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Assignment IA

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Assignment 1A

1) consider following interface of 8 puzzle problems.

8	7	6
2	1	5
3	4	-

Intial

-	8	7
2	1	6
3	4	5

final

consider Heristic functions defined below:-
h1 : misplaced tiles count except space
h2 : correctly placed tiles count except space.
h3 : sum of manhatten distance between current and corossed position of all times except space

Answer the following questions

a) In a puzzle problem we are concerned with getting to goal configuration within least number of system. All moves are now equally utility Define g(n) in your own word what will be the cost of 6 steps solution to some arbitrary 8 puzzle instance?

The lowest path count g(n) can be the cost to reach the goal configuration in learnt steps.

In our case we can reach the final configuration in atleast moves: UP, UP, LEFT, LEFT since all the moves are equally

costly, we compute
$g(n)$ as

$g(n) = 1+1+1+1$

$g(n) = n$

consider the following arbitrary 8 puzzle instance which sinle solution in 6 steps

8	7	6
2	1	5
-	3	4

The solution can be seprated as:

$\{\{8,7,6\},\{2,1,5\},\{-3,4\}\rightarrow\{\{8,7,6\},\{2,1,5\},\{3,-,4\}\}$

$\{\{8,7,6\},\{2,1,5\},\{3,4,-\}\}\rightarrow\{\{8,7,6\},\{2,1,-\},\{3,4,5\}\}$

$\{\{8,7,-\},\{2,1,6\},\{3,4,5\}\rightarrow\{\{8,-,7\},\{2,1,6\},\{3,4,5\}\}$

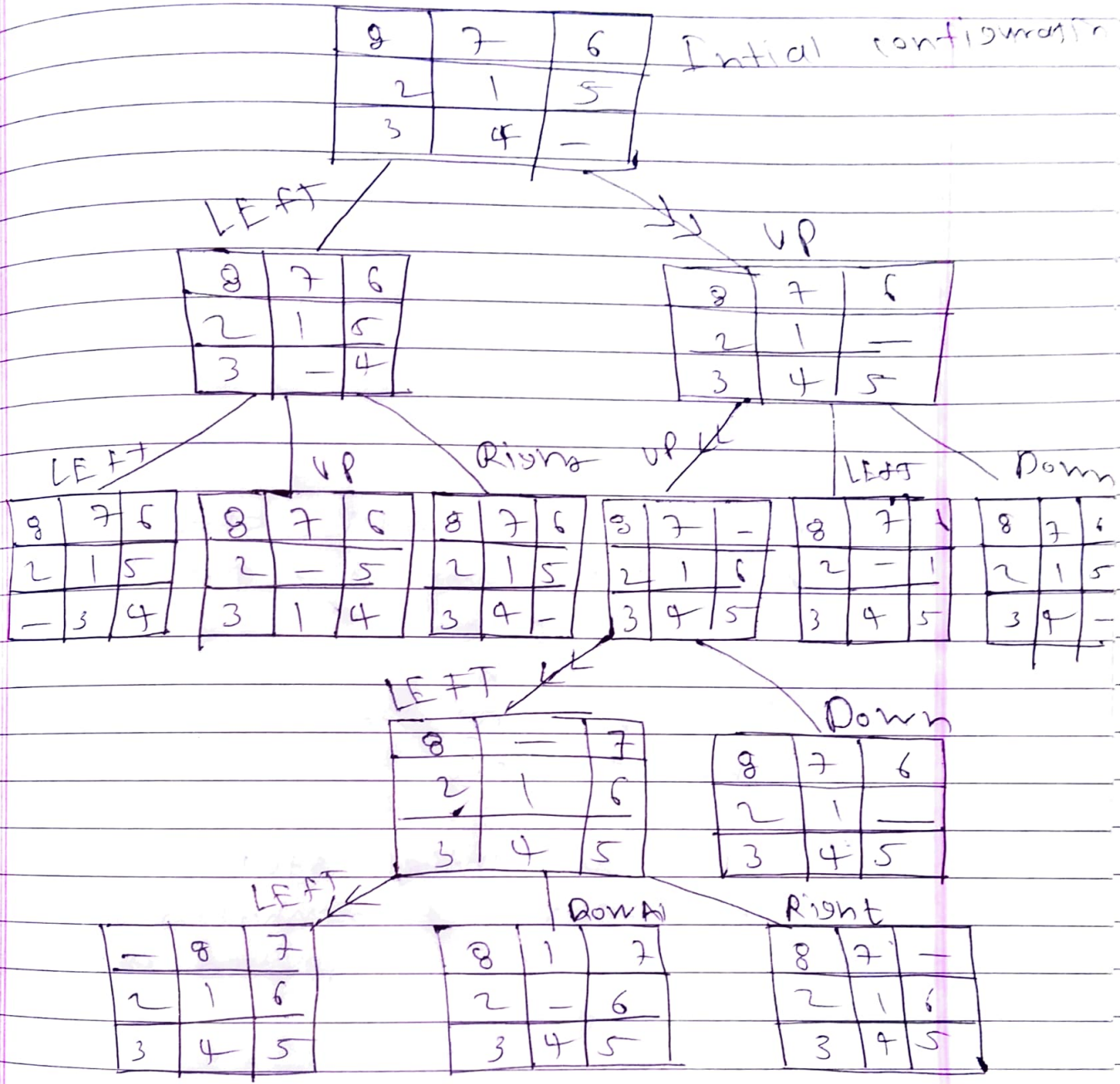
$\{\{-,8,7\},\{2,1,6\},\{3,4,5\}\}$

Since all the moves are equally costly the cost would be

$g(n) = 6$

c) Draw exhustive state space tree of depth limited to 4 for instance of 8 puzzle position in the questions

Ans →


Intial configuration
LEFT
UP
LEFT
UP
Right
UP
LEFT
Down
LEFT
Down
LEFT
Down
Right
final
configuration

(Q) compute $h_i(n)$, where $i = 1, 2, 3$ and n = intial state, final / goal state from question.

->

for $i = 1$, n = inatial state

h_1 (intial) = this place tiles count except space

h_1 (intial) = h.

n = goal state

h_1 (goal) = 0

for $i = 2$, n = intall state

h_2 (intial) = correctly placed tile count except space

h_2 (intial) = n

for n = goal state

h_2 (goal) = 8

for $i = 3$, w = intial state

h_3 (intial) = sum of manhatton distance between current and correct position of all times except space.

h_3 (intial) = 0 + 0 + 0 + 0 + 1 + 1 + 1 + 1

= 4

for n = goal state

h_3 (goal) = 0