Experiment No. 5
Implementation of A* search for problem solving.
Date of Performance:
Date of Submission:

CSL502: Artificial Intelligence Lab

Aim: Implementation of A* search for problem solving.

Objective: To study the informed searching techniques and its implementation for problem solving.

Theory:

Informed search algorithm contains an array of knowledge such as how far we are from the goal, path cost, how to reach to goal node, etc. This knowledge help agents to explore less to the search space and find more efficiently the goal node.
The informed search algorithm is more useful for large search space. Informed search algorithm uses the idea of heuristic, so it is also called Heuristic search.
Heuristics function: Heuristic is a function which is used in Informed Search, and it finds the most promising path. It takes the current state of the agent as its input and produces the estimation of how close agent is from the goal. The heuristic method, however, might not always give the best solution, but it guaranteed to find a good solution in reasonable time. Heuristic function estimates how close a state is to the goal. It is represented by h(n), and it calculates the cost of an optimal path between the pair of states. The value of the heuristic function is always positive.
Greedy best-first search algorithm always selects the path which appears best at that moment. It is the combination of depth-first search and breadth-first search algorithms. It uses the heuristic function and search. Best-first search allows us to take the advantages of both algorithms. With the help of best-first search, at each step, we can choose the most promising node. In the best first search algorithm, we expand the node which is closest to the goal node and the closest cost is estimated by heuristic function, i.e.

1. f(n)= g(n).

Were, h(n)= estimated cost from node n to the goal.
The greedy best first algorithm is implemented by the priority queue.

A* search algorithm:

! "
$ %
#
$ % & &
' #

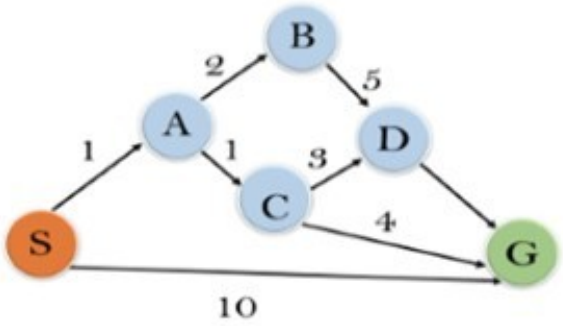
(

Advantages:

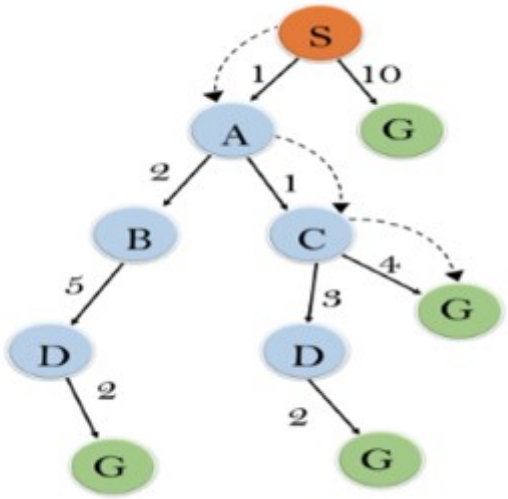
Disadvantages:

Example:

In this example, we will traverse the given graph using the A* algorithm. The heuristic value o f all states is
given in the below table so we will calculate the f(n) of each state using the formula f(n)= g(n) + h(n), where g(n) is the cost to reach any node from start state.



State	h(n)
S	5
A	3
B	4
C	2
D	6
G	0



CSL502: Artificial Intelligence Lab

) **+, - **+. /0 1
) **+, **+ - **+, **+2 3 **+. /0 1
) **+, **+ ***+. 4 **+,** +*** +% // **+,** +2 3 **+. /0 1
5 4

! "#$%% $%%&

, 6 7

'

(

, 6 & 7

! "

)

8 & , 6 5

9 ! , 6
& ! ! !
&: & &

! 9 ! , 6 " #$%

Conclusion:

Comment on your implemented Program and result you got.

CSL502: Artificial Intelligence Lab