Mathematical Model

Parameters

- N: Number of files

- $Capacity$: Total capacity of a floppy disk

- $Size_j$: Size of file j for $j = 1, 2, \ldots, N$

Decision Variables

- x_{ij}: Binary variable that is 1 if file j is placed on floppy disk i, and 0 otherwise

- y_i: Binary variable that is 1 if floppy disk i is used, and 0 otherwise

Objective Function

Minimize the number of floppy disks used:

$$\min \sum_{i=1}^{N} y_i$$

Constraints

1. The sum of file sizes on each floppy disk cannot exceed the capacity:

$$\sum_{j=1}^{N} Size_j \cdot x_{ij} \leq Capacity \cdot y_i \quad \forall i = 1, 2, \ldots, N$$

2. Each file must be placed on exactly one floppy disk:

$$\sum_{i=1}^{N} x_{ij} = 1 \quad \forall j = 1, 2, \ldots, N$$

3. Binary constraints for decision variables:

$$x_{ij} \in \{0, 1\} \quad \forall i = 1, 2, \ldots, N, \quad \forall j = 1, 2, \ldots, N$$

$$y_i \in \{0, 1\} \quad \forall i = 1, 2, \ldots, N$$