AM/E/c Queuing Hub Maximal Covering Location Model with Fuzzy Parameter

Authors : M. H. Fazel Zarandi, N. Moshahedi

Abstract : The hub location problem appears in a variety of applications such as medical centers, firefighting facilities, cargo delivery systems and telecommunication network design. The location of service centers has a strong influence on the congestion at each of them, and, consequently, on the quality of service. This paper presents a fuzzy maximal hub covering location problem (FMCHLP) in which travel costs between any pair of nodes is considered as a fuzzy variable. In order to consider the quality of service, we model each hub as a queue. Arrival rate follows Poisson distribution and service rate follows Erlang distribution. In this paper, at first, a nonlinear mathematical programming model is presented. Then, we convert it to the linear one. We solved the linear model using GAMS software up to 25 nodes and for large sizes due to the complexity of hub covering location problems, and simulated annealing algorithm is developed to solve and test the model. Also, we used possibilistic c-means clustering method in order to find an initial solution.

Keywords : fuzzy modeling, location, possibilistic clustering, queuing