SNS COLLEGE OF TECHNOLOGY

Coimbatore-35
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Approved by AICTE, New Delhi & Affiliated to Anna University, Chennai

DEPARTMENT OF INFORMATION TECHNOLOGY

19ITB201 – DESIGN AND ANALYSIS OF ALGORITHMS

II YEAR IV SEM

UNIT-II-BRUTE FORCE AND DIVIDE AND CONQUER

TOPIC: Brute Force-Assignment Problem

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BRUTE FORCE ASSIGNMENT PROBLEM

Subject :Design and Analysis of Algorithm
Unit :II

EXHAUSTIVE SEARCH

- Traveling Salesman Problem
- Knapsack Problem
- Assignment problem

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Exhaustive search

Exhaustive search is simply a brute-force approach to combinatorial problems such as permutation, combination and sum of subsets

The method:

- Generate a list of all the potential solutions to the problem
- selectthe solution that satisfy all the constraints, and then
- Find the desiredsolution that optimizes some objective function.

Assignment problem:

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

	Job 1	Job 2	Job 3	Job 4
Person 1	9	2	7	8
Person 2	6	4	3	7
Person 3	5	8	1	8
Person 4	7	6	9	4

Algorithmic Plan:

- Generate all legitimate assignments,
- compute their costs, and
- select the cheapest one.

We can describe feasible solutions to the assignment problem as n-tuples $\langle j1, \ldots, jn \rangle$ in which the ith component = $1, \ldots, n$, indicates the column of the element selected in the i th row (i.e., the job number assigned to the ith person). For e xample, for the cost matrix above, $\langle 2, 3, 4, 1 \rangle$ indicates the assignment of Person 1 to Job 2, Person 2 to Job 3, Person 3 to Job 4, and Person 4 to Job 1.

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

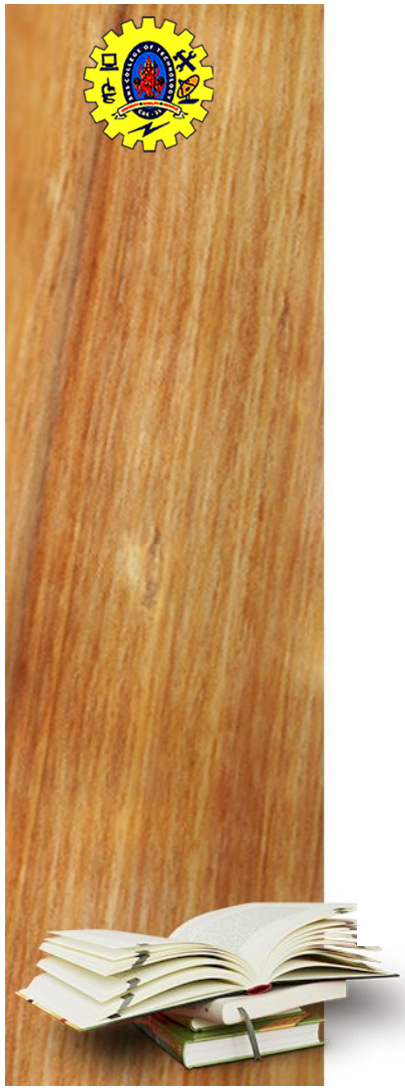
<1, 2, 3, 4> cost = 9 + 4 + 1 + 4 = 18
<1, 2, 4, 3> cost = 9 + 4 + 8 + 9 = 30
<1, 3, 2, 4> cost = 9 + 3 + 8 + 4 = 24
<1, 3, 4, 2> cost = 9 + 3 + 8 + 6 = 26
<1, 4, 2, 3> cost = 9 + 7 + 8 + 9 = 33
<1, 4, 3, 2> cost = 9 + 7 + 1 + 6 = 23

etc.

(First few iterations of solving a small instance of the assignment problem by exhaustive search)

Analysis:

T(n)=n!



Thank you!