

Aim :- To solve any problem in AI and implement Depth First search.

Title :- Solve any problem in AI and implement Depth search First algorithm (DFS)

Theory :-

Depth First Search :-

DFS is also important type of uninformed search. It visits all the vertices in the graph. This type of algorithm always choose to go deeper into the graph. After DFS visited all the reachable vertices and continues the search.

DFS reminds the space limitation of Breadth First search by always generating next child of the deepest unexpanded node. The data structure stack is used for DFS algorithm implementation.

- It is uninformed search technique.
- We use LIFO approach in this algorithm.
- We generally search for deepest node.
- It might or might not give complex soln.
- The time complexity of DFS =  $O(b^d)$ 
  - $b \Rightarrow$  Branch Factor
  - $d \Rightarrow$  depth of Node
- This search take place vertically
- For this algorithm to be successful, we usually need backtracking concept of programming.

Algorithm :-

- Step ① : PUSH the starting node into the stack
- Step ② : If the stack is empty then stop and

return failure

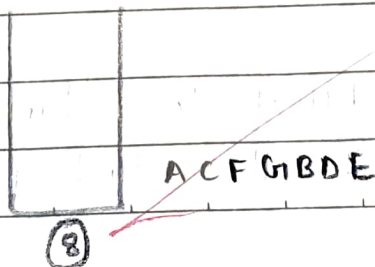
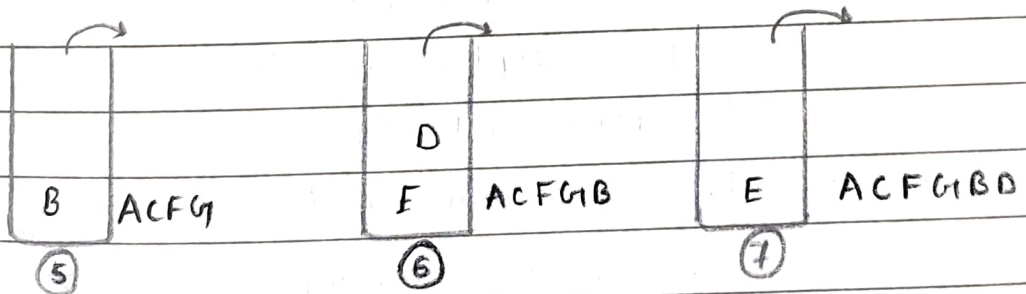
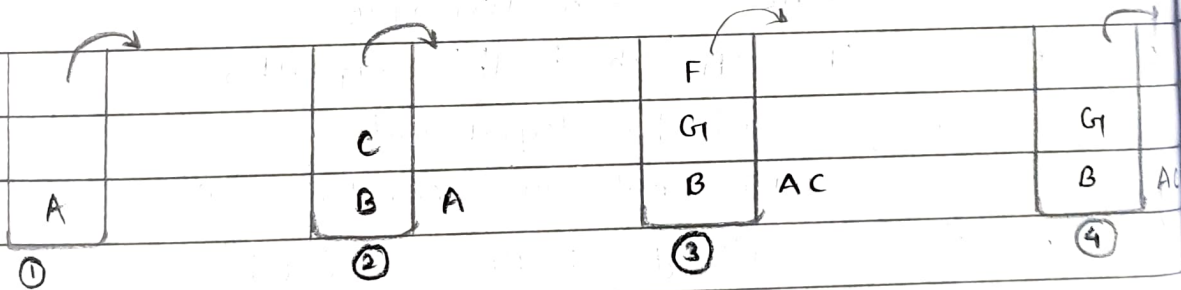
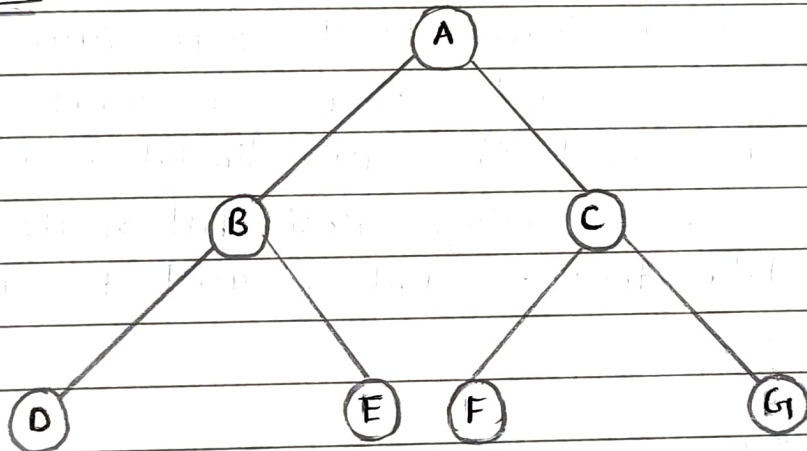
step ③ : IF the top node of the stack is the node then stop and return success.

step ④ : Else POP the top node from the stack process it. Find all neighbours that are in state and PUSH them into the stack in any order.

step ⑤ : Go to step ③

step ⑥ : Exit

Example :-



### Advantages :-

- ① Consumes Very less memory space.
- ② It will search at the goal node in a less time period than BFS if it traverses in a right path.
- ③ It may find solution without examination whole nodes.
- ④ If there are multiple solutions, then DFS stops when first solution is found, whereas BFS gives all the sol<sup>n</sup> at the time.

### Disadvantages :-

- ① There is possibility that it may go down the leftmost path forever. Even a finite graph can generate an infinite tree.
- ② It is possible that states may keep reoccurring.

### Conclusions :-

We have successfully understand and implemented Depth First search algorithm.

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