

Facility location problem

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Notations:

m = number of facilities, index: $i = 0, 1, 2, \dots$

n = number of customer nodes, index: $j = 0, 1, 2, \dots$

k = X and Y coordinates: $(0, 1)$

d_{jk} = k coordinate (X, Y) of customer j

Decision variables:

f_{ik} = coordinate k of facility i

y_{ij} = 1 if customer j is assigned to cluster of facility i, 0 otherwise

Problem formulation:

objective function:

$$\sum_{i,j} (y_{ij} * x_{ij}) : \min \quad (\text{non-linear}) \quad (1)$$

s.t:

$$\sum_j y_{ij} = 1 \quad \forall i \quad (2)$$

$$x_{ij} = \text{euclidean distance } (f_i, d_j) \quad \forall i, j \quad (3)$$

$$y_{ij} \in (0, 1) \quad (4)$$