Tutorial Unit 1

MCA Semester-III

PS03CMCA53: Artificial Intelligence

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Short Questions/Objective Questions

1. Define AI.
2. List any three characteristics of natural intelligence.
3. List any three constituents of AI definition.
4. State and explain in brief the nature of AI solution.
5. Name three types of AI application areas. Which of these area is the most difficult to implement?
6. Give two real life systems/applications that use AI. Mention how AI can be used in the system in one line.
7. What is full form of DIKW?
8. Define a production system.
9. Define KBS (Full form and one line definition).
10. List any two types of KBS.
11. Draw general structure of KBS.
12. List sources of knowledge.
13. List types of knowledge.
14. List components of knowledge.
15. Give an example of fact.
16. Give an example of rule or procedural knowledge.
17. Give an example of heuristic.
18. Name two strategies of inference engine working.
19. What are the limitations of knowledge acquisition in a typical KBS?
20. List three strategies of knowledge update.
21. Give full form of WFF. Where can it be used?
22. Define predicate in knowledge representation.

Big Questions

23. List and describe three types of AI application areas. Also give examples from each category. Which of these area is the most difficult to implement?
24. Write a short note on data pyramid (DIKW chain) and systems in the data pyramid (DIKW chain).
25. Explain production system by taking a water jug problem.
26. Explain hill climbing search.
27. Explain with steps following three types of Hill Climbing. Mention advantages and disadvantages of each.
    - Simple hill Climbing:
    - Steepest-Ascent hill-climbing:
    - Stochastic hill Climbing:
28. Explain following terms(with diagram) w.r.t Hill climbing.
    - Local Maximum
    - Global Maximum
    - Shoulder
    - Flat Maximum (Plateau)
    - Ridge
29. Draw general structure of KBS. Explain all its components in brief.
30. Explain various types of knowledge such as (i) commonsense knowledge, (ii) informed common sense knowledge, (iii) meta knowledge, (iv) domain knowledge, etc.
31. Explain knowledge components (such as facts, rules, and heuristic) by giving example of each.
32. Explain how inference engine works.
33. Explain forward chaining and backward chaining mechanisms of typical inference engine.
34. Explain knowledge acquisition process.
35. Explain knowledge representation structures.
36. Draw model of KBS development.

37. Describe limitations of symbolic representations of knowledge into a typical KBS.

38. Given a full 4-gallon jug and an empty 3-gallon jug, the goal is to fill the 4-gallon jug with exactly two gallon of water. You may use the following state space formulation.
    State = (x,y), where x is the number of gallons of water in the 4-gallon jug and y is # of gallons in the 3-gallon jug
    Initial State = (0,0)
    Goal State = (2,*), where * means any amount
    Create the search tree. Discuss which search strategy is appropriate for this problem.

39. Given a full 5-gallon jug and an empty 2-gallon jug, the goal is to fill the 2-gallon jug with exactly one gallon of water. You may use the following state space formulation.
    State = (x,y), where x is the number of gallons of water in the 5-gallon jug and y is # of gallons in the 2-gallon jug
        Initial State = (5,0)
        Goal State = (*,1), where * means any amount
    Create the search tree. Discuss which search strategy is appropriate for this problem.

40. The missionaries and cannibals problem is usually stated as follows. Three missionaries and three cannibals are on one side of a river, along with a boat that can hold one or two people. Write down State-Space Search Steps and Find a way to get everyone to the other side without ever leaving a group of missionaries in one place outnumbered by the cannibals in that place.

41. Explain heuristics. Write down two heuristics (Hamming Distance and Manhattan Distance) that can be utilized to solve 8-puzzle problem.

42. Breadth First Search Guarantees Solution. Depth First does not, but Iterative Deepening Search again guarantees a solution. Justify your agreement/non-agreement.

43. A man is walking down the village road with a tiger, a goat and a bundle of grass. Soon he arrives at the river bank where there is one tiny boat that can carry him and another animal or grass at a time. Constraint: Left alone, the tiger will eat the goat. And similarly, the goat will eat the grass bundle.

Formulate and Draw State-Space Search Steps for the above problem (till depth 3/or till the Goal is reached.

Is it a good idea to check for repeated states?

44. Why do you think people have a hard time solving this puzzle, given that the state space is so simple?
45. Draw First four piles of Game tree for Tic-Tac-Toe.
46. Differentiate between Strong AI and Weak AI. Give one example of each.
47. Giving example of each, State the difference between Moon Shot Projects and Reaping Low Hanging fruits with respect to AI in current scenario.
48. Differentiate between the following giving one example of each.
    - Tacit Knowledge and Explicit Knowledge
    - Procedural Knowledge and Declarative Knowledge
    - Prepositional Logic and Predicate Logic
    - Predicate Logic and Fuzzy Logic
    - Backward Chaining and Forward Chaining
49. What is Natural Language Processing. Identify atleast One Application where NLP can be advantageous. Explain it in detail giving examples.
50. List atleast five applications of AI. Discuss one of them in detail.