



# Iterated two-phase local search for the Set-Union Knapsack Problem

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Auteur Wei, Zequn [1], Hao, Jin-Kao [2]

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Many practical decision-making problems involve selecting a subset of objects from a set of candidate objects such that the selected objects optimize a given objective while satisfying some constraints. Knapsack problems such as the Set-union Knapsack Problem (SUKP) are general models that allow such decision-making problems to be conveniently formulated. Given a set of weighted elements and a set of items with profits where each item is composed of a subset of elements, the SUKP aims to pack a subset of items in a capacity-constrained knapsack in a way that the total profit of the selected items is maximized while their weights do not exceed the knapsack capacity.

Résumé en anglais In this work, we present an effective iterated two-phase local search algorithm for this NP-hard problem. The proposed algorithm iterates through two complementary search phases: a local optima exploration phase to discover local optimal solutions, and a local optima escaping phase to drive the search to unexplored regions. We show the competitiveness of the algorithm compared to the state-of-the-art methods in the literature. Specifically, the algorithm discovers 18 improved best results (new lower bounds) for the 30 benchmark instances and matches the best-known results for the 12 remaining instances. We also report the first computational results with the general CPLEX solver, including 6 proven optimal solutions. Finally, we investigate the impacts of the key ingredients of the algorithm on its performance.

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## Liens

- [1] <http://okina.univ-angers.fr/publications?f%5Bauthor%5D=39816>
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