

ABDUL RAFEH

CSC-205-104

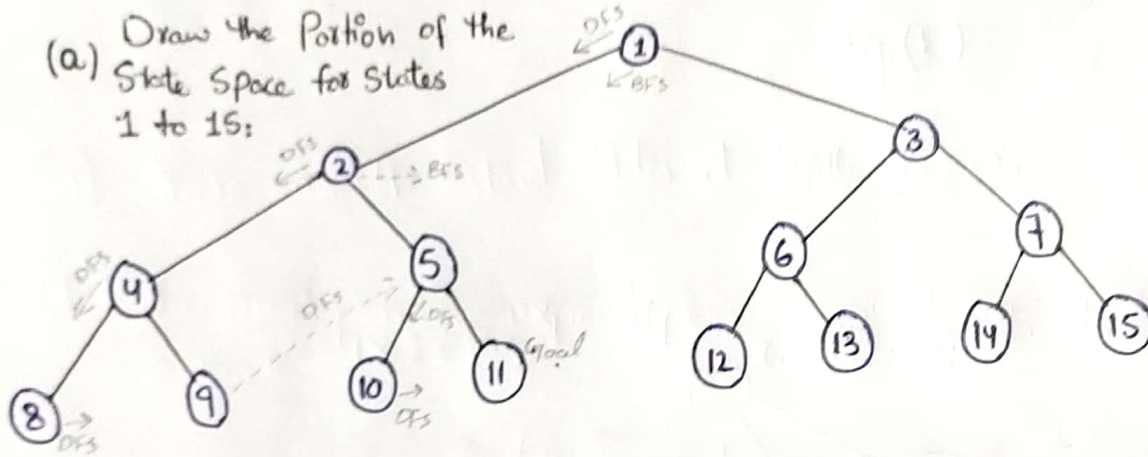
E "Evening"

AI Assignment #01

Sis: ZUBAIR

PROBLEM #01

- (a) Draw the Portion of the State Space for States 1 to 15:



- (b) Suppose the goal state is 11 list the order in which nodes will be visited for BFS, DFS with limit 3, and IDS.

Searching goal state:

BFS: $1 \rightarrow 2 \rightarrow 3 \rightarrow 4 \rightarrow 5 \rightarrow 6 \rightarrow 7 \rightarrow 8 \rightarrow 9 \rightarrow 10 \rightarrow 11 \rightarrow \text{goal}$

DFS: $1 \rightarrow 2 \rightarrow 4 \rightarrow 8 \rightarrow 9 \rightarrow 5 \rightarrow 10 \rightarrow 11 \rightarrow \text{goal}$

IDS: $1, 1 \rightarrow 2 \rightarrow 3, 1 \rightarrow 2 \rightarrow 4 \rightarrow 5 \rightarrow 3 \rightarrow 6 \rightarrow 7, 1 \rightarrow 2 \rightarrow 4 \rightarrow 8 \rightarrow 9 \rightarrow 5 \rightarrow 10 \rightarrow 11 \rightarrow \text{goal}$

- (c) Yes, In this Problem the Predecessor of each State x is $(x/2)$, which is easily Computable. Assuming BFS in both forward & backward direction.

forward
Backward
forward
Backward

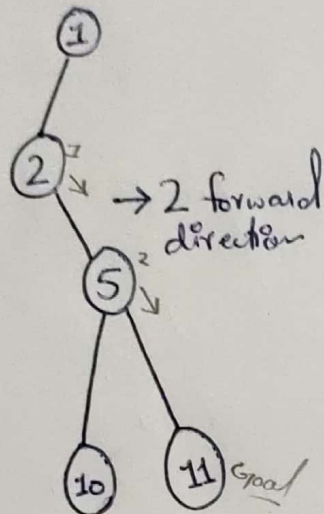
visited node
1
11
2
5

fringe
forward fringe = {2, 3}
Backward fringe = {5}
forward fringe = {3, 4, 5}
Backward fringe = {2}

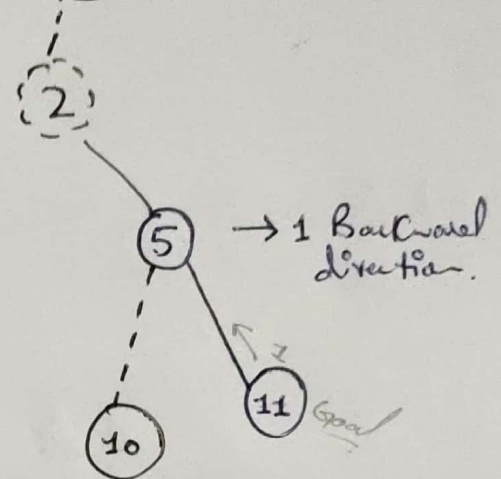
Algorithm Stopped when Search in backward direction visited node 5, because node 5 is in the fringe of forward direction.

