First Semester Regular/Back Examination – 2015-16

SOFT COMPUTING

Branch-Power Electronics & Drives

Time: 3 Hours

Max marks: 70

Q.Code-T1228

Answer Question No.1 which is compulsory and any five from the rest.

The figures in the right hand margin indicate marks.

Q1   Answer the following questions: (2 x 10)
- a) State the merits and demerits of Khonen self organizing feature maps.
- b) Mention the importance of gradient descent learning rule used in back propagation neural network.
- c) What is meant by unsupervised learning?
- d) The performance of GA depends on the balance between selection process and population diversity- Justify the statement.
- e) What do you mean by subtractive clustering?
- f) Justify the following statement
  "Approximate reasoning is important in fuzzy logic."
- g) Discuss fuzzy composition techniques.
- h) Differentiate between fuzzy-neural hybrid and fuzzy-genetic hybrid system.
- i) Define simulated annealing NN.
- j) What do you mean by Support Vector Machine?

Q2   a)   Show that the single layer perceptron cannot solve the XOR problem.   (5)

      b)   Explain various activation functions and learning rules used in neural network architecture.   (5)

Q3   a)   Compare and Contrast between MLP and RBFN. State 'Cover's theorem on separability of patterns'.   (5)

      b)   Explain Real-Time recurrent learning (RTRL) algorithm in details.   (5)

Q4   a)   Explain Ant Colony optimization in details.   (5)

      b)   Using genetic algorithm process, maximize the function $f(x)=x^2$ where x is permitted to vary between 0 and 31.Assume the necessary operators for the process of your own.   (5)

Q5 a) Explain briefly about fuzzy c-means clustering.   (5)
    b) Explain briefly about Type –II Fuzzy System.   (5)
Q6   (10)

A Kohonen self-organizing map is shown with weight in the Fig. 1

   a) Using the square of the Euclidean distance, find the cluster unit
       C_J that is closest to the input vector (0.3, 0.4)
   b) Using a learning rate of 0.3, find the new weights for unit C_J.
   c) Find new weights for C_{J-1} and C_{J+1} even if they are allowed to
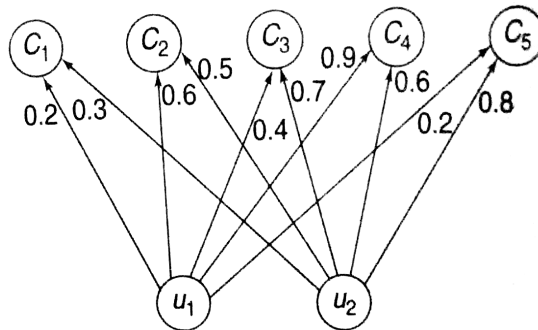   learn.

Figure 1

Q7 a) Explain in detail about the various operators involved in genetic   (5)
        algorithm.
    b)   (5)

Let X = {a, b, c, d}, Y= {1, 2, 3, 4}

And $\tilde{A}$ = {(a, 0) (b, 0.6) (c, 0.7) (d, 1)}

        $\tilde{B}$ = {(1, 0.3) (2, 1) (3, 0.9) (4, 0)}

        $\tilde{C}$ = {(1, 0) (2, 0.3) (3, 1), (4, 0.6)}
    Determine the implication relations

(i) IF x is $\tilde{A}$ THEN y is $\tilde{B}$.

(ii) IF x is $\tilde{A}$ THEN y is $\tilde{B}$ ELSE y is $\tilde{C}$

Q8   Write short notes on any two of the following: (5 x 2)
    a) Bacteria foraging method
    b) Fitness Function
    c) Back Propagation Through Time (BPTT) Algorithm
    d) Inverse Modeling