Tribhuvan University

Institute of Science and Technology

2081

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Bachelor Level / Second Year/ Forth Semester/ Science — Full Marks: 60

Computer Science and Information Technology (CSC 266) — Pass Marks: 24

(Artificial Intelligence) — Time: 3 hours.

(NEW COURSE)

Candidates are required to give their answers in their own words as for as practicable.

All figures in the margin indicate full marks.

Section A

Long Answer Questions.

Attempt any TWO questions. **[2 × 10 = 20]**

1. How can you relate synapse, dendrite, and axon in biological neural networks with the elements of artificial neural networks? Create a multi-layer ANN with input layer, hidden layer and output layer. Assume necessary inputs and weights to the ANN and illustrate a single iteration of back propagation algorithm to train the ANN. [4+6]

2. What is Skolem constant? How is Skolemization done during resolution? Represent the following statements into FOPL. [2+3+5]

   All movies are not hit.
   Sarangi is a movie.
   All movies which has good script are hit
   Sarangi has a good script but Sarangi is sentimental.
   There is a movie which is comedy.

3. How is informed search different from uninformed search? Create a state space with appropriate heuristics, now illustrate how hill climbing search expands nodes to reach a goal. Modify the state space heuristics and demonstrate when the hill climbing will not be complete. [3+4+3]

Section-B

Short Answer Questions

Attempt any EIGHT questions. **[8 × 5 = 40]**

4. What is intelligence? Describe the foundations of AI. [1+4]

5. What is a rational agent? Justify with example how goal-based agent works? [1+4]

6. How uniform cost search is used to search goal in the state space? Illustrate with example. [5]

7. How can you represent knowledge using scripts? Create a knowledge base using script based on your own assumption. [2+3]

8. What is reinforcement learning? Configure an ANN neuron to simulate OR gate. [5]

9. What is robotics? How machine vision is used in robotics? [3+2]

10. Define fuzzy logic? Construct a fuzzy rule base expert system with your own considerations of fuzzy sets. [1+4]

11. How is the minimax algorithm used in game search? Consider state space is defined by a collection of pairs like (A, B) representing paths between states A and B. Construct state space for following and use a minimax algorithm. [1+4]

(A, B), (A, C), (B, D), (D, E), (C, F), (C, G), (D, H), (D, I), (E, J), (F, K), (F, L), (G, M), (G, N).

The utilities for states H, I, J K, L, M, N are 1, 3, 2,6, 3, 4, 1 respectively.

12. Justify which types of environments resembles following agents. [5]

a. Mission Game with fixed 6 states having two players
b. Tesla Driverless Robovan where road conditions are changing
c. Game Result Predicting Agent where current prediction state is independent of previous sate.