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Assignment NO.2

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Subject -

Problem Statement -

Implement A star algorithm for any game search problem.

Theory -

1) A-star Algorithm-

- A* is a computer algorithm that is widely used in path finding and graph traversal the process of plotting an efficiency traversable path between multiple points called nodes.
- Noted for its performance and accurracy it enjoys widespread use.
- The key feature of the A* algorithm is that it keeps a track of each visited node which helps in ignoring the nodes that are ahead visited saving a huge amount of time.
- It also has a list that holds all the nodes that are left to be explored and it choose the most optimal node from this list thus saving time not exploring unnecessary or less optimal nodes.
- So we use two lists namely 'open list' and 'closed list'.
- Intially, the open list holds the start node.
- F-score = h-score + g-score.

Algorithm -

step1:

Define a list OPEN.
Intially OPEN consists of a single node the start nodes.

step-2 -
IF the list is empty return failure & exit.
Step-3 -
Remove node n with the smallest value of f(n) from OPEN and move it to list CLOSED.
IF node n is a goal state return success & EXIT.
Step-4-
Expand node n.
step-5 -
IF any successor to n is the goal node return success & the solution by traling the path from goal node to S.
Otherwise, go to step 6.
Step-6 -
for each sucessor node
Apply the evaluation function f to the node.
IF the node has not been in either list add it to OPEN.
Step-7-
Go back to step 2.

Advantages -
① It is optimal search Algorithm in terms of hevlistics.
② It is one of the best hevristic search techniques.
③ It is used to solve complex search problem.
④ There is no other optimal algorithm guaranteed to expand fewer nodes than A.

Disadvantages -
① This algorithm is complete if the branching factor is finite & every action has fixed cost.
② The performance of A* search is dependent on accuracy of heuristic algorithm used to compute the function h(n).

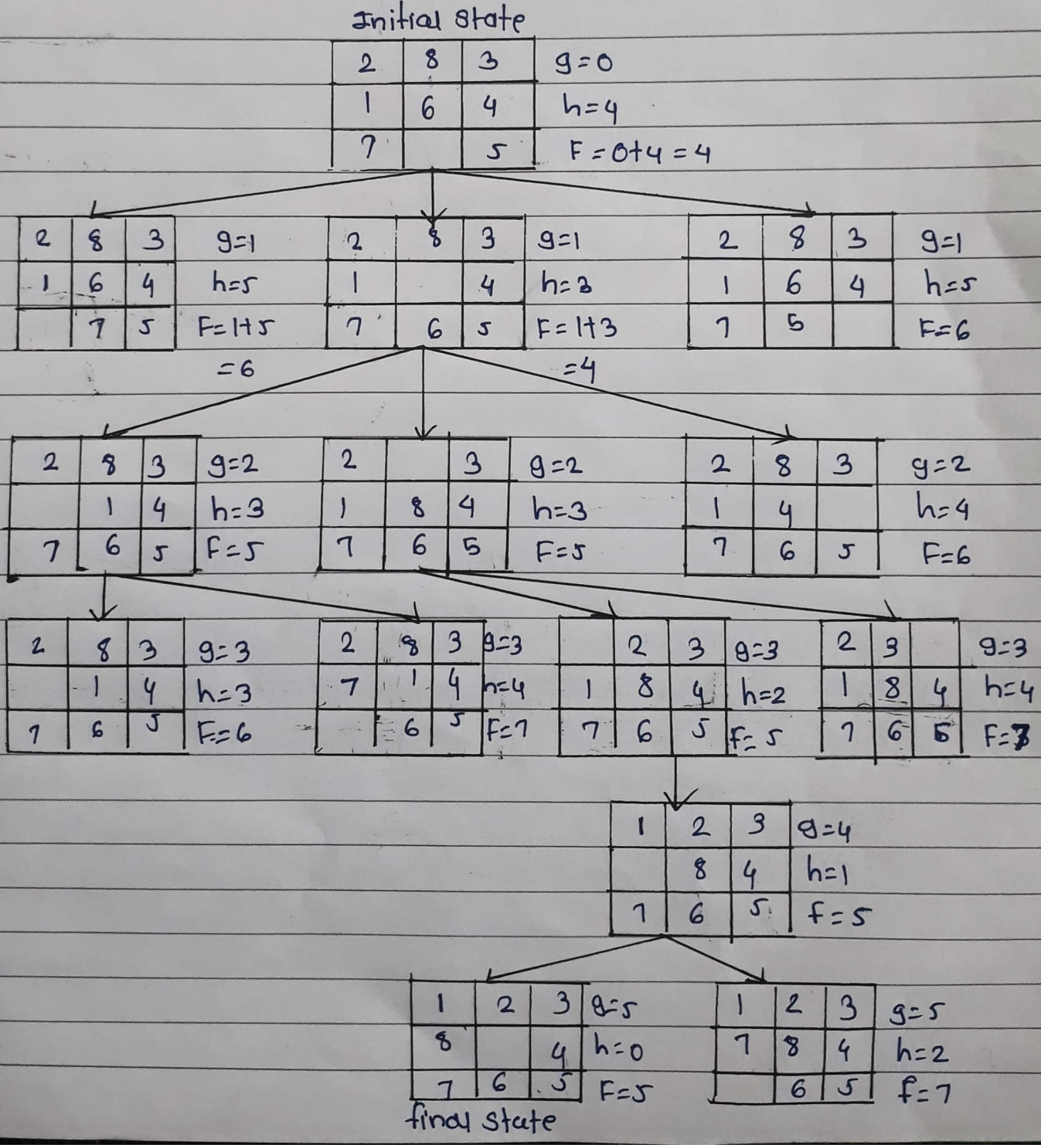
Application -

① It can be used as a path finding algorithm for map based applications.

② String searchhing applications can also use this by determining the goal state NLP uses this to check my parsing errors.

③ A lot of games use this algorithm for its positioning system.

* Solve 8 puzzle problem using A* Search Algorithm.



Conclusion -

Learned about A* algorithm & implemented A* algorithm for a game search problem.