Roll no:- 41310

Assignment AIR1

Page No.:

Date:

* **Title:-** A* search Algorithm.

* **Problem statement:-** Solve 8 puzzle problem using A* Algorithm.

* **objective:-** To learn & implement A* algorithm

* **out Come:-**

students will be able to implement A algorithm for 8 puzzle problem.

* **S/W & H/W packages:-**

operating system:- windows or opensource linux
python interpreter

* **Theory:-**

A* Algorithm is a computer algorithm. that is widely used in path finding and graph traversal the process of plotting an efficiently traversable path between multiple points called nodes. It is used for its performance and accuracy.

The key feature of A* is it keeps a track of each visited node which helps in ignoring the nodes that are already visited

It also has a list that holds all nodes that are left to be explored and it chooses most optimal node from the list. Thus saving time not exploring unnecesary or less optimal nodes.

So, we use two list open list & close list. The open list contain all node that are being generated and are not existing in closed list and each node explored after each neighbour node explore and neighbours in open list is how nodes are expanded.

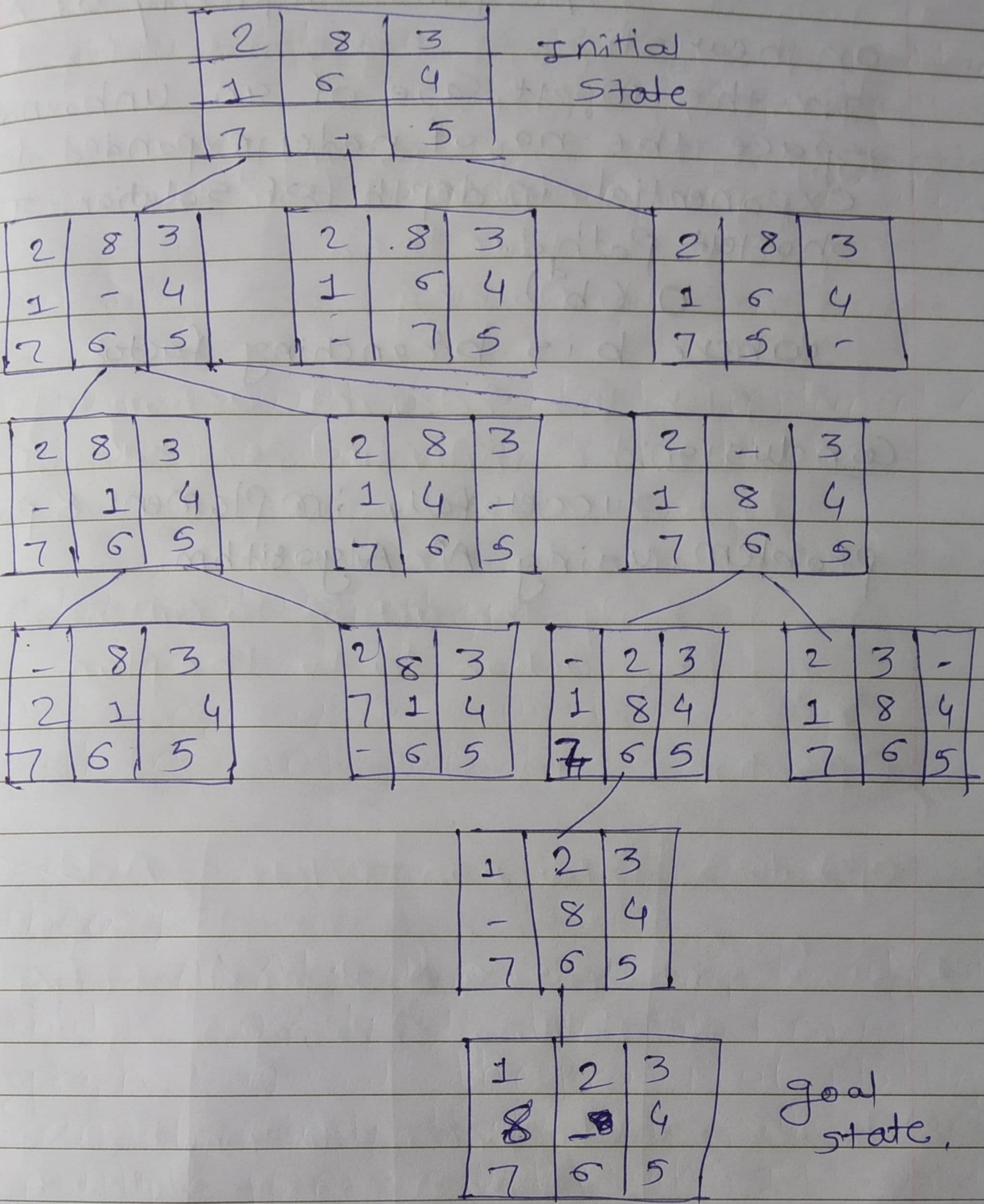
Each node has a pointer to its parent so that at any given point it can retrace the path to the parent. Initially, open list holds start node. The next node choosen from list is based on its f score. The node with the least. f score is paucced up and explored

f-score = h-score + g-score.

A* uses combination of heuristic value (h-score is how for the goal node is) as well as (g-score the number of nodes traversed from start node to current node

~~Test Cas~~.

Test Case:-



$f(n) = g(n) + h(n)$

So $g(n)$ will give level.
and $h(n)$ will give no. of nodes. different in start and goal matrix.

Complexity:-

The time complexity of A* depends on heuristic.

In the worst case of an unbounded search space the no. of nodes expanded is exponential in depth of solution. The shortest path d.

∴ $O(b^d)$

where b is branching factor.

Conclusion:-

succesfully implement 8 puzzle problem using A* Algorithm.