MT-2

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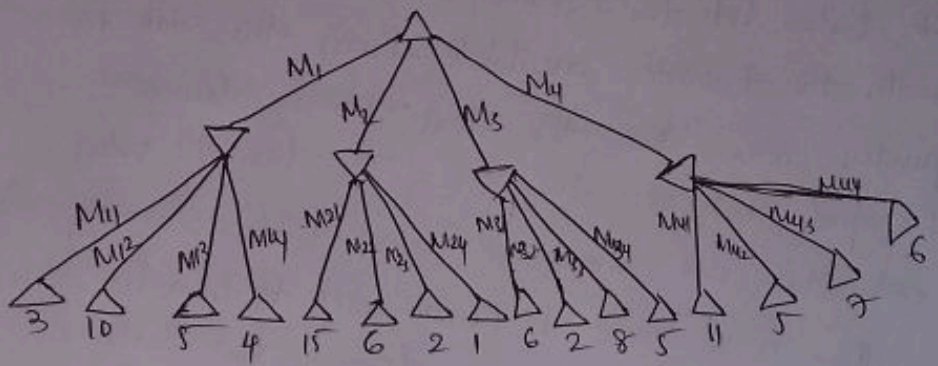
Class: CSE-E3-C1-(311

1. Consider the following Game Tree (Max moves first)



1. What is the minimax backup Value of root node?

5

2. Which move will max Select at the root node, assuming both players play Optimally?

M4

3. which move will be Selected by min after max's move assuming both players play Optimally.

M42

4. How many nodes will be pruned by alpha beta Search?

3

5. What will be alpha and beta Value in the root node once the minimax algorithm with a alphabeta pruning is Completed?

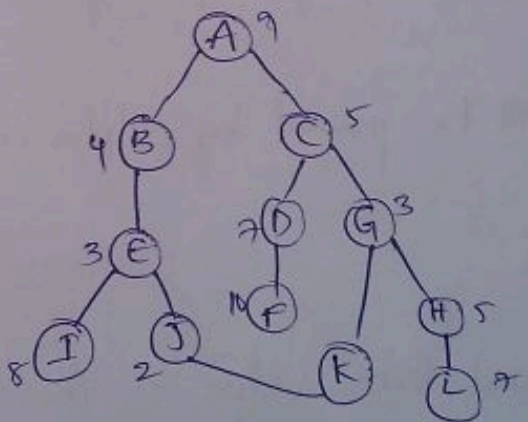
$\alpha = 5$

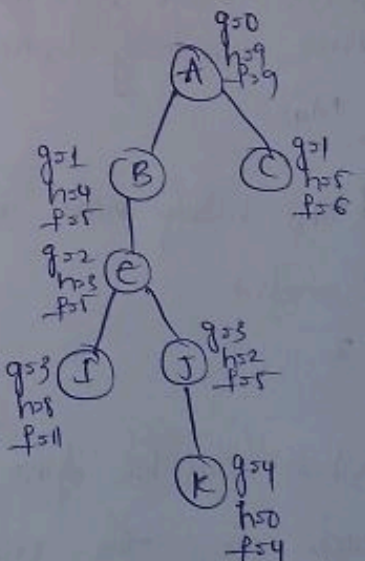
$\beta = \infty$

Section-B

1. The table below lits the States in a Search domain, along with the transistion available from the State fa this question, assume that the Start State is always A and the goal State is always k. the heuristic values for each State are Shown in Second table. Assuming that there is a cost 1 (unit cost) to move from one State to another. Draw a diagram that illustrates the Search tree of explored States given A* Search indicated the calculated cost at each node in the tree.

A → B, C	G → H, K	A : 9	G : 3
B → E	H → L	B : 4	H : 5
C → D, G	I →	C : 5	I : 8
D → F	J → K	D : 7	J : 2
E → I, J	K →	E : 3	K : 0
F →	L →	F : 10	L : 7





Optimal path: A-B-E-J-k.

2. What is an admissible heuristic? Is the heuristic given in previous question admissible? if yes, justify.

An admissible heuristic is used to Estimate the cost of reaching the goal state in an informed Search algorithm.

the Estimated cost should be always less than as Equal to actual cost of reaching the goal.

No, the above heuristic is not admissible.

2)b) Explain all the classificat'n Evaluat'n matrics with Example. Why accuracy measure alone is not Sufficient?

