46th Annual Iranian Mathematics Conference
25-28 August 2015
Yazd University

Talk An optimal algorithm for reverse obnoxious center location problems on graphs pp.: 1–4

An optimal algorithm for reverse obnoxious center location problems on graphs

Behrooz Alizadeh
Sahand University of Technology

Roghayeh Etemad*
Sahand University of Technology

Abstract

This paper is concerned with a reverse obnoxious center location problem on graphs in which the aim is to modify the edge lengths within a given budget such that a predetermined facility location on the underlying graph becomes as far as possible from the existing customer points under the new edge lengths. We develop a combinatorial algorithm which solves this problem in linear time.

Keywords: Obnoxious center location; Reverse optimization; Combinatorial optimization.
Mathematics Subject Classification [2010]: 90C27, 90B80, 90B85, 90C35

1 Introduction

Location problems are basic optimization models in the area of operation research which have significant applications in practice and theory. These problems ask to find the best locations of facilities on graphs or on real spaces in order to serve the existing clients. The facilities on a system could be either desirable or undesirable (obnoxious), where the aim of an obnoxious facility location model is to establish one or more facilities as far as possible from the clients while fulfill their demands.

In practice, some times we are faced with the situations that we should change some input patameters of the graph in order to improve the existing locations of the facilities. Such problems are mainly categorized into *inverse and reverse location problems* in the literature. Whereas, in an inverse location problem the goal is to modify certain parameters of the problem under investigation at minimum total cost such that predetermined facility locations become optimal, the task of a reverse location model is to improve the given locations by changing some parameters within a given budget constraint. In this case, the improved graph works as efficient as possible.

For the reverse 1-center location problem on an unweighted tree, an algorithm with running time $\mathcal{O}(n^2 \log n)$ was proposed by Zhang et al. [5]. In 2009, Alizadeh et al. [2] considered the inverse 1-center location problem with edge length augmentation on tree networks and developed an $\mathcal{O}(n \log n)$ time combinatorial algorithm using a set of suitably extended AVL-search trees. Later, Alizadeh and Burkard [1] showed that the inverse absolute and vertex 1-center model can be solved in $\mathcal{O}(n^2)$ time provided that no

*Speaker