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Section: 11

Task_5

Time complexity of BFS (Task-2):

If the gnaph is represented as adjacency list and there are V number of nodes/ vertex and E number of edges in the gnaph.

We can discover all neighbors of each node by traversing it's adjacency list just once in linear time. (Each neighboring vertex is inserted once into a queue and also each visited vertex is marked so it can not be visited again)

⇒ So, the sum of the size of adjacency lists of all the nodes / vertex is E in case of directed gnaph. As each vertex maintains a list of all its adjacent edges.

Therefore, the time complexity in case of adjacency list = $O(V) + O(E)$

$= O(V+E)$

Again, if the graph is represented as an adjacency matrix (Basically, a $V \times V$ array).

In order discover all the outgoing edges of each node, we have to traverse an entire row of length V in the matrix. Point to be noted, each rao of the adjacency matrix corresponds to a node in the graph. That row includes information about edges that emerge from the vertex.

Therefore, time complexity in case of adjacency matrix = $O(V \times V) = O V^2$

Time complexity of DFS (Task-3):-

Let, V= number of venter and E= number of edges in the gnaph.

If the gnaph is nepnesented as adjaceney list, (Like BFS, we can discoven all its neighbons by scaning its adjaceney list just once in linean time.) so, the gnaph. sum of the sizes of adjacent list is E like BFS.

Thenefone, the time complexity in this case = $O(E+V)$

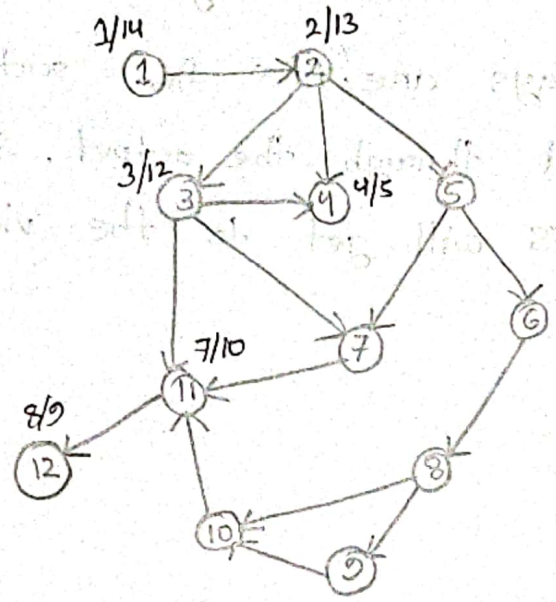
Again,

adjaneency matnix (VXV)

Like BFS, each now stones infonmation about edges emenging fnom the node and the discoven all its outgoing edges we have to scan an entine now of length V.

So, time complexity of the DFS in this case = $O(V^2)$.

Gany (used the DFS algorithm) gets to the victory road first.



Performing BFS:

Queue

1	2	3	4	5	7	11	6	12	8

Dequeue 1 2 3 4 5 7 11 6 12

steps 1 2 3 4 5 6 7 8 9

Performing DFS:

1 2 3 4 7 11 12

steps 1 2 3 4 5 6 7

From the above simulation we can see, who are using DFS will get to the victory road first. But we know, we always are used BFS for shortest paths but as we have to find through the output. So, those who are using DFS will get to the victory road first.