CSE140: Introduction to Intelligent Systems (Winter 2023)

Quiz – 1 Rubrics

Marks - 20 **Date** – 16/03/2023 **Duration** -30mins

Instructions –

- Attempt all questions.
- MCQs have a single correct option.
- State any assumptions you have made clearly.
- **Standard institute plagiarism policy holds**.

Q1. Which of the following is False? **[1]**

a) Semantic networks may lead to ambiguity and inconsistency while representing different nodes in different parts of the network.
b) Frames and scripts can be easily extended and modified without majorly modifying the structure of existing knowledge.
c) Rule-based system cannot suffer from uncertainty and ambiguity.
d) Logic representation is best suited for the tasks based on deductive reasoning such as decision-making problems.

Answer: Refer to the slides for answer.

Q2. Consider the statements - **[1]**

A) Inductive reasoning tries to draw a conclusion for the population given the sample.
B) Deductive reasoning tries to draw a conclusion for the sample given the population.
C) Deductive reasoning tries to draw a conclusion for the population given the sample.
D) Inductive reasoning tries to draw a conclusion for the sample given the population.

Choose the correct option –

a) A and B are true.
b) A and C are true.
c) B and D are true.
d) C and D are true.

Answer: As discussed during the lectures.

Q3. Explain the different types of knowledge representations along with their examples. **[4]**

Answer:

- Logic-based representation: uses formal logic to represent knowledge, e.g., propositional logic, predicate logic.
- Semantic networks: represent knowledge as nodes and links between them, e.g., concept maps.

- Frames and scripts: organize knowledge into hierarchical structures with attributes and values, e.g., object-oriented programming.
- Rule-based systems: represent knowledge as a set of rules or conditional statements, e.g., expert systems.

Q4. Write predicate logic clauses for the given statements. **[2]**

a) There exists at least one student enrolled in the IIS course who will get an A+
Ans -
∃x (Student(x) ^ Enrolled(x,IIS) ^ Gets(x,A)
[or any equivalent expression as designed by the student]

b) Every student who is enrolled in the IIS course will need to learn Prolog.
Ans -
∀x (Student(x) ^ Enrolled(x,IIS) →Learn(x,Prolog))
[or any equivalent expression as designed by the student]

Q5. Given the following statements, convert them into propositional logic clauses and use inference rules to prove that Devika will go to college. **[4]**

a) Devika likes mathematics and she likes stories.

b) If she likes mathematics, she likes algebra.

c) If she likes algebra and likes physics, she will go to college.

d) She likes stories and she likes physics.

Ans -

P : Devika likes mathematics

Q : Devika likes stories

R : Devika likes algebra

S : Devika likes physics

T : Devika will go to college

The given statements in propositional logic are -

$P \wedge Q$

$P \rightarrow R$

$(R \wedge S) \rightarrow T$

$Q \wedge S$

Inference –

P ∧ Q is true means P is true

P , P → R are true means R is true [modus ponens]

Q ∧ S is true, means S is true

R ∧ S , (R ∧ S) → T are true means T is true [modus ponens]

So, T is true, hence Devika will go to college

Q6. What are the components of a smart home intelligence system? **[4]**

(Define its input interface, knowledge base, inference engine and output interface).

Answer –

- **Input Interface**: Sensor data from temperature and humidity sensors,Voice Commands,touchscreen.
- **Knowledge Base**: Historical temperature and humidity data, user's preferred temperature and humidity levels
- **Inference Engine**: Analyzes the data from the sensors and the user's preferences to determine the optimal temperature and humidity levels for the home.
  For example, if the temperature sensor detects that the temperature is too high, the inference engine might lower the thermostat to cool the home.
- **Output Interface**: Control of heating and cooling systems, such as turning on or adjusting the thermostat to reach the desired temperature and humidity levels.

Q7. Give four advantages of an intelligent system? **[4]**

Ans - refer to slides.