

TOTAL FACILITY CONSTRUCTION PLANNING PROBLEM

HIROAKI ISHII

Received April 3, 2019

Abstract

This paper consider the following construction problem with various type facilities, i.e., type 1: an emergency facility, type 2: semi-obnoxious one, type 3: welcome one, type 4: not so far but not so near one and type 5: supply center of school lunch. There are finite possible construction sites F_1, F_2, \dots, F_n in a rectangular area $U = \{a \leq x \leq b, c \leq y \leq d\}$ and construction cost c_{ij} depends on the construction site F_j and facility type $T_i, i = 1, 2, 3, 4, 5, j = 1, 2, \dots, n$. We use A-distance and except construction cost, for T_i , weighted maximum distance from the emergency facility to the hospital via accident site $D_{1,j}$ to be minimized among $j = 1, 2, \dots, n$ For $T_\ell, \ell = 2, 3, 4$. the minimal satisfaction degree μ_{ij} with respect to the membership function about A-distance from the facility site to be maximized among $j = 1, 2, \dots, n$ and for T_5 , the latest lunch delivery time t_{5j} of schools among possible construction site F_j should be minimized. Main problem is as follows.

Each facility $T_i, i = 1, 2, 3, 4, 5$, is constructed at just one possible site so that total construction cost and weighted total sum $w_1 M_{1j_1} + w_2 M_{2j_2} + \dots + w_5 M_{5j_5}$ should be minimized where j_k is construction site of $T_k, k = 1, 2, 3, 4, 5$. This problem becomes bi-criteria problem and we seek non-dominated solutions. Finally we discuss further research problems.