

Abstract

Emad F Wanas

The Location of Center-Median Facility on a Network with Unreliable Edges

Facility location problems are one of the hot areas of research for centuries. Currently, there exists an intensive interdisciplinary interest in facility location problems. Economists, engineers from numerous disciplines, management scientists, mathematicians, operations researchers, regional scientists, technical geographers, transportation systems designers, and urban planners have contributed different analyses and different solutions to facility location problems even each defines "facility" differently. In this thesis, we study of the problem of a facility location on a network that considers two criteria the minmax criterion (center problem) and the minisum criterion (median problem). We will incorporate reliability aspects related to the fact that edge transmission may fail. The main results of this thesis is to locate a single facility on a network with unreliable edges. Three problem are studied: 1) The reliable 1-center problem. We seek for a node which maximizes the expected number of nodes that are reachable from it. The users are concerned with the network capability of establishing a route to some service provider. The objective function is formally stated as either minimizing the maximum expected number of unsuccessful responses to demand requests over all nodes, named the reli-minmax problem, maximizing the minimum expected number of successful responses to demand requests over all nodes, named the reli-maxmin problem, as sub-problems of the most general reliable 1-center problem. 2) The reliable 1-median problem. It is the problem of finding the location of a single facility on a network that minimize the expected total number of unsuccessful responses to demand requests over all nodes. 3) The reliable cent-dian problem. It is the convex combination of the above two problems.