Abstract

In this paper, we propose a multi-agent approach for solving the multidimensional multi-choice knapsack problem (called MMKP). The MMKP is an NP-Hard optimization problem in strong sense. It is considered as a combination of two other variants such as: the multi-choice knapsack problem (MCKP) and the multidimensional knapsack problem (MDKP). The MMKP can be applied in many problems in real world. It can model many industrial situations, such as capital budgeting, model of allocation resources and finance. The particular properties of the MMKP favor its decomposition into many MMKP sub-problems with small sizes. The assignment of sub-problems and the sharing of available resources are allocated to a first agent. Each subproblem is then solved by an agent. To work collaboratively, a strategic negotiation between agents has been defined. A coordinator agent (CA) will evaluate and merge the generated solutions to build a feasible solution to the initial problem. The choice rules
of the CA is modeled as a multidimensional knapsack problem (MKP). The proposed method is able to solve several instances of literature effectively, in particular for large size instances.

References

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Index Terms

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Keywords

Combinatorial optimization, Agents, multiple choice, knapsack problem