PA-3406

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M.Sc. (Computer Science)
CSDT124C : SOFT COMPUTING
(2019 Pattern) (Semester - II)

Time : 2 Hours]   *[Max. Marks : 35*

Instructions to the candidates :
1) *Question 1 is compulsory.*
2) *Solve any three questions from Q.2 to Q.5.*
3) *Question Q.2 to Q.5 carry equal marks.*

Q1) Solve **Any five** of the following :   **[5]**

a) What is fuzzy logic?

b) Define artificial neural network and what are the components of neural network?

c) What are the application of soft computing?

d) Where is genetic algorithm used?

e) What is meant by fuzzification?

f) Why is activation function used?

Q2) Attempt the following :   **[10]**

a) i) What is Cartesian product? Consider the two sets A and B given as, A = {0, 1}. B = {a, b, c} find the Cartesian product of A and B.
                                                           [2]

ii) Consider following fuzzy set,   **[4]**

$$R = \left\{ \frac{1.0}{0} + \frac{0.5}{1} + \frac{0.7}{2} + \frac{0.4}{3} + \frac{0.5}{4} \right\}$$

$$S = \left\{ \frac{0.6}{0} + \frac{0.7}{1} + \frac{0.2}{2} + \frac{0.9}{3} + \frac{0.2}{4} \right\}$$

Find the following,

1) $R \cup S$.

2) $R \cap S$.

3) $\bar{R}$.

4) $\bar{R} \cup S$.

b) What are the classification of Activation Function?   **[4]**

Q3) Attempt the following :   **[10]**

a) i) What are Genetic algorithm? Write down any two disadvantages of
        genetic algorithm.   **[2]**

    ii) Explain lambda-cut for a fuzzy relation. Consider relation

$$R, \begin{bmatrix} 0.9 & 0.0 & 0.2 \\ 1.0 & 0.5 & 0.3 \\ 03. & 1.0 & 0.7 \end{bmatrix}$$

        Determine the λ-cut relations for the following λ values on R. **[4]**

        1) $\lambda_{0.6}$.

        2) $\lambda_{0.4}$.

        3) $\lambda_{0.8}$.

        4) $\lambda_{0.9}$.

b) What is Hebbian learning rule formula? Explain hebb learning rule with
    suitable example.   **[4]**

Q4) Attempt the following : **[10]**

    a)   i)   Difference between artificial neural network and biological network.
                    [2]

            ii)   Explain crossover operator with suitable examples.   **[4]**

    b)   Consider fuzzy sets,   **[4]**

$$P=\left\{\frac{0.1}{C_1}+\frac{0.5}{C_2}+\frac{1.0}{C_3}\right\} \quad S=\left\{\frac{0.3}{S_1}+\frac{0.8}{S_2}\right\} \quad Q=\left\{\frac{0.4}{Z_1}+\frac{0.7}{Z_2}+\frac{1.0}{Z_3}\right\}$$

        Find the following,

        i) $R = P \times S$.

        ii) $T = Q \circ R$ wing max-product composition.

Q5) Attempt **any two** of the following : **[10]**

    a)   Explain the following terminologies of genetic algorithm.   **[5]**

        i)   Population.

        ii)   Chromosomes.

        iii)   Genes.

        iv)   Alleles.

        v)   Fitness Function.

    b)   Define "Back Propagation". What are the advantages and disadvantages of Back propagation algorithms.   **[5]**

    c)   What is fuzzy implication? Let $X = \{1, 2, 3, 4, 5, 6\}$ be the universe of discourse, consider the following three fuzzy set defined on the above universe.   **[5]**

$$A=\left\{\frac{0.6}{2}+\frac{1.0}{3}+\frac{0.2}{4}\right\} \quad B=\left\{\frac{0.4}{2}+\frac{1.0}{3}+\frac{0.8}{4}+\frac{0.3}{5}\right\}$$

$$C=\left\{\frac{0.3}{1}+\frac{0.5}{2}+\frac{0.6}{3}+\frac{0.6}{4}+\frac{0.5}{5}+\frac{0.3}{6}\right\}$$

        Determine the implication relations.

        If X is in A Then Y is in B.

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