

LAB - 03

Q1 A* Algorithm for 8-puzzle problem

function A* search(problem) returns a solution or failure

node \leftarrow a node n with n -state: problem initial state, $n.g = 0$

frontier \leftarrow a priority queue ordered by ascending g^{th} only element n .

loop do

if empty? (frontier) then return failure

$n \leftarrow \text{pop}(\text{frontier})$

if problem.goalTest(n -state) then return solution

for each action a in problem.actions(n -state) do

$n \leftarrow \text{childNode}(\text{problem}, n, a)$

insert(n , $g(n) + h(n)$, frontier).

Misplaced files

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

$g(n) \rightarrow \text{depth}$

$h(n) \rightarrow \text{no. of misplaced files}$

Manhattan distance

$f(n) = \text{sum of distance of each tile from current position to goal position.}$

State space tree

1	2	3
4	5	6
0	7	8

1	0	3
4	5	6
7	8	0

↓

1	2	3
0	5	6
4	7	8

$$f(n) = 1 + 3 = 4$$

↓

1	2	3
4	5	6
7	0	8

$$f(n) = 1 + 1 = 2$$

↓

1	2	3
4	0	6
7	5	8

$$f(n) = 2 + 2 = 4$$

↓

1	2	3
4	5	6
7	8	0

$$f(n) = 2 + 0 = 2$$

goal state

↓

1	2	3
4	5	6
0	7	8

$$f(n) = 1 + 2 = 3$$

↓

1	2	3
0	5	6
4	7	8

$$f(n) = 1 + 1 + 1 + 1 = 4$$

↓

1	2	3
4	5	6
7	0	8

$$f(n) = 1 + 1 = 2$$

↓

1	2	3
4	0	6
7	5	8

$$f(n) = 0 + 1 + 1 = 2$$

↓

1	2	3
4	5	6
7	8	0

$$f(n) = 0 + 0 = 0$$

goal state