

Performance evaluation of a heuristics for the prize collecting Steiner tree problem

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Abstract

The prize collecting Steiner tree problem is one of the most important problems in the field of combinatorial optimization. The problem is known to be NP-hard, therefore it is hard to compute an optimal solution for the problem. We aim to find a better approximate solution. In this paper, we present a new heuristics for the prize collecting Steiner tree problem. We first introduce a weight function using penalty and cost functions. Next, the heuristics computes a spanning tree by a greedy approach. Finally, if there are some arcs such that the objective function value can be further improved, such arcs are deleted. The heuristics is simple and actually runs fast even when the size of an input is large. The heuristics is implemented. The average CPU time is about 165 milliseconds when the number of vertices and edges are 500 and 20000, respectively. Through computational experimentation, we compare the performances of the heuristics and a known 3-approximation algorithm.

Keywords

Prize collecting Steiner Tree problem, combinatorial optimization, heuristics

Biography

Yuki Hosokawa is a student of the master's course in the Graduate school of Science and Engineering, Hosei University. His research interests include combinatorial optimization.

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