



Iterated responsive threshold search for the quadratic multiple knapsack problem

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Résumé en anglais

The quadratic multiple knapsack problem (QMKP) consists in assigning objects with both individual and pairwise profits to a set of limited knapsacks in order to maximize the total profit. QMKP is a NP-hard combinatorial optimization problem with a number of applications. In this paper, we present an iterated responsive threshold search (IRTS) approach for solving the QMKP. Based on a combined use of three neighborhoods, the algorithm alternates between a threshold-based exploration phase where solution transitions are allowed among those satisfying a responsive threshold and a descent-based improvement phase where only improving solutions are accepted. A dedicated perturbation strategy is utilized to ensure a global diversification of the search procedure. Extensive experiments performed on a set of 60 benchmark instances in the literature show that the proposed approach competes very favorably with the current state-of-the-art methods for the QMKP. In particular, it discovers 41 improved lower bounds and attains all the best known results for the remaining instances. The key components of IRTS are analyzed to shed light on their impact on the performance of the algorithm.

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