(15)

ANNA UNIVERSITY CHENNAI
B.E DEGREE END SEMESTER EXAMINATIONS, NOV./DEC. 2012
BRANCH: COMPUTER SCIENCE AND ENGINEERING
FIFTH SEMESTER – REGULATIONS 2008

CS 9304 – ARTIFICIAL INTELLIGENCE

Time: Three hours **Max.Marks:100**

Answer All Questions
Part – A (10X2 = 20 Marks)

1. Analyze and list the capabilities required for a computer to act humanly.
2. Write about the types of blind search.
3. Briefly discuss about the scenarios where hill climbing algorithm gets stuck.
4. What is meant by horizon effect? Give an example.
5. Write the sentence in FOL:"A grandparent is a parent of one's parent"
6. What is meant by reification?
7. Differentiate between exploration and exploitation.
8. Why Q-learning is called model free method?
9. Discuss about content based image retrieval.
10. What is meant by localization?

PART –B (16 x 5 = 80 marks)

11. (a) Describe PEAS of Image-analysis Part-picking robot task environment and analyze its various properties. (6)
    (b) Write a short notes on agent and agent program.Discuss elaborately about the four basic kinds of agent program of intelligent systems . (10)

12. (a) (i) List the issues addressed by the general purpose method of solving CSPs.Explain how the issues are handled?. (8)
    (ii) What do you meant by genetic algorithm?Explain genetic algorithm in detail. (8)

    (OR)

    (b) (i)Explain how min-max procedure is used in alpha-beta pruning algorithm. (8)
    (ii) What is the drawback of A* search.Explain the techniques that overcome the drawbacks. (8)

13. (a) (i) Decide whether each of the following sentences is valid ,unsatisfiable, or neither. Verify your decisions using equivalence rules. (8)
    $((Smoke \wedge Heat) \Rightarrow Fire) \Leftrightarrow ((Smoke \Rightarrow Fire) \vee (Heat \Rightarrow Fire))$
    $(Smoke \Rightarrow Fire) \Rightarrow ((Smoke \wedge Heat) \Rightarrow Fire)$

    (ii) With example describe backward chaining algorithm. (8)

    (OR)

(b) (i) Consider a vocabulary with only four propositions,A,B,C and D.How many models are there for the following sentences? (8)

a. $(A \wedge B) \vee (B \wedge C)$
b. $A \vee B$
c. $A \Leftrightarrow B \Leftrightarrow C$

(ii) With example describe forward chaining algorithm. (8)

14. (a) Explain the steps involved in constructing a decision tree. Construct a decision tree for the data given below.

ID code	Outlook	Temperature	Humidity	Windy	Class Label: Play
a	Sunny	Hot	High	False	No
b	Sunny	Hot	High	True	No
c	Overcast	Hot	High	False	Yes
d	Rainy	Mild	High	False	Yes
e	Rainy	Cool	Normal	False	Yes
f	Rainy	Cool	Normal	True	No
g	Overcast	Cool	Normal	True	Yes
h	Sunny	Mild	High	False	No
i	Sunny	Cool	Normal	False	Yes
j	Rainy	Mild	Normal	False	Yes
k	Sunny	Mild	Normal	True	Yes
l	Overcast	Mild	High	True	Yes
m	Overcast	Hot	Normal	False	Yes
n	Rainy	Mild	High	True	No

(OR)

(b) (i) Compare and contrast active reinforcement learning and passive reinforcement learning (6)

(ii) How are the techniques used in passive reinforcement learning adjusted for use in active reinforcement learning? 10)

15. (a) With example explain Top-Down parsing.

(OR)

(b) Describe the following :

(i) Edge detection (8)
(ii) Robot Hardware (8)

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Table F-3. Friction loss in metres per 100 metres in main lines of portable aluminium pipes with couplings

(Based on Scobey's formulae, K_s 0.40 and 9 metres pipe lengths)

[Adapted from Hurd (1969)]

Flow	*Diameter of pipe*						
litres/sec.	*7.5 cm*	*10.0 cm*	*12.5 cm*	*15.0 cm*	*17.5 cm*	*20.0 cm*	*25.0 cm*
2.52	0.658	0.157					
3.15	1.006	0.239					
3.79	1.423	0.339					
4.42	1.906	0.449	0.150				
5.05	2.457	0.584	0.193				
5.68	3.073	0.731	0.242				
6.31	3.754	0.893	0.295	0.120			
7.57	5.307	1.263	0.417	0.170			
8.83	7.113	1.693	0.560	0.227			
10.10	9.169	2.182	0.721	0.293			
11.36	11.47	2.729	0.967	0.366			
12.62	14.01	3.333	1.102	0.448	0.209		
13.88	16.79	3.996	1.321	0.537	0.251		
15.14	19.81	4.713	1.558	0.633	0.296		
16.41	23.06	5.488	1.814	0.737	0.344		
17.67	26.55	6.316	2.089	0.849	0.397		
18.93	30.27	7.203	2.381	0.967	0.452	0.235	
20.19	34.22	8.142	2.092	1.094	0.511	0.265	
21.45	38.39	9.133	3.020	1.227	0.573	0.298	
22.72	42.80	10.18	3.366	1.368	0.639	0.332	
23.98	47.43	11.29	3.731	1.516	0.708	0.368	
25.24	52.28	12.44	4.113	1.671	0.781	0.399	0.136
26.50		13.65	4.513	1.833	0.857	0.445	0.149
27.76		14.57	4.930	1.988	0.936	0.486	0.163
29.03		16.23	5.364	2.179	1.019	0.529	0.177
30.29		17.59	5.815	2.363	1.104	0.573	0.192
31.55		19.01	6.284	2.554	1.193	0.620	0.208
34.70		22.79	7.532	3.060	1.430	0.742	0.249
37.86		26.88	8.886	3.611	1.687	0.876	0.294
41.01		31.30	10.35	4.204	1.965	1.020	0.342
44.17		36.04	11.91	4.839	2.262	1.174	0.394
47.32		41.08	13.58	5.517	2.520	1.339	0.449
50.48			15.35	6.237	2.915	1.513	0.507
53.63			17.22	6.999	3.271	1.698	0.569
56.79			19.20	7.801	3.666	1.893	0.635
59.94			21.28	8.645	4.041	2.097	0.703
63.10			23.45	9.530	4.454	2.312	0.775
69.49			28.11	11.42	5.338	2.771	0.929
75.72			31.75	13.58	6.298	3.269	1.096
82.03				15.69	7.333	3.886	1.277
88.34				18.06	8.441	4.382	1.470
94.65				20.59	9.624	4.996	1.675
101.0				23.28	10.88	5.648	1.894
107.0				26.12	12.21	6.337	2.125
114.0					13.63	7.064	2.369
120.0					15.08	7.829	2.625
126.0					16.62	8.630	2.894

