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B.Tech Degree End Semester Examinations, Nov / Dec 2011
Information Technology
Eighth Semester – (Regulations 2004)

IT 527 Artificial Intelligence

Time: 3 hr

Max Mark: 100

Answer ALL Questions

Part- A (10X 2 = 20)

1. Differentiate goal based agent and utility based agent.
2. Give PEAS formulation for an automated TAXI driving scenario
3. How is uninformed search different from informed search?
4. For 8-puzzle problem, give the number of states, initial state, goal test, successor function and the cost function.
5. Convert the sentence " People don't do things that will cause them to be in situations that they don't like" in predicate logic
6. How is greedy search different from A*?
7. Draw a decision tree for the problem of deciding whether to move forward at a road intersection, given that the light has just turned green
8. Design a Mc-Culloch Pitts neuron for boolean XNOR function
9. Differentiate supervised, unsupervised and reinforcement learning
10. Write the verb subcategorization for the sentence " John said that he will not go to school tomorrow"

Part – B (16 X 5 = 80)

11. a) You are given two jugs, a 4-gallon one and a 3-gallon-one. Neither has any measuring markers on it. There is a pump that can be used to fill the jugs with water. How can you get exactly 2 gallons of water into the 4 gallon jug? Define the state space and derive atleast one solution from the state space. (8)
b) With an example explain the different structure of agents (8)
12. a) i) Compare the different uninformed search strategies in terms of completeness, time, space and optimality with an example (8)
ii) Describe a state space in which iterative deepening search performs much worse than depth-first search (for example $O(n^2)$ vs $O(n)$) (8)
(or)
b) i) With an application of your choice explain min-max algorithm (10)
ii) A 3foot tall monkey is in a room where some bananas are suspended from the 8foot ceiling. He would like to get the bananas. The room contains two stackable, movable, climbable 3foot high crates. Give the initial state, goal state, successor function, and the cost function. Choose a formulation that is precise enough to be implemented. (6)
13. a) i) What are the different inference rules in predicate logic (6)
ii) Convert the following clauses to predicate logic and prove by resolution (10)
 - Every child loves Santa
 - Everyone who loves Santa loves any reindeer
 - Rudolph is a reindeer, and Rudolph has a red nose
 - Anything which has a red nose is weird or is a clown
 - No reindeer is a clown

- Scrooge does not love anything which is weird
- (Conclusion) Scrooge is not a child

(or)

- b) i) Differentiate monotonic and non-monotonic logic. Explain TMS with an example (8)
 ii) Explain Frame problem in Actions with an example? Is there any solution for this problem? If so, how can it be solved (8)

14. a) i) Differentiate supervised, unsupervised and reinforcement learning with an example. (8)

ii) If $P(H)$ is the probability of hypothesis H , $P(D)$ – Probability of data, how will you represent $P(D/H)$ in Bayes theorem? Consider the following set of propositions and construct a Bayesian network along with the conditional probability matrix. Explain the use of Bayesian network in this problem (8)

- Patient has spots
- Patient has measles
- Patient has high fever
- Patient has Rocky Mountain Spotted Fever
- Patient has previously been inoculated against Measles
- Patient was recently bitten by a tick
- Patient has an allergy

(or)

b) i) Name any two instance based methods of learning. Explain the learning process in neural network that has four inputs and a single neuron. (8)

ii) Explain the different logical forms of learning with an example (8)

15. a) i) what are different ways in which agent choose their speech acts in communication. Explain each of the speech act with an example (8)

ii) What are the different types of ambiguities present in language processing? Explain with an example with reference to English Language. Will PCFG solve any of these ambiguities. How? (8)

(or)

b) i) i) For the sentence, " *Someone walked slowly to the supermarket*", give a step by step procedure of top-down and bottom-up parsing (8)

ii) Explain Verb sub categorization with an example (8)