BFS vs DFS - Time & space complexity

Breadth-first search (BFS)

Exploration: which checks the graph by level by level.

and it is used queue (FIFO) data structure

Time complexity:

visiting all vertices → $O(N)$

Exploring all edges → $O(E)$

total = $O(N+E)$

Space complexity:

Queue may hold up to $O(N)$ nodes in the worst case

Graph storage (adjacency list) = $O(N+E)$

Overall = $O(N+E)$

Depth First Search (DFS)

Exploration: Goes deep along one path, then then comes back to explore alternatives

It uses stack or recursion stack

Time complexity:

visiting all vertices → $O(N)$

Exploring all edges → $O(E)$

total = $O(N+E)$