(d) for reaching goal (11) we need to follow tree. as Per tree start state from 1 to goal state 11 have 2 forward and 1 backward direction.

eg:- forward

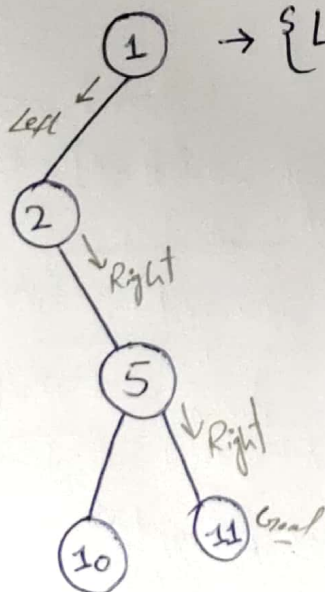


Backward



(e) Yes, we start from goal state, let node = 1 from original start state be new goal. each state have only one next state since the new problem branching factor = 1.

eg:- $\rightarrow \{Left, Right, Right\}$.



PROBLEM # 02

The given grid (b)
branching factor
is 6.

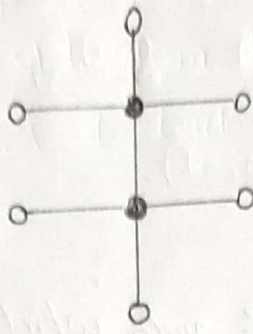
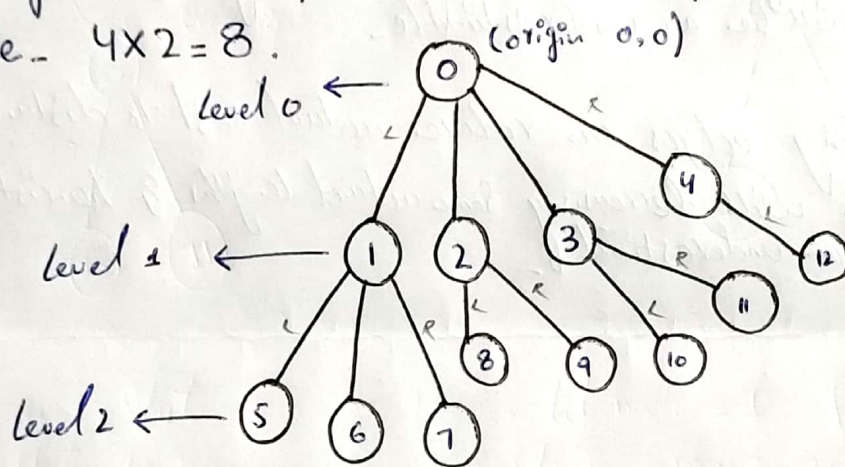


fig. (b)

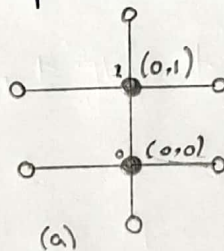
(a) There are 4 distinct states at depth $K > 0$.

(b) The origin node expanded 4 and depth its expanded to 8 node. $4 \times 2 = 8$.



(c) The maximum node expanded at level 2 is = 8 node.

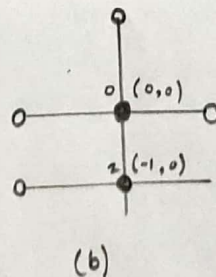
(d) ^(a)
 $0 = (0, 0)$
 $1 = (0, 1)$



$$d = \sqrt{(x_1 - x_2)^2 + (y_1 - y_2)^2}$$

$$= \sqrt{0 + (-1)^2} = \sqrt{1}$$

$$\boxed{= 1}$$



$0 = (0, 0)$
 $2 = (-1, 0)$

$$= \sqrt{(0 - (-1))^2 + (0)^2}$$

$$= \sqrt{1}$$

$$\boxed{= 1}$$

