



Why

We consider a multiple knapsack problem in which different knapsacks have different profits and weights.

Definition

Denote by $[m]$ and $[n]$ the sets $\{1, \dots, m\}$ and $\{1, \dots, n\}$, respectively. Given $p : [m] \times [n] \rightarrow \mathbf{R}$, $w : [m] \times [n] \rightarrow \mathbf{R}_+$, $c : [m] \rightarrow \mathbf{R}_+$, find $x : [m] \times [n] \rightarrow \{0, 1\}^n$ to

$$\begin{aligned} & \text{maximize} && \sum_{i=1}^m \sum_{j=1}^n p_{ij} x_{ij} \\ & \text{subject to} && \sum_{j=1}^n w_{ij} x_{ij} \leq c_i, \quad i = 1, \dots, m \\ & && \sum_{j=1}^n x_{ij} \leq 1, \quad i = 1, \dots, m \\ & && x_{ij} \in \{0, 1\} \quad i = 1, \dots, m, j = 1, \dots, n \end{aligned}$$

The above is called a *generalized assignment problem*.

