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504202

May 2024

M.Tech. (CSE/CE)- II Semester

Soft Computing (MCS-18-202)

Time : 3 Hours] [Max. Marks : 75

Instructions :

1. *It is compulsory to answer all the questions (1.5 marks each) of Part-A in short.*
2. *Answer any four questions from Part-B in detail.*
3. *Different sub-parts of a question are to be attempted adjacent to each other.*

PART–A

1. (a) Define the following with reference to fuzzy sets : support, membership. (1.5)

(b) Explain why a single neuron cannot be used for the XOR type classification. (1.5)

(c) What is the purpose of a Knowledge Base in a Fuzzy Control/Expert system? (1.5)

(d) Write the axioms related to complement norm. (1.5)

(e) What is the purpose of cross over in a GA based solution. (1.5)

(f) What is the difference between a regression and classification problem? (1.5)

(g) What are problems associated with extracting the knowledge from human experts? (1.5)

(h) Describe any two commonly used signal functions. (1.5)

(i) What are the major constituents of Soft Computing Domain? (1.5)

(j) What is a projection in the context of fuzzy relations? (1.5)

PART–B

2. (a) Describe the journey from artificial intelligence to computational intelligence. (5)

(b) Explain the concept of reinforcement learning with the help of suitable example. (5)

(c) Write a short note on neural toolbox facility in MATLAB. (5)

3. (a) Describe the working of Radial basis Function Networks. Also compare it with Multilayer perceptron model. (7)

(b) Explain Stability Plasticity dilemma. Explain it with the help of design and working of Adaptive Resonance Theory (ART) networks. (8)

4. (a) Normally a person uses following aspects while buying a house : Price, Space available, locality, distance from office. Explain how fuzzy logic can help in selecting an appropriate house. (7)

(b) Make the basic architecture of a fuzzy control system and explain its working with the help of a suitable example. (8)

5. (a) What is deep learning? How it helps in the solving the problems related to computer vision. (5)

(b) Explain how GA helps in arriving at the optimal solution with the help of a suitable example say Travelling Salesman Problem or Knapsack problem. (10)

6. (a) Explain how a single perceptron can be trained to act as a AND type classifier. (5)

(b) Design a fuzzy relation "far" that represents the distance between the capital cities of various states in India. (5)

(c) Describe how an Artificial Neural Network (ANN) can be trained using back-propagation. What is the role forward pass and backward pass? (5)

7. (a) Differentiate between supervised and un supervised learning. (3)

(b) Write a short note on t-norm along with its associated axioms and functions. (4)

(c) Differentiate between Mamdani and Sugeno type fuzzy Inference System. (4)

(d) Describe the Purpose of mutation in GA based solution. Explain how mutation can be performed while solving the TSP (Travelling Salesman Problem). (4)