

Unit-II

PART-1 Brute Force And Divide And Conquer.

Brute Force.

→ A straightforward approach, usually based directly on problem's Statement & definitions of concept involved.

→ Generally it involved iterating through all possible solutions until a valid one is found.

Ex:

1. Computing a^n ($a > 0$)
2. Computing $n!$ $n * (n-1)$
3. Multiplying 2 matrix $C = A \cdot B$
- A. Search Key for given Value list.

(Sorting, Searching, convex hull, Closest-pair problems).

Closest-pair problems:

Find the two closest points in a set of 'n' points (in the two dimensional Cartesian plane).

Alg:

Brute force closest pair (P)

// Find the distance b/w two closest pair points in the plane by brute force.

1) I/P: A list P of $(n \geq 2)$ pt $p_1 (x_1, y_1) \dots p_n (x_n, y_n)$

2) O/P: The distance b/w the closest pair of pt.

$D = \infty$

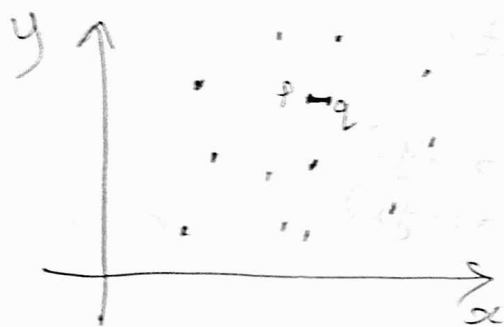
for $i = 1$ to $n-1$ do

for $j = i+1$ to n do

$d = \min(d, \sqrt{(x_i - x_j)^2 + (y_i - y_j)^2})$

return d .

Time complexity of the alg is $O(n^2)$.



Application:

It is used to cluster analysis in Statistics.

$$C(n) = \sum_{i=1}^{n-1} \sum_{j=i+1}^n 2$$

$$= 2 \cdot \sum_{i=1}^{n-1} (n-i)$$

$$= 2 [(n-1) + (n-2) + \dots + 1]$$

$$= (n-1) \cdot n \in O(n^2)$$