Name :- Pulkit Bansal
Sec :- G
Branch :- C.S.E core
Roll No. :- 30
Univ. Roll No. :- 2014789

Tutorial Sheet - 5

Ans ①

BFS	DFS
→ BFS stands for breadth first search.	→ DFS stands for Depth First Search.
→ BFS uses queue to find the shortest path.	→ DFS uses stack to find the shortest path.
→ BFS is better when target is closer to source.	→ DFS is better when target is far from source.
→ As BFS considers all neighbour so it is not suitable for decision tree used in puzzle games.	→ DFS is more suitable for decision tree. As with one decision, we need to traverse further to augment the decision. If we reach the conclusion, we won.
→ BFS is slower than DFS.	→ DFS is faster than BFS.
→ Time complexity of BFS = O(V+E) where V is vertices and E is edges.	→ Time complexity of DFS is also O(V+E) where V is vertices & E is edges.

Ans ② BFS does the Search for nodes level by level, i.e. it searches the nodes will report to their distance from root. Here, siblings are executed before children. We use "Queue" as it is FIFO data structure. we visit the node which is

discovered first from the root.

For DFS, we retrieve it from root to the bottom node as much as possible, same idea as LIFO. Therefore, we use stack data structure. Here children are visited before the siblings.

Any ③ A graph with relatively few edges is sparse sparse graph is a graph $G(V, E)$ is curics $|E| = O(|V|)$
edge → Vertex.

A graph with many edges is dense.

Dense graph is a graph $G(V, E)$ in which $|E| = O(|V^2|)$

Adjacency list can be used for sparse-Graph where Adjacy Matrix can be used for Dense Graph.

Any ④ Detect a cycle in a Directed Graph using BFS:-

1) Compute in degree number of incoming edges, for each of the vertex present in the graph and units-able count of visited nodes as 0.

2) Pick all the vertices with in degree as 0 and add them into a queue. (Enqueue operation).

3) Remove a vertex from the Queue. (Degree operation) and then:
→ Increment count of visited nodes by 1.
→ decrease is degree by 1 for all its neighbouring nodes
→ If is degree of a neighbouring nodes is reduced to zero,

then. add it to the queue.

→ Repeat step-3 untill the queue is empty.
→ If count of visited nodes is not equal to the number of nodes in the graph has cycle, otherwise not.

* Detect A Cycle in a directed graph using DFS:

1) Create the graph using the gives number of edges and vertices.
2) Create a recursive function that initializes the current indese or vertese visited, and recursion stack.
3) Mark the current node as visited and also mark the indese in recursion stack.
4) find all the vertices, which are not visited and are adjacent to the current node. Recursively call the function for its ose vertices, i.e, the recursive function returns. there.
5) If the adjacent vertices are already marked in the recursion stack then return True.
6) Create a wrapper class, that calls the recursive function for all the vertices and if any function returns true return true. Else if for all vert. as the function returnsfalse. return false.

Ans ⑨ Heaps are grew for emplementing a priority queue bcz of the largest and smallest element at the root of the tree for a max heap and min heap respectively.

→ We use a max heap for max-priority queue and a min heap for a min priority queue.

Applications

① Dijkstra's shortest path algorithm using hashig queue- When the graph is stored in the form of adjacency list or matrix, priority queue can be used to extract minimum efficient when implementing algorithm.

② Prim's Algorithm :- It is used to implement prism's Algorithm to store keys of nodes and extract minimum key node at every step.

③ Data compression :- It is used in Huffman codes which is used to compress data.

Ans ⑩

Min Heap	Max Heap
→ In a min heap the key present after root node must be less than as request to among the keys present all of its criteria.	→ In Max heap the key present at the root node must be greater than or equal to among the keys present at all of its children.
→ In a Min heap the Minimum key element present at the root.	→ In a max-heap, the maximum key element present at the set.
→ A min heap uses the ascending priorities	→ A max heap was the descending priority.

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