Reinforcement learning based local search for grouping problems: A case study on graph coloring

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Mots-clés	Grouping problems [4], Heuristics [5], Learning-based optimization [6], Reinforcement learning [7]
Résumé en anglais	Grouping problems aim to partition a set of items into multiple mutually disjoint subsets according to some specific criterion and constraints. Grouping problems cover a large class of computational problems including clustering and classification that frequently appear in expert and intelligent systems as well as many real applications. This paper focuses on developing a general-purpose solution approach for grouping problems, i.e., reinforcement learning based local search (RLS), which combines reinforcement learning techniques with local search. This paper makes the following contributions: we show that (1) reinforcement learning can help obtain useful information from discovered local optimum solutions; (2) the learned information can be advantageously used to guide the search algorithm towards promising regions. To the best of our knowledge, this is the first attempt to propose a formal model that combines reinforcement learning and local search for solving grouping problems. The proposed approach is verified on a well-known representative grouping problem (graph coloring). The generality of the approach makes it applicable to other grouping problems.
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