

Assignment No. 4

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1. Explain Uniform Search.

Ans.

Uninformed Search is a class of general purpose search algorithm which operate in brute force way.

Uninformed Search algorithms do not have additional information about State or Space space other than how to traverse the space so it is also called blind Search.

Following are the various types of uninformed search algorithm.

- 1) Breadth first Search.
- 2) Depth first search.
- 3) Depth limited Search.
- 4) Iterative deepening depth first search.
- 5) Uniform cost Search.
- 6) Bi-directional Search.

10. Breadth first search

→ a) Breadth first search is the most common search strategy for traversing, a tree or graph.

b) This algorithm starts searching from root node of the tree and expands all successor nodes at the current level before moving to nodes of next level.

c) The breadth first search algorithm is example of general graph search algorithm.

Advantage

① BFS will provide solⁿ if exist

② If there are more than one solution for given problem then, BFS will provide the minimal solution which required the least number of steps.

E Disadvantage

① It Requires lot of memory since each level of the tree must be saved into memory to expand the next level.

② BFS Need lot of time if the solution is far away from the Root Node.

2 Depth first search

① Depth First Search is a Recursive algorithm for traversing a tree or graph data structure.

② It is called the depth first search because it starts from the Root Node and follow each path to its greatest depth node before moving to next path.

③ DFS uses a stack data structure for its implementation.

④ The process of the DFS algorithm is similar to the BFS algorithm.

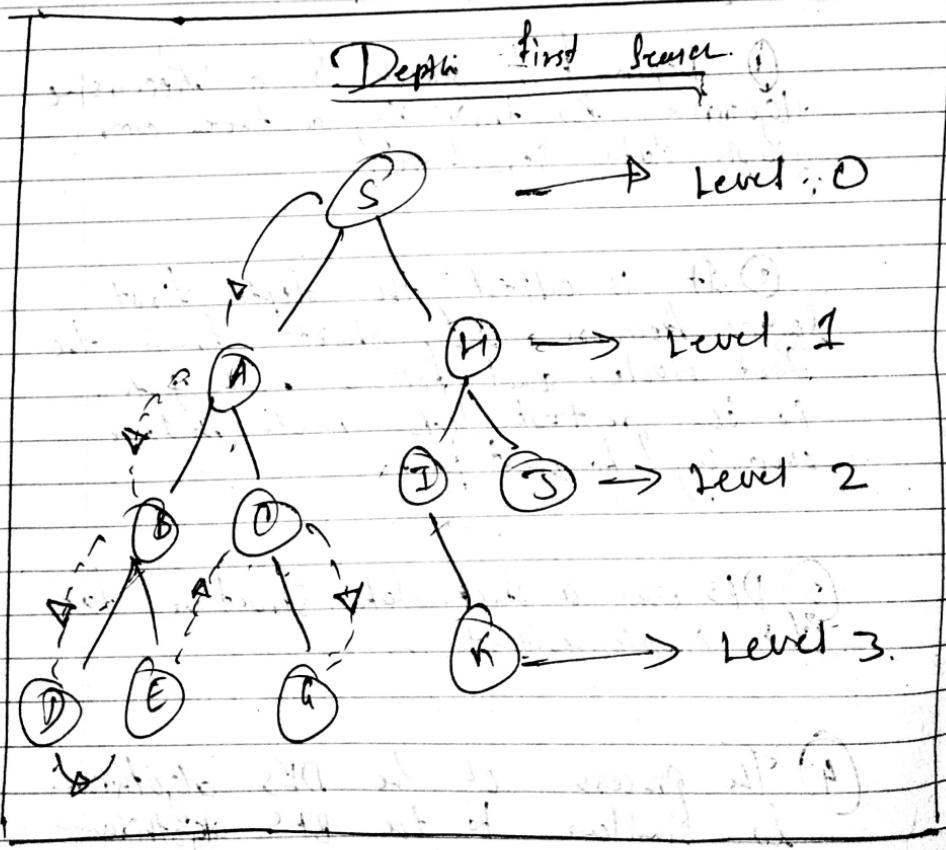
Advantage of DFS:

DFS Required very less memory as it only need to store of the node in an array from Root Node to the current node.

