1/11/21
Monday

CT-2 DS301 - AI LES

B. Catherine Joyce
CS19B1015

$X = \{$ age = 40-49, menopause = premeno, tumor_size = 20-24, inv-nodes = 0-2, node-caps = No, deg-malig = 2, breast_quad = right, breast-quad = left_low, irradiat = yes $\}$

Let C_1 = norecurrence & C_2 = recurrence

$P(C_1) = \frac{7}{16}$ $\qquad$ $P(C_2) = \frac{9}{16}$

$P(\text{Age} = 40-49 \mid C_1) = \frac{2}{7}$	$P(\text{Age} = 40-49 \mid C_2) = \frac{2}{9}$
$P(\text{menopause} = \text{premeno} \mid C_1) = \frac{7}{7} = 1$	$P(\text{menopause} = \text{premeno} \mid C_2) = \frac{6}{9}$
$P(\text{tumor\_size} = 20-24 \mid C_1) = \frac{2}{7}$	$P(\text{tumor\_size} = 20-24 \mid C_2) = \frac{1}{9}$
$P(\text{inv\_nodes} = 0-2 \mid C_1) = \frac{5}{7}$	$P(\text{inv\_nodes} = 0-2 \mid C_2) = \frac{3}{9}$
$P(\text{node\_caps} = \text{No} \mid C_1) = \frac{7}{7} = 1$	$P(\text{node\_caps} = \text{No} \mid C_2) = \frac{5}{9}$
$P(\text{deg\_malig} = 2 \mid C_1) = \frac{4}{7}$	$P(\text{deg\_malig} = 2 \mid C_2) = \frac{4}{9}$
$P(\text{breast} = \text{right} \mid C_1) = \frac{3}{7}$	$P(\text{breast} = \text{right} \mid C_2) = \frac{3}{9}$
$P(\text{breast\_quad} = \text{left\_low} \mid C_1) = \frac{4}{7}$	$P(\text{breast\_quad} = \text{left\_low} \mid C_2) = \frac{4}{9}$
$P(\text{irradiat} = \text{yes} \mid C_1) = \frac{3}{7}$	$P(\text{irradiat} = \text{yes} \mid C_2) = \frac{6}{9}$

$P(C_1 \mid X) = P(X \mid C_1)\, P(C_1)$

$P(X \mid C_1) = \frac{2}{7} \times 1 \times \frac{2}{7} \times \frac{5}{7} \times 1 \times \frac{4}{7} \times \frac{3}{7} \times \frac{4}{7} \times \frac{3}{7} = 0.003497$

$\therefore 0.003497 \times \frac{7}{16}$ $\qquad$ $0.003497 \times \frac{7}{16} = 0.00152$

$P(C_2 \mid X) = P(X \mid C_2)\, P(C_2)$

$P(X \mid C_2) = \frac{2}{9} \times \frac{6}{9} \times \frac{1}{9} \times \frac{3}{9} \times \frac{5}{9} \times \frac{4}{9} \times \frac{3}{9} \times \frac{4}{9} \times \frac{6}{9}$

$\Rightarrow 0.0001338$

$\therefore 0.0001331 \times \frac{9}{16} = 0.00007$

$\because P(X \mid C_1) > P(X \mid C_2)$

X belongs to C_1 which is non-recurrance event.

2) <u>Heuristic functions</u> : The methods adopted to find an approximate/ profitable way which is more prominent out of several paths. The equation is estimated.

h(n) : number of tiles out of place.

