9/29/14

Integer Linear Programming

ILP is linear programming plus some variables have to be integer.

Capital Budgeting

n projects which may or may not be carried out.

Project j requires a_{ij} dollars in period $i = 1, 2, \cdots, m$

In total there is at most b_i dollars available in period i.

Project j will produce c_j dollars if undertaken

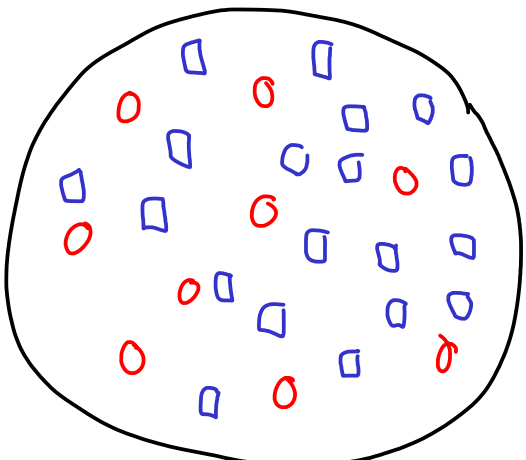
Variables: x_j = 0 do not carry out project j
1 carry out project j.

Maximise revenue $= c_1 x_1 + c_2 x_2 + \cdots + c_n x_n$

$$a_{i1} x_1 + a_{i2} x_2 + \cdots + a_{in} x_n \leq b_i \quad i = 1, 2, \ldots m$$

② Plant Location : m sites for possible depot ○

n customers □



Costs f_i to build depot i

$c_{ij}\theta$ to satisfy proportion $0 \leq \theta \leq 1$ of customer j's demand

Must satisfy all demand

Variables y_i: 0 do not build i, 1 build i — x_{ij} = proportion of demand j sat from i

Minimise cost $= f_1y_1 + f_2y_2 + \cdots + f_my_m + \sum_i \sum_j c_{ij}x_{ij}$

building cost — supply cost

$$\sum_{i=1}^{m} x_{ij} = 1 \quad \forall j$$

$$x_{ij} \leq y_i \quad \forall i,j$$

$$0 \leq x_{ij} \leq 1$$