(*Note:* Where 6.1 m sections of pipes are used, *increase* values shown in table by 7.0 per cent. Where 12.2 m sections of pipe are used, *decrease* values shown in the table by .0 per cent.)

APPENDIX F

Friction head loss in irrigation pipes

Table F-1. Friction loss in metres per 100 metres in lateral line of portable aluminium pipe with couplings

(Based on Scobey's formula and 9 metres pipe length)

[Adapted from Hurd (1969)]

Flow (litres/sec)	*Diameter of pipe*				
	5.0 cm *Ks 0.34*	*7.5 cm* *Ks 0.33*	*10.0 cm* *Ks 0.32*	*12.5 cm* *Ks 0.32*	*15.0 cm* *Ks 0.32*
1.26	0.32				
1.89	2.53				
2.52	4.49	0.565	0.130		
3.15	6.85	0.858	0.198		
3.79	9.67	1.21	0.280		
4.42	12.9	1.63	0.376	0.122	
5.05	16.7	2.10	0.484	0.157	
5.68	20.8	2.63	0.605	0.196	
6.31	25.4	3.20	0.738	0.240	0.099
7.57		4.54	1.04	0.339	0.140
8.83		6.09	1.40	0.454	0.188
10.10		7.85	1.80	0.590	0.242
11.36		9.82	2.26	0.733	0.302
12.62		12.0	2.76	0.896	0.370
13.88		14.4	3.30	1.07	0.443
15.14		16.9	3.90	1.26	0.522
16.41		19.7	4.54	1.47	0.608
17.67		22.8	5.22	1.70	0.700
18.93		25.9	5.96	1.93	0.798
20.19		29.3	6.74	2.18	0.904
21.45		32.8	7.56	2.45	1.02
22.72		36.6	8.40	2.74	1.13
23.98		40.6	9.36	3.03	1.26
25.24		44.7	10.3	3.34	1.38
26.50			11.3	3.66	1.51
27.76			12.3	4.00	1.66
29.03			13.4	4.35	1.80
30.29			14.6	4.72	1.95
31.55			15.8	5.10	2.12
34.70			18.9	6.12	2.52
37.86			22.2	7.22	2.98
41.01			25.9	8.40	3.46
44.17			29.8	9.68	3.99
47.32			33.8	11.0	4.54
50.48				12.5	5.15
53.63				14.0	5.78
56.79				15.6	6.44
59.94				17.3	7.14
63.10				19.0	7.86

(***Note:*** For 6 metres pipe length, *increase* values in the Table by 7.0 per cent and for 12 metres length *decrease* values by 3.0 per cent.)

Table 13.2. Estimated maximum diameter of the wetted circle formed by an emission point in a drip irrigation system comprising point source drip outlets at a discharge rate of 4 lit./hr.,

(*Note*: For line source application, the values should be multiplied by a factor of 0.5.)

Depth of root zone and soil texture	*Homogeneous soil layers*	*Soil profiles of varying textural groups*	
		Mostly of low density	*Mostly of moderate density*
	m	*m*	*m*
Root zone depth, 0.75 m:			
Coarse soil	0.45	0.75	1.05
Medium soil	0.90	1.20	1.50
Fine soiil	1.05	1.50	1.80
Root zone depth, 1.5 m:			
Coarse soil	0.75	1.40	1.80
Medium soil	1.20	2.10	2.70
Fine soil	1.50	2.00	2.40

[*Source*: Adapted from United States Soil Cons. Service, (1984).]

Table 12.5. Correction factor 'F' for friction losses in aluminium pipes with multiple outlets.

No. of sprinklers on lateral	*1st sprinkler is one sprinkler interval from main*	*1st sprinkler is 1/2 sprinkler interval from main*	*No. of sprinklers on lateral*	*1st sprinkler is one sprinkler interval from main*	*1st sprinkler is 1/2 sprinkler interval from main*
1	1.000	1.000	16	0.365	0.345
2	0.625	0.500	17	0363	0.344
3	0.518	0.422	18	0.361	0.343
4	0.469	0393	19	0.360	0.343
5	0.440	0.378	20	0.359	0.342
6	0.421	0.369	22	0.357	0.341
7	0.408	0.363	24	0.355	0.341
8	0398	0.358	26	0.353	0.340
9	0.391	0.355	28	0.351	0.340
10	0.385	0.353	30	0.350	0.339
11	0.380	0.351	35	0.347	0.338
12	0.376	0.349	40	0.345	0.338
13	0.373	0.348	50	0.343	0.337
14	0.370	0.347	100	0.338	0.337
15	0.367	0.346	> 100	0.335	0.335