

Mathematical Model for Hiring Translators

Parameters

- N : Number of translators
- M : Number of required languages
- $Cost_i$: Cost of hiring translator i , for $i = 1, 2, \dots, N$
- $Languages_i$: Set of languages that translator i can translate, for $i = 1, 2, \dots, N$
- $RequiredLanguages$: List of required languages, indexed by $j = 1, 2, \dots, M$

Decision Variables

- x_i : Binary variable indicating whether translator i is hired (1) or not (0), for $i = 1, 2, \dots, N$

Objective Function

Minimize the total cost of hiring translators:

$$\min \sum_{i=1}^N Cost_i \cdot x_i$$

Constraints

- Each required language must be covered by at least one hired translator:

$$\forall j \in \{1, 2, \dots, M\}, \quad \sum_{i: j \in Languages_i} x_i \geq 1$$

- Binary constraints for decision variables:

$$\forall i \in \{1, 2, \dots, N\}, \quad x_i \in \{0, 1\}$$