Question Bank

AU-6369

Department of CSIT

MCA: Semester IIIYear:2014 Paper Title: Artificial Intelligence and Expert Systems Max Marks: 60

Note: The model answers to few questions are provided in http://www.ggu.ac.in/CSIT_LectureNotes14-15.html and written LN in the following answers. Remember these are model answers only to provide guidelines. The classroom exercises also to be recalled.

Section A: (All 10 questions are compulsory)   10X2=20

Very Short Answer Questions: Write very short answers to following questions.

- How will you define the term Artificial Intelligence?

    AI is the science of making a machine think and act like an intelligent person. Or take Any definition/meaning from P5-8 of LN.

- What are simple reflex agents?

    Simple Reflex Agent: When the actions of nearest object are clearly visible then what response has to be taken, e.g. If the car going ahead applies brake (as appears from brake lights of the front car), then car following it should also initiate brake. In other words, take a counter action against an action (reaction vs action) , P15 of LN.

- Name the components of a production system.

    A *production system commonly consists of following four basic components:*

    (a)   A *set of rules of the* form   Ci A_i *where C_i refers to starting state and A_i represents consequent state. Also C_i the condition part and A_i is the action* part.

    (b) One or more *knowledge databases that contain whatever information is relevant* for the given problem.

    (c) A *control strategy that ascertains the order in which the rules must be applied to the available d*atabase

    (d) A *rule applier which is the computational system that implements the control* strategy and

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applies the rules to reach to goal (if it is possible). See P15 of LN.

- What is the meaning of the term informed search?

A search strategy which is better than another at identifying the most promising branches of a search-space is said to be more *informed*. It incorporates additional measure of a potential of a specific state to reach the goal. The potential of a state (node) to reach a goal is measured through a **heuristic function.** These are also called intelligent search

- Best first search

- Greedy Search

- A* search

- What is a water jug problem?

The water jug problem: You are given two jugs, a 4-litre one and a 3-litre 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 litres of water into 4-litre (or 3 Lt) jug.

- Unify (i) P(a,a) and P(a,c) (ii) Q(m,n) and Q(p,p)

- Use c/a to get P(c,c) and P(c,c)

- Use p/m and then p/n to get Q(p,p) and q(p,p) or any similar operation

- Draw a semantic net for the sentence ' John gave the book to Mary'.

Pl. See P76 of LN

- Define the term classification.

In general classification is the process of separating objects on the basis of classes (or similarity, to be discussed later) or classifying objects into different groups such that objects belonging to a group have something similar than in other groups. See P81 of LN.

- Define unsupervised classification with an example.

P#	F1	F2	F3

1	4	2.3	8
2	8	5.6	12
3	6	2.3	3

When the class of the patterns is not given in a database, such classifications are called unsupervised classification. P82 of LN.

- Write in brief about any two advantages of an expert system.

  - Availability (ii) knowledge update at any time, see P93 of LN.

Section B: **(Attempt any 4 questions out of 7 questions)** **4X10=40**

Descriptive Questions:

- Discuss the term artificial intelligence as defined by various scientists and researchers. How it is useful in computer science, explain.

  Pl. elaborate P4-12. AI is very useful in Computer Sc. for the reason that many decisions can be fuzzy or uncertain. The conventional techniques (hard programming) can solve problems which involve pure computation or decision making under various rules. But when there is no surety about a fact (lie it may rain today/I may go to school today etc) then we cannot make a clear decision based on such facts. Pattern classification, data mining, expert systems or Natural language processing are some of the broad areas of Computer Sc where AI can play a major role to solve the inherent problems.

- Explain the meaning of the term environment and explain any four types of environments.

  P15-16. The environment enables an agent to receive input under suitable conditions. An environment can be accessible (or inaccessible), static (or dynamic), discrete (or continuous), episodic (or non episodic or one time), deterministic (or stochastic), elaborate any four.

- Write short notes on (a) generate and test search (b) informed and uninformed search.

  - P37 of LN (b) P29-36 of LN.

- Given sentences (a) Marcus was a man (b) Marcus was a Pompeian (c) All Pompeians were Romans (d) Caesar was a ruler (e) All Pompeians were either loyal to Caesar or hated him (f) Everyone is loyal to someone (g) People only try to assassinate rulers they are not loyal to (h) Marcus tried to assassinate Caesar. Prove using resolution that Marcus hated Caesar.

First convert all sentences into clause form then see P69-71 of LN for solution.

- Describe pattern recognition with examples.

  Pattern refers to any object, live or dead e.g. a person, a vehicle, a pencil, a cloth or any such thing which can be represented by some metric is a pattern. We know that in Ai we try to draw conclusions from vague sentences using knowledge representation or natural language processing. Now if we want to identify objects which have some shape then we will have to apply some special technique. How will be classify apple or orange from each other, a pen or pencil, a car and a truck, all such recognitions can be better handled by important branch of AI called pattern recognition..In this branch we learn how to design a machine (classifier) which can separate objects from each other under a situation when class of similar objects is given in advance (supervised) or we have no idea about class of any object (unsupervised) . Write example of supervised and unsupervised classification with algorithms from Unit 4.

- What are supervised and unsupervised classifications, explain with example.

  See Unit 4 of LN with k-nn and k-means algorithms with proper short example.

- Explain the roles of a knowledge engineer, domain expert and an end user in an expert system.

  See Unit 5 of LN. Knowledge Engineer is one who processes the knowledge collected from domain expert. The knowledge engineer may not be a subject expert but he/ she must be familiar with the domain to work upon. The domain expert is the one who has the real expertise in the subject which is going to be designed by a knowledge engineer. The end user is the user of the expert system. He will report all feedback, problems, and suggestions to the knowledge engineer who in turn will discuss with domain expert to solve provided the product is free from other technical flaws.