



Backtracking based iterated tabu search for equitable coloring

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Résumé en anglais

An equitable k -coloring of an undirected graph $G=(V,E)$ is a partition of its vertices into k disjoint independent sets, such that the cardinalities of any two independent sets differ by at most one. As a variant of the graph coloring problem (GCP), the equitable coloring problem (ECP) concerns finding a minimum k for which an equitable k -coloring exists. In this work, we propose a backtracking based iterated tabu search (BITS) algorithm for solving the ECP approximately. BITS uses a backtracking scheme to define different k -ECP instances, an iterated tabu search approach to solve each particular k -ECP instance for a fixed k , and a binary search approach to find a suitable initial value of k . We assess the algorithm's performance on a set of commonly used benchmarks. Computational results show that BITS is very competitive in terms of solution quality and computing efficiency compared to the state-of-the-art algorithm in the literature. Specifically, BITS obtains new upper bounds for 21 benchmark instances, while matching the previous best upper bound for the remaining instances. Finally, to better understand the proposed algorithm, we study how its key ingredients impact its performance.

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