A tri-objective model for locating a semi-desirable facility in the plane

José Fernández
Dpt. of Statistics and Operations Research
University of Murcia, Murcia, Spain
josefdez@um.es

Juana L. Redondo and Pilar M. Ortigosa
Dpt. of Informatics
Agrifood Campus of International Excellence, ceiA3
University of Almería, Almería, Spain
{jlredondo,ortigosa}@ual.es

Aránzazu G. Arrondo
Indra, Madrid, Spain
agarrondo@ual.es

Abstract

We consider the problem of locating a single semi-desirable facility in the plane. Three objectives are taken into consideration. The first one maximizes the efficiency of the service provided by the facility to some users, by minimizing the sum of weighted distances between the facility and those users. The second one minimizes the social cost caused by the undesirable effects produced by the facility, by minimizing the sum of the repulsions of the affected people (as they feel it). The third one aims to distribute the repulsions fairly (as equal as possible) among the affected people. Two recent general-purpose multi-objective evolutionary algorithms, MOEA/D and FEMOEA, are suggested to obtain a discrete approximation of its Pareto-front. A computational study shows that both algorithms are suitable to cope with the problem, although FEMOEA seems to obtain slightly better results, especially for larger instances.

Keywords: Semi-desirable facility, Nonlinear tri-objective optimization problem, Gini index, Pareto-front, Evolutionary algorithms