Burke in 2007, and integrates it into a cooperative model. The idea is to optimize the overall quality of a Pareto set approximation by evolving several sub-populations in parallel, each population executing a different configuration of IBMOLS. The algorithm uses a weighted version of the epsilon quality indicator by means of different weight vectors. The populations cooperate through sharing a non-dominated archive, which stores the best compromises found during the optimization process, and which is used to re-initialize regularly each sub-population. Wε-CMOLS is compared with state-of-the-art algorithms such as IBEA, NSGA-II and SPEA2. Experiments highlight that the use of a cooperative model as well as a weighted indicator to guide the search toward different directions, can lead to interesting results for the multi-objective knapsack problem.
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