



SNS College of Engineering Coimbatore - 641107



Assignment problem

AP/IT

Example 3: The Assignment Problem

There are n people who need to be assigned to n jobs, one person per job. The cost of assigning person i to job j is $C[i,j]$. Find an assignment that minimizes the total cost.

| | Job 0 | Job 1 | Job 2 | Job 3 |
|----------|-------|-------|-------|-------|
| Person 0 | 9 | 2 | 7 | 8 |
| Person 1 | 6 | 4 | 3 | 7 |
| Person 2 | 5 | 8 | 1 | 8 |
| Person 3 | 7 | 6 | 9 | 4 |

Algorithmic Plan: Generate all legitimate assignments, compute

their costs, and select the cheapest one.

$n!$

How many assignments are there?

cycle cover in a graph

Pose the problem as one about a cost matrix:

Assignment Problem by Exhaustive Search

$$C = \begin{matrix} & 9 & 2 & 7 & 8 \\ 6 & 4 & 3 & 7 & \\ 5 & 8 & 1 & 8 & \\ 7 & 6 & 9 & 4 & \end{matrix}$$

Assignment (col.#s)

1, 2, 3, 4

1, 2, 4, 3

1, 3, 2, 4

1, 3, 4, 2

1, 4, 2, 3

1, 4, 3, 2

Total Cost

$$9+4+1+4=18$$

$$9+4+8+9=30$$

$$9+3+8+4=24$$

$$9+3+8+6=26$$

$$9+7+8+9=33$$

$$9+7+1+6=23$$

etc.

(For this particular instance, the optimal assignment can be found by exploiting the specific features of the number given. It is:)

2,1,3,4