

## FUZZY FACILITY LOCATION PROBLEM WITH PREFERENCE OF CANDIDATE SITES AND ASYMMETRIC A-DISTANCE

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Received April 2010; revised August 2010

**ABSTRACT.** *We consider the asymmetric A-distance though it is not a metric due to the asymmetry in a rigorous sense. However, it reflects on an actual situation of urban areas that time from the demand point to the facility depends on the passing direction and in some places slopes and so it is asymmetric. Further, most residents in urban areas hope that even the city office should not be so near and so far from their homes. That implies the judge criteria existing in residents' mind are conflicting, while the local government considers the preference of the facility location site, from the point of construction cost, land cost, etc. So, we propose the following model considering the satisfaction degree with respect to the asymmetric A-distance from the facility for each customer (residents) and preference of the site. 1) The region we consider here is the rectangular urban area and several demand points are set up in this area. 2) For each demand point, satisfaction degree with respect to the asymmetric A-distance to the facility is defined and it is denoted by the membership function. 3) The preference of the site as a candidate point of the facility is also given. The objective is to find the non-dominated sites of the facility maximizing both minimal satisfaction degree among all demand points and its preference.*

**Keywords:** Facility location, Demand points, Asymmetric A-distance, Minimal satisfaction degree, Preference of candidate sites

**1. Introduction.** There exist huge number of facility location models and Hamacher et al. [1] tried to classify them using similar codes to queue and schedule. Widmayer et al. [2] have introduced A-distance that is a generalization of rectilinear distance used in the urban area. For rectilinear distance, we should refer to [3] as a classic but successful model and efficient algorithm due to geometrical approach. In order to use more realistic distance, we consider asymmetric A-distance though, in a rigorous sense, it is not a metric due to the asymmetry. Further, most residents in urban areas hope that even the city office should not be so near and so far from their homes. That implies the judge criteria existing in residents' mind are conflicting. As a similar model from a facility type, E. Carrizosa and E. Conde [4] have considered a semi-desirable facility. However, most researches on a facility location we consider so far are classified the facility into either desirable facility (typical one is a public facility) or undesirable one (e.g., [5-7]), while local government considers the preference of the facility location site, from the point of construction cost, land cost, etc. So, we propose the following model considering the satisfaction degree