Ding, Wei; Xue, Guoliang

Minimum diameter cost-constrained Steiner trees. (English) Zbl 1302.05174


Summary: Given an edge-weighted undirected graph \( G = (V, E, c, w) \) where each edge \( e \in E \) has a cost \( c(e) \geq 0 \) and another weight \( w(e) \geq 0 \), a set \( S \subseteq V \) of terminals and a given constant \( C_0 \geq 0 \), the aim is to find a minimum diameter Steiner tree whose all terminals appear as leaves and the cost of tree is bounded by \( C_0 \). The diameter of a tree refers to the maximum weight of the path connecting two different leaves in the tree. This problem is called the minimum diameter cost-constrained Steiner tree problem, which is NP-hard even when the topology of the Steiner tree is fixed. In this paper, we deal with the fixed-topology restricted version. We prove the restricted version to be polynomially solvable when the topology is not part of the input and propose a weakly fully polynomial time approximation scheme (weakly FPTAS) when the topology is part of the input, which can find a \((1 + \varepsilon)\)-approximation of the restricted version problem for any \( \varepsilon > 0 \) with a specific characteristic.

MSC:

- 05C82 Small world graphs, complex networks (graph-theoretic aspects)
- 68W25 Approximation algorithms
- 90C35 Programming involving graphs or networks
- 05C22 Signed and weighted graphs
- 68Q25 Analysis of algorithms and problem complexity

Full Text: DOI

References:


Spriggs, MJ; Keil, JM; Bespamyatnikh, S; Segal, M; Snoeyink, J, Computing a $(1+\epsilon)$-approximate geometric minimum-diameter spanning tree, Algorithmica, 38, 577-589, (2004) - Zbl 1138.68477 · doi:10.1007/s00453-004-1056-z


This reference list is based on information provided by the publisher or from digital mathematics libraries. Its items are heuristically matched to zbMATH identifiers and may contain data conversion errors. It attempts to reflect the references listed in the original paper as accurately as possible without claiming the completeness or perfect precision of the matching.