CSE-221

LAB-3

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20201220

08

Task: 4 [~~Please Read It~~ Summary is at END]

For BFS in adjacency list

- Here we visit a node and check the neighbours connected to it.
- As we check all neighbours connected it means we check all edges connected with that particular node.

As checking all edges make Time Complexity $O(E)$

But, as we add each Node to queue and pop so it has a time complexity of $O(V)$

So, in general we say $O(V+E)$, If one of them is larger then other one will automatically be non-dominant. so it will be either $O(V)$ or $O(E)$ depending which is larger. Thus for general case Time Complexity = $O(V+E)$

For BFS in adjacency Matrix

In Adjacency Matrix time complexity doesn't depend on number of edges.
In Adjacency Matrix we have to check all coloumns connespond to related row, Thus Time complexity is $O(V)$, but this has to be done for all vertices making time Complexity of $O(V^2)$

For DFS in Adjacency List

Logic here is pretty similar to BFS, only change is instead of exploring ~~th~~ all the neighbors completely we start exploring the neighbours with it for example in our case 2 is connected with 3, 4, and 5 so we enter 3 and start looking for neighbors of 3 rather than going to 4.

- So to visit ~~a~~ all vertexes it take V time
  ∴ O(V)
- The we explore the neighbors on edges thus ~~to~~ E time is taken ∴ O(E)

∴ In general we write O(V + E)

For DFS in Adjacency Matrix

To check ~~each~~ all coloumns connespond to related rows time taken is V but to check all ~~colour~~ vertices time taken will be V^2

~~The~~ ∴ $O(V^2)$

Which is faster

Garry will reach victory road faster as he uses DFS and in our case using DFS takes least amount of places to reach victory road.

Summary

	BFS	DFS
Matrix	$O(V^2)$	$O(V^2)$
list	$O(V+E)$	$O(V+E)$

Winner: Granny using DFS

less nodes are travelled compared to BFS given in our question