Disadvantage

There is the possibility that many states keep Re-occurring and there is no guarantee of finding the solution.

Depth first search



Q2. Explain DFS with example.

Ans

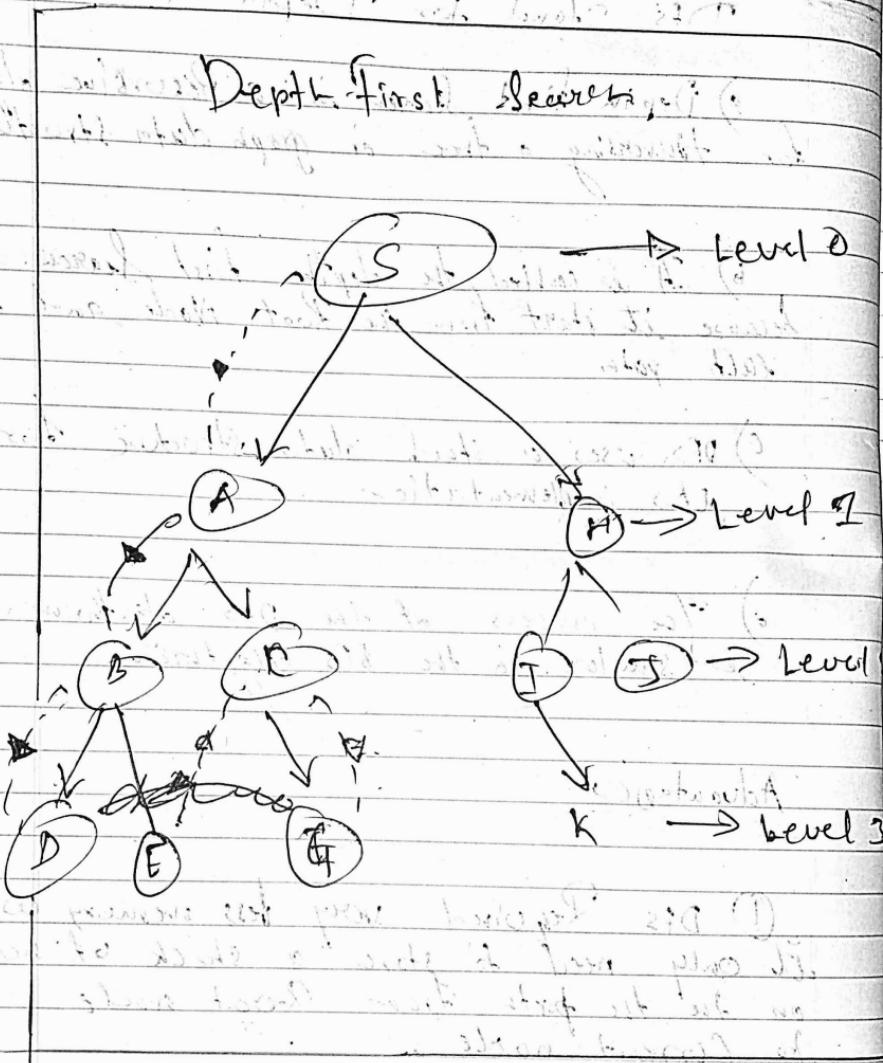
DFS stand for Depth first Search.

- a) Depth first search is a recursive algorithm for traversing a tree or graph data structure.
- b) It is called the depth first search because it starts from the Root Node and follows each path.
- c) DFS uses a stack data structure for its implementation.
- d) The process of the DFS algorithm is similar to the BFS algorithm.

Advantages:

- ① DFS requires very less memory as it only needs to store a stack of nodes on the path from Root node to Current node.
- ② DFS algorithm goes for deep down searching and sometimes it may go to the infinite loop.

Example: In the below search tree, ~~we~~ Time flows
of depth first search and follow order
w.s. Root Node \rightarrow Left Node \rightarrow Right Node



It starts searching from Root node
and traverse A, then B, then C, then D and E, after traversing E, it will
backtrack for free as E has no other successor and will.
goal node is not found after
backtracking it will traverse
and G.

