Dynamic programming driven memetic search for the Steiner tree problem with revenues, budget and hop constraints

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Résumé en anglais	We present a highly effective dynamic programming driven memetic algorithm for the Steiner tree problem with revenues, budget, and hop constraints (STPRBH), which aims at determining a subtree of an undirected graph, so as to maximize the collected revenue, subject to both budget and hop constraints. The main features of the proposed algorithm include a probabilistic constructive procedure to generate initial solutions, a neighborhood search procedure using dynamic programming to significantly speed up neighborhood exploration, a backbone-based crossover operator to generate offspring solutions, as well as a quality-and-distance updating strategy to manage the population. Computational results based on four groups of 384 well-known benchmarks demonstrate the value of the proposed algorithm, compared to the state of the art approaches. In particular, for the 56 most challenging instances with unknown optima, our algorithm succeeds in providing 45 improved best known solutions within a short computing time. We additionally provide results for a group of 30 challenging instances that are introduced in the paper. We provide a complexity analysis of the proposed algorithm and study the impact of some ingredients on the performance of the algorithm.
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Liens

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