Facility location problem

Sudhan Bhattarai

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Notations:
m = number of facilities, index: i = 0, 1, 2, ...
n = number of customer nodes, index: j = 0, 1, 2, ...
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
x_{ij} = distance between facility i and customer j
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 (non-linear) (1)

s.t:
$\sum_j y_{ij} = 1 \quad \forall i$ (2)
x_{ij} = euclidean distance $(f_i, d_j) \quad \forall i, j$ (3)
$y_{ij} \in (0, 1)$ (4)