Minimax Regret Path Location on Trees

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1 Introduction

This paper deals with those networks location problems under uncertainty that are characterized by a situation in which the actual weights of the vertices and of the edges of the network are not known, but, for each vertex and each edge, only an interval of possible values is given. In location problems such a situation arises for example when, for each demand point, an interval estimate of its demand is known. For a given objective function - that obviously depends on the demands - a facility must be located in order to minimize the worst-case loss in the objective function that may occur because the weight of each client is not known exactly. In the literature, these problems are known as "minimax regret" location problems. In the recent years, the attention was mainly focused on problems related to facilities that correspond to single points and a variety of results was provided for tree networks[1–7]. In the different papers the uncertainty is related to the weights of the vertices of the network and/or to the weights of its edges.

In this paper we study the minimax regret path location problem on trees. In particular, we consider a tree with nonnegative lengths assigned to its edges, while it is known that the weight of each vertex belongs to a given interval of values, that is, we have an upper and a lower bound on such weight. We study the following two problems: the *Minimax Regret Path Center Problem* (MRPCP) and the *Minimax Regret Median Path Problem* (MRMPP). These problems refer to the minimization of the maximum regret function when the path is located w.r.t. the center and to the median criterion, respectively. To the best of our knowledge these problems have not been considered yet in the literature; for both we provide polynomial time algorithms.

Keywords: Minimax regret, Path location, Robust optimization.

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