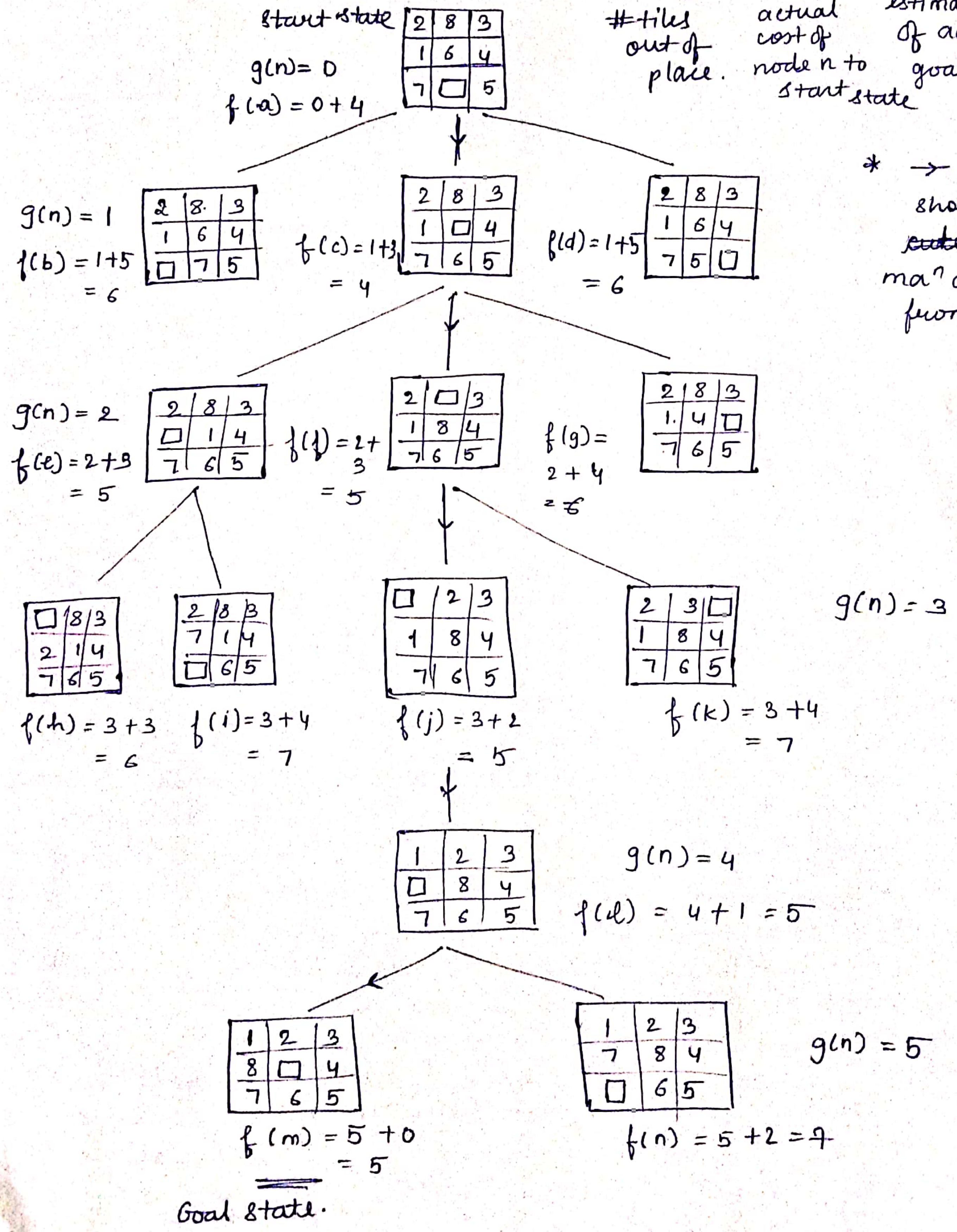
$$\boxed{f(n) = g(n) + h(n)}$$

f(n): # tiles out of place.

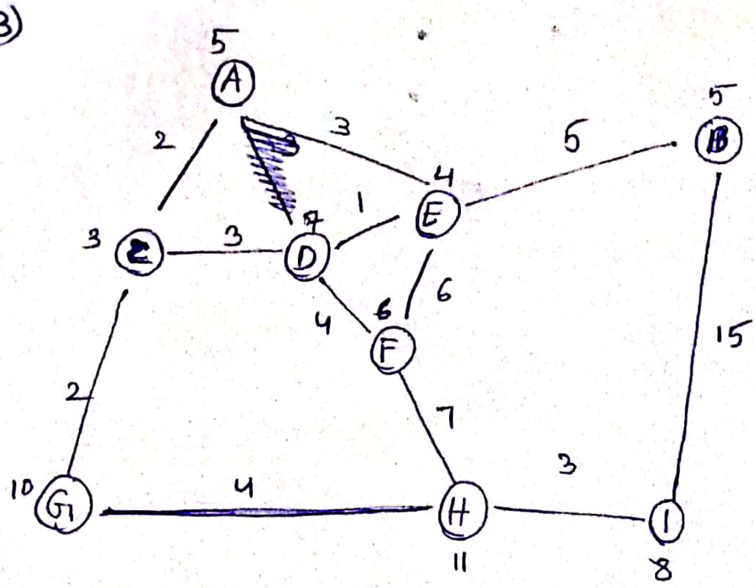
g(n): actual cost of node n to start state

h(n): estimated cost of achieving goal from n.

* → → shows the transformation of cubes from start to goal.



3)



Start state = A

goal state = H

Algorithm is admissible if it never overestimates the cost to the goal, & a heuristic that finds the shortest path to a goal if it exists is admissible.

$g(n) + h(n)$

① $A \rightarrow E$ $3 + 4 = 7$

$A \rightarrow C$ $2 + 3 = 5$ ✓

$f(C) < f(E)$ ∴ $A \rightarrow C$

② $C \rightarrow D$ $(A \rightarrow C \rightarrow D)$ $= (2+3) + 7 = 12$

$C \rightarrow G$ $(A \rightarrow C \rightarrow G)$ $= (2+2) + 10 = 14$

∵ $f(D) < f(G)$ $A \rightarrow C \rightarrow D$

③ $D \rightarrow E$ $= (2+3+1) + 4 = 10$

$D \rightarrow F$ $= (2+3+4) + 6 = 15$

∵ $f(E) < f(F)$ $A \rightarrow C \rightarrow D \rightarrow E$

④ $E \rightarrow B$ $= (2+3+1+5) + 5 = 16$

$E \rightarrow F$ $= (2+3+1+6) + 6 = 18$

∵ $f(B) < f(F)$ $A \rightarrow C \rightarrow D \rightarrow E \rightarrow B$

⑤ $B \rightarrow I$ $= (2+3+1+5+15) + 8 = 34$ $A \rightarrow C \rightarrow D \rightarrow E \rightarrow B \rightarrow I$

⑥ $I \rightarrow H$ $= (2+3+1+5+15+3) + 11 = 40$

Considering the A* Algorithm, Path is $A \rightarrow C \rightarrow D \rightarrow E \rightarrow B \rightarrow I \rightarrow H$

29/11/19