Assignment 1 (A)

Name :- Mitali Ramesh Nalawade

Roll No. :- 39

class :- BE-IT

Subject :- IS Lab

Assignment 1 (A)

Q. Consider following interface of 8 puzzle Problem:

8	7	6
2	1	5
3	4	-

initial

-	8	7
2	1	6
3	4	5

final configuration

consider Heuritic function defired below.
h_1 = misplaced files count except space
h_2 = Consider placed file count except space
h_3 = sum of distance between current
portion of all times except space.

Answer the following Question.

a) In 8 puzzele problem we are
concerned with getting to goal configuration
within least numbe of steps. All moves
are thus equally Defire $g(n)$ in yort own
words. what will be the cost of 6 step
solution to some arbitary 8-puzile instance.

→

The lowest path cost $g(n)$ can be the
cost to reach the goal configuration
in least steps.
In our case, we can reach the final
configuration in at least 4 moves.

UP, UP, LEFT, LEFT

since all the moves are equally costly
we compute $g(n)$ as,

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

$$g(n) = 4$$

Consider following arbitary 8 puzzle
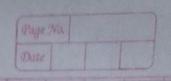instance which gives solution in 6 step

8	7	6
2	1	5
-	3	4

The solution can be represented as :-

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

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

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

Since all the moves are equally costly, the
cost would be

$$g(n) = 6$$

c) draw exhaustive data space tree of depth limited to 4 for instance of 8 puzzle problem in the question.

initial configuration

8	7	6
2	1	5
3	4	—

left

8	7	6
2	1	5
3	—	4

up

8	7	6
2	1	—
3	4	5

LEFT

8	7	6
2	1	5
—	3	4

UP

8	7	6
2	—	5
3	1	4

Right

8	7	6
2	1	5
3	4	—

up

8	7	—
2	1	6
3	4	5

LEFF

8	7	6
2	—	1
3	4	5

Down

8	7	6
2	1	5
3	4	—

LEFT

8	—	7
2	1	6
3	4	5

Down

8	7	6
2	1	—
3	4	5

LEFT

—	8	7
2	1	6
3	4	5

Down

8	1	7
2	—	6
3	4	5

Right

8	7	—
2	1	6
3	4	5

Final configuration

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

For $i = 1$, $n = $ initial state
$h_1 = $ (initial) $= $ misplaced files count
h_1 (initial) $= 4$ except space

$h = $ goal state
h_1 (goal) $- 0$

for $i = 2$, $n = $ initial state
h_2 (initial) $= $ correctly placed files
count except space
h_2 (initial) $= 4$
for $n = $ goal state
h_2 (goal) $= 8$

for $i = 3$, $n = $ initial state
h_3 (initial) $= $ sum of manhattan distance
between current & correct portion of
all times except space

h_3 (initial) $= 0 + 0 + 0 + 0 + 1 + 1 + 1 + 1$
$= 4$

for $n = $ goal state
h_3 (goal) $= 0$