

18CSC305J - Artificial Intelligence

Unit III

QUESTION BANK

PART A

1. A Knowledge based agent 's environment is based on
 - a. percept
 - b. action
 - c. percept and action
 - d. action and percept.
2. The operator \rightarrow in propositional logic represents
 - a. not
 - b. and
 - c. or
 - d. if ..then
3. A sentence is true if it is true in all models is a
 - a. contradiction
 - b. tautology
 - c. unsatisfiability
 - d. refutation
4. The existential quantification (\exists) $xP(x)$ is read as
 - a. There is at least one x such that P(x)
 - b. For all x in P(x)
 - c. P(x) for all values of x in domain
 - d. P(x) for no values of x in the domain."
5. Analogical reasoning is the process of reasoning
 - a. From one particular object to another
 - b. with different assumptions
 - c. with facts of life
 - d. with our own ideas.
6. Forward chaining reasoning method proceeds from
 - a. Facts to conclusions
 - b. Conclusion to facts
 - c. Facts to problems
 - d. Conclusion to data
7. Translate the following statement into FOL.
"Every dog is clever "
 - a) $\forall a \text{ clever}(\text{dog})$
 - b) $\exists a \text{ clever}(a)$
 - c) $\forall a \text{ dog}(a)$
 - d) $\exists a \text{ dog}(a)$
8. Propositional logic is representation of ----- sentence
 - a) exclamatory
 - b) interrogative
 - c) declarative
 - d) descriptive
9. A sentence is true if it is true in all models is a
 - a) contradiction
 - b) tautology

- c) satisfiability d) refutation
10. Basic rules applied in order to derive conclusions to get the outcome is called as
 a) inference b) reference
 c) logic d) semantics
11. Process of reasoning from one particular object to another is called as
 a.) analogical reasoning b.) hypothetical reasoning
 c.) commonsense reasoning d) crucial reasoning
12. Which is created by using single propositional symbol?
 a. Complex sentence b. Atomic sentence
 c. Composition sentence d. Connective sentence
13. Semantic network is
 a. A way of representing knowledge b. Data type
 c. A data structure d. Association of attributes
14. Forward chaining reasoning method proceeds from
 a. Facts to conclusions b. Conclusion to facts
 c. Facts to problems d. Conclusion to data
15. Rule based system defines the problem domain and aims to find a solution from
 a. A set of production rules b. A set of production examples
 c. A set of axioms d. Positive & negative examples
16. ----- transforms system inputs, which are crisp numbers into fuzzy sets
 a. Inference b. Fuzzifier
 c. Defuzzifier d. Rules
17. Translate the following statement into FOL.
 “For every a, if a is a philosopher, then a is a scholar”
- a. $\forall a \text{ philosopher}(a) \text{ scholar}(a)$ b. $\exists a \text{ philosopher}(a) \text{ scholar}(a)$
 c. $\forall a \text{ philosopher}(a)$ d. $\text{scholar}(a)$

28. Which of the following is desired to build probabilistic systems feasible in the world?

- (A). Reliability (B). Feasibility
(C). Crucial robustness c) simplicity

29. What will be returned by backward chaining AI Algorithm?

- (A). Additional statements (B). Logical statement
(C). Substitutes matching the query (d). Crucial robustness

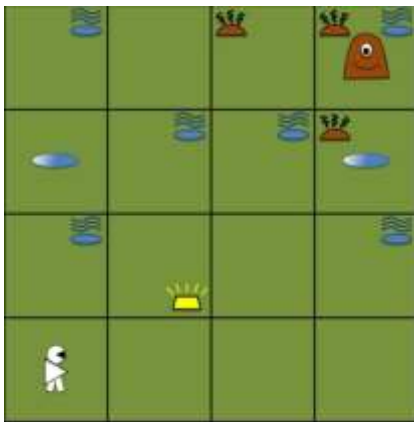
PART – B (4 Marks)

1. Define logic. How Wumpus world logic is constructed for all possible models.
2. Explain the BNF representation of predicate logic.
3. Write short notes on frames.
4. Consider the following sentence for constructing CFG and a parse tree.
“Raji received a wonderful gift.”
5. List few issues associated with the representation of knowledge structure.
6. Write down the condition for entailment in logic with a suitable example.
7. How can this English sentence be translated into a logical expression? “Everyone likes someone”.
8. What is meant by the term Inference? Explain the different types of Inference with examples.
9. What is the necessity of a Semantic Network? Explain Partitioned Semantic Network with an appropriate example.
10. Convert the following FOPL to English
 - i. $\forall x \text{ IsABunny}(x) \Rightarrow \text{IsCute}(x)$
 - ii. $\forall x \text{ IsAStudent}(x) \wedge \text{IsTakingAI}(x) \Rightarrow \text{IsCool}(x)$
11. Write short notes on frames.
12. Define tautology and entailment.
13. How can this English sentence be translated into a logical expression?
“You cannot ride the roller coaster if you are under 4 feet tall unless you are older than 16 years old.”
14. Show that $\neg(p \rightarrow q)$ and $p \wedge \neg q$ are logically equivalent using truth table
15. Derive the conclusion using predicate logic.
 1. “All lions are fierce.”
 2. “Some lions do not drink coffee.”
 3. “Some fierce creatures do not drink coffee.”

16. What do you mean by fuzzification?
17. Define Bayes theorem.
18. Define certainty factor.
19. What does Dempster theory specify?
20. Brief Bayesian belief network.
21. Write about Recognize-Act Cycle
22. Brief the process of matching in Production systems
23. What is conflict resolution?
24. State Modus ponens rule.
25. Differentiate between Propositional logic and Predicate logic.
26. Define Inductive inference.
27. State the advantages and disadvantages of forward chaining and backward chaining.
28. What is a Fuzzy set?
29. Mention the reasons for which Bayes' theorem is intractable.
30. From a standard deck of playing cards, a single card is drawn. The probability that the card is king is $\frac{4}{52}$, then calculate posterior probability $P(\text{King}|\text{Face})$, which means the drawn face card is a king card.

PART C

1. Explain Wumpus World Problem in detail. Create a traditional environment to understand an intelligent agent system in which it progresses to acquire gold from the mine.



2. Elaborate the process of unification with an algorithm and show how it is lifted from propositional logic to First order logic
3. Convert the following sentences in the propositional logic to clausal form. (6)

$$P \Leftrightarrow (Q \wedge \sim R).$$

$$W \Rightarrow P.$$

$$R \Leftrightarrow S.$$

$$S \Rightarrow P.$$

$$P \Rightarrow (\sim(Q \vee W) \vee S).$$

4 Convert to CNF

$$\forall X (q(X) \vee r(X) \Rightarrow s(X))$$

5. Using Resolution solve (6)

dog(fido)

$\forall (x)(\text{dog}(X) \rightarrow \text{animal}(X))$

$\forall (Y)(\text{animal}(Y) \rightarrow \text{die}(Y))$

Conclusion

die(fido)

6. Explain Unification and Lifting in detail with supporting examples.

7. With appropriate examples clearly explain the difference between Propositional and Predicate Logics.

8. Explain Forward and Backward Chaining in detail with appropriate examples.

9. Explain semantic networks and what are the types of reasoning in knowledge representation?

10. Explain the process of knowledge representation using rules by highlighting the control strategies.

11. What is a Bayesian network? How is the Bayesian network used in representing uncertain knowledge? Explain the method of performing inference in Bayesian network