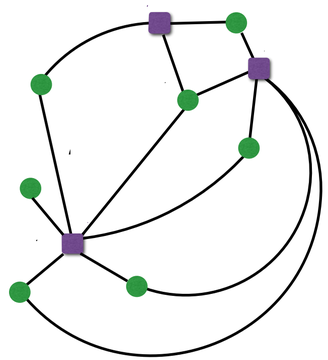
Facility location

IP model

Variables

$x_{ij} = 1$ iff client j is assigned to facility i

$y_i = 1$ iff facility i is open



IP model

Constraints

Each client is assigned to some facility

$$\sum_{i \in F} x_{ij} \geq 1, \qquad j \in C$$

and

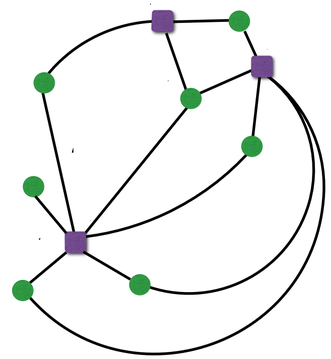
If at least one client is assigned to facility i then facility i has to be open

$$y_i - x_{ij} \geq 0, \qquad j \in C,\ i \in F$$

IP model

Objective

$$\text{minimize} \quad \sum_{i \in F} \sum_{j \in C} c_{ij} x_{ij} + \sum_{i \in F} f_i y_i$$



IP model

$$\text{minimize} \quad \sum_{i \in F} \sum_{j \in C} c_{ij} x_{ij} + \sum_{i \in F} f_i y_i$$

$$\text{subject to} \quad \sum_{i \in F} x_{ij} \geq 1, \qquad j \in C$$

$$y_i - x_{ij} \geq 0, \qquad j \in C,\ i \in F$$

$$y_i \in \{0, 1\}, \qquad i \in F$$

$$x_{ij} \in \{0, 1\}, \qquad j \in C,\ i \in F$$

Linear programming relaxation

$$\text{minimize} \quad \sum_{i \in F} \sum_{j \in C} c_{ij} x_{ij} + \sum_{i \in F} f_i y_i$$

$$\text{subject to} \quad \sum_{i \in F} x_{ij} \geq 1, \qquad j \in C$$

$$y_i - x_{ij} \geq 0, \qquad j \in C,\ i \in F$$

$$y_i \in \{0, 1\}, \qquad i \in F$$

$$x_{ij} \in \{0, 1\}, \qquad j \in C,\ i \in F$$

$$0 \leq y_i \leq 1, \qquad i \in F$$

$$0 \leq x_{ij} \leq 1, \qquad j \in C,\ i \in F$$

Facility location