Actual \ Predicted	Yes	No
Yes	TP 3	FN 1
No	fp 3	TN 3

1. Accuracy:- Accuracy is ratio of Total correctly predicted to total values.

Recall:- Recall is ratio of positive class predicted correctly to total positive class (actual).

Precision:- Precision is ratio of positive classes predicted correctly to total predicted positive classes.

f1 score:- f1 Score is double the precision multiplied by Recall divide by Sum of precision and Recall.

$$\text{Accuracy} = \frac{TP+TN}{TP+FN+FP+TN} = \frac{6}{10} = 0.6760\%.$$

$$\text{Recall} = \frac{TP}{TP+FN} = \frac{3}{3+1} = \frac{3}{4} = 0.75 = 75\%.$$

$$\text{precision} = \frac{TP}{TP+FP} = \frac{3}{3+3} = \frac{3}{6} = \frac{1}{2} = 50\%.$$

$$f_1 \text{ Score} = \frac{2 * \text{Recall} \times \text{precision}}{\text{Recall} + \text{precision}} = \frac{2*0.75*0.5}{0.7+0.5}$$

$$= 0.6 = 60\%.$$

3) a) What is Supervised and unSupervised Learning?

Supervised Learning is generally used to classify data as make predictions, whereas UnSupervised Learning is Generally used to understand relationships within datasets.

b) In a study of relationship between x = mean daily temperature for the month & y = monthly charges on Electrical bill, the following ~~error~~ data was gathered. Find the Parameter values and training Error for best-fitting model.

X	Y	XY	X^2
20	125	20×125	$(20)^2$
30	110	30×110	$(30)^2$
50	95	50×95	$(50)^2$
60	90	60×90	$(60)^2$
80	110	80×110	$(80)^2$
90	130	90×130	$(90)^2$

$\Sigma X = 330$ $\Sigma Y = 660$ $\Sigma XY =$ $\Sigma X^2 = 21900$

~~10297450~~ 36450.

$\bar{X} = \frac{\Sigma X}{n} = 55$

$\bar{Y} = \frac{\Sigma Y}{n} = 110$

$\hat{\beta} = \frac{n\Sigma XY - \Sigma X \Sigma Y}{n\Sigma X^2 - (\Sigma X)^2}$

$= \frac{6 \times 36450 - 330 \times 660}{6 \times 21900 - (330)^2}$

$= 0.04$

$\hat{\alpha} = \bar{Y} - \hat{\beta}\bar{X}$

$= 110 - 0.04 \times 55$

$= 107.8$

$\hat{y} = 107.8 + 0.04x$

$SSE = \sum_{i=1}^{n} (y_i - \hat{y})^2$

MT-1

Section-A

A moveGen function representation is given in the figure Here S is the start node and G1 is the goal node. Now, run Dfs and Separately Bfs until the goal is found, then answer the Questions in this Group. The Given Dfs & Bfs algorithms maintain (node, parent) pairs in Open & closed lists

N - MoveGen(N)
S - {A, B}
A - {S, C, D}
B - {S, C, G}
C - {B, A}
D - {C, A, B, G}
G - {S, A, B, D}

1) When Dfs finds G, the closed list is...
(S, nil) (A, S) (C, A) (D, A) (G, D)

2) When Dfs finds G, the open list is
(B, S)

3) When Bfs finds G, the closed list is...
(S, nil) (A, S) (B, S) (D, A) (C, A) (G, D)

