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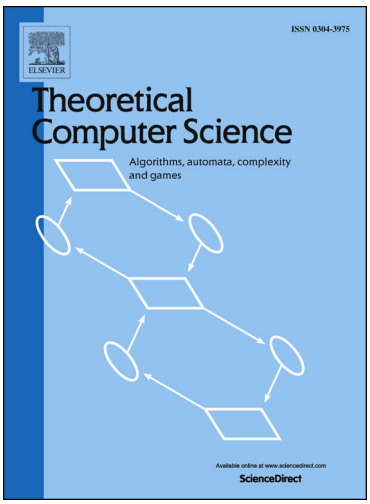

Upgrading min-max spanning tree problem under various cost functions

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Upgrading min-max spanning tree problem under various cost functions

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Abstract This paper addresses upgrading min-max spanning tree problem (MMST). Given a graph $G(V, E)$, the aim of this problem is to modify edge weights under certain limits and given budget so that the MMST with respect to perturbed graph improves as much as possible. We present a complexity result for general non-decreasing cost functions. In special case, it is shown that the problem under linear and sum-type Hamming cost function can be solved in $O(|E|^2)$ and $O(|E| \log |E| \log |V|)$ time, respectively.

Keywords location problems · upgrading problems · min-max spanning tree.

1 Introduction

Usually the instances of classical network optimization problems are static and realistic, but, applications often admit some improvements of parameters under specific circumstances. This leads to the area of network "upgrading" problems. In these special network modification problems, one may invest a budget in order to change the parameters (weights of edges or vertices) of the given network within certain limits such that the optimal objective value with respect to the modified parameters is minimized while the topological structure of the graph remains unchanged [1,2]. In this paper we consider the upgrading min-max spanning tree (MMST) problem where a budget for reducing the weights of edges is assigned and

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