① Completeness: DFS search algorithm

is complete within finite space as it will expand every node within a limited search tree.

② Time Complexity:

Time complexity of DFS will be equivalent to node travelled by the algorithm ..

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3. Explain BFS With example?

Ans. ① BFS Stand for Breadth first Search.

② BFS is most common Search Strategy for traversing a tree or "graph".

③ This algorithm search breadthwise in a tree or graph so it is called breadth first Search.

④ The Breadth first algorithm is an example of a general graph search algorithm.

⑤ Breadth first search implement using FIFO queue data structure.

Advantage

① BFS will provide a Solution if any solution provide exists.

② If there are more than one solution for given problem the BFS will provide all the multiple solution.

Disadvantage:

- ① BFS will provide a solution if any solution exists. (Advantage)

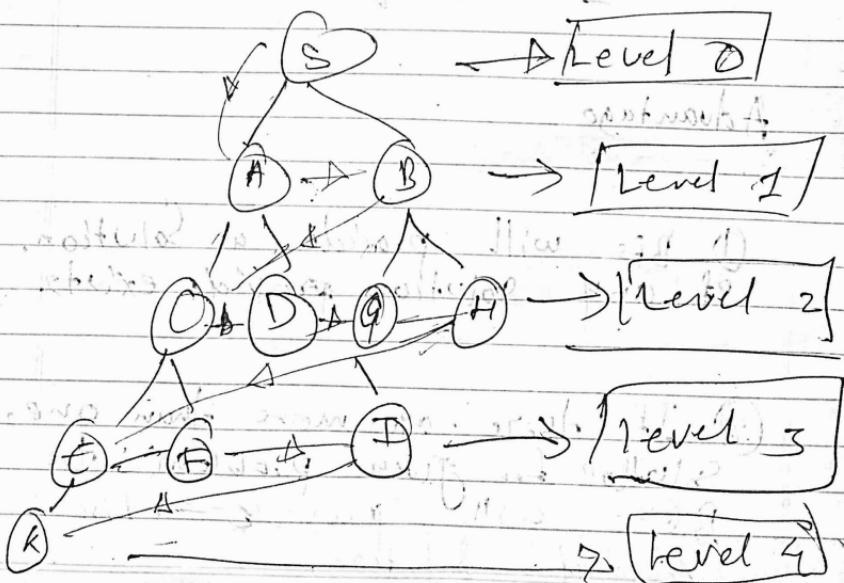
② It requires lot of memory since each level of tree must be saved into memory to expand Next level.

③ BFS need lot of time, if the solution is far away from the Root node.

Example

$S \rightarrow A \rightarrow B \rightarrow E \rightarrow D \rightarrow G \rightarrow H$
 $\quad \quad \quad E \rightarrow F \rightarrow I \rightarrow K$

Breadth First Search
 not able to search depth wise



Time Complexity

Time Complexity of BFS algorithm can be obtained by the number of nodes traversed in BFS until the shallowest node.

Where a is depth of shallowest solution and b is node at every stage

Space Complexity

Space Complexity of BFS Algorithm is given by the memory size of frontier when BFS will find solution.

Optimality: BFS is optimal if path cost is non-decreasing function of depth of the node.

(4) Differentiate between DFS and BFS.

Ans. BFS

1. BFS stands for Breadth first search.

2. BFS (Breadth first search) uses queue data structure for finding the shortest path.

3. BFS can be used to find single source shortest path in an unweighted graph because in BFS we reach a vertex with minimum number of edges from source vertex.

4. BFS consider all neighbour first and therefore not suitable for decision making used in game or puzzle.

DFS

1. DFS stands for Depth first search.

2. DFS (Depth first search) use stack data structure.

3. DFS is In DFS, it more suitable, when there are more solution away from source.

4. DFS is more suitable for game or puzzle problem.

we make decision then explore all path through this decision.

And if this decision lead to win situation we Stop.

5.) The time complexity of BFS is $O(V+E)$.

When Adjacency

List used and $O(V+E)$ stand for

vertices and E stand for edges.

6.) Here Sibling are visited before the children.

5] The time complexity of DFS is also $O(V+E)$ when Adjacency matrix is used

6] Here, children are visible before the sibling.