4) When Bfs finds G, the Open list is
NULL

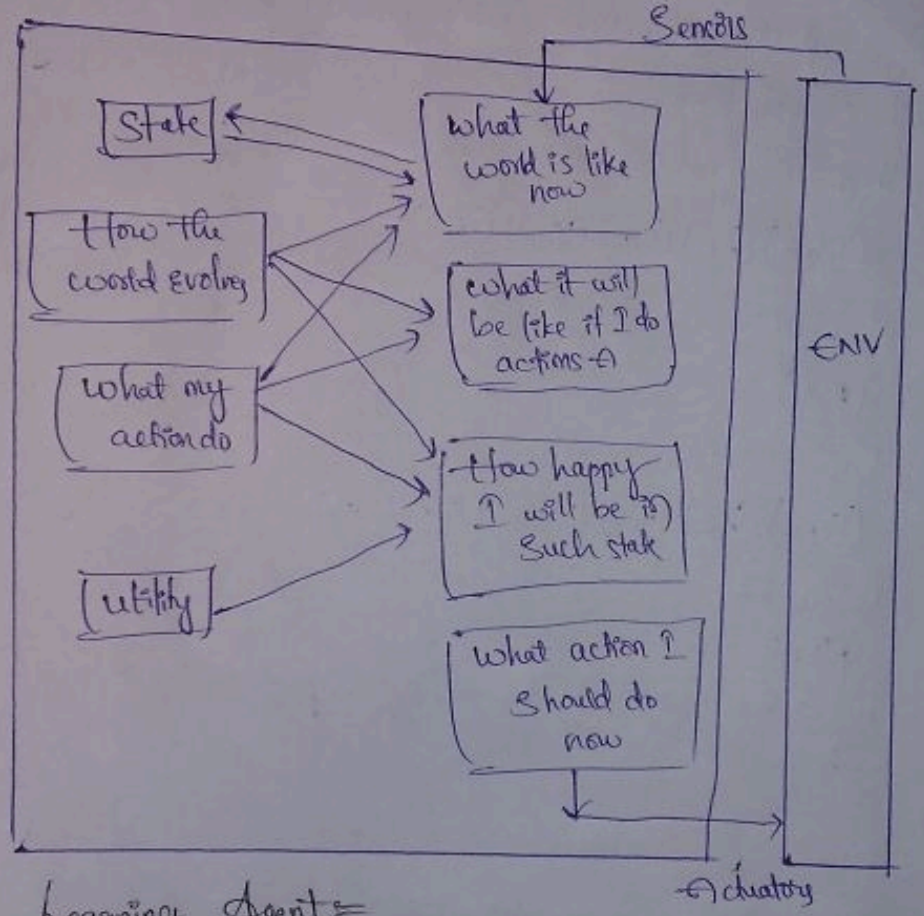
5) When Bfs finds G, the no. of Unique nodes Opened by G1 is
5

Section-B

1) What is a rational agent? Explain the Structure of ~~ab~~ utility based agent & learning agent.
A rational agent or rational being is a person or Entity that always aims to perform Optimal actions based on given premises and Information.

Utility Based Agents:-

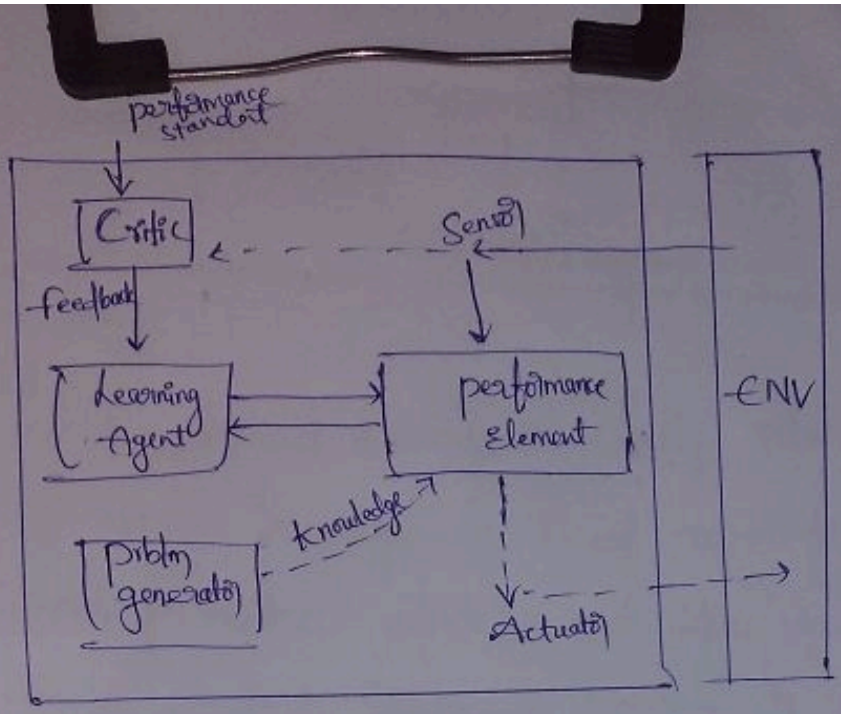
These agents are Similar to the Goal-based agent but provide an Extra Components of utility measurment which makes them different by providing a measure of Success at a given State.



Learning Agent:-

Learn from its past Experience. It has learning Capabilities.

→ It Starts to act with basic knowledge and then able to act & adapt Automatically through learning.


performance standard
Critic
Sensor
feedback
Learning Agent
performance Element
ENV
knowledge
Problem generator
Actuator