GANPAT UNIVERSITY
B. Tech. Semester: VII (BM&I) Engineering
Regular Examination Nov-Dec 2016
2BM705: Neural Networks & Fuzzy Logic

Time: 3 Hours / As per Scheme   **Total Marks: 70**

Instruction:
1. All the questions are compulsory.
2. Answer of each section must be written in separate answer books.
3. Figure to the right indicate marks.
4. Assume data, if needed.
5. Conventional terms / notations are used.

Section – I

Que. – 1   [12]

    a). Define Neural network. Enumerate its advantages & disadvantages.   [6]

    b). Draw and explain simple model of neuron.   [4]

    c). i). What is Pruning?   [2]
        ii). What is the significance of weight and bias?

OR

Que. – 1   [12]

    a). What are Medical and Biological data? Enlist and explain it in detail.   [6]

    b). Discuss Echo cancellation in telephone circuits using ADALINE.   [4]

    c). Explain the objective of Neural Network   [2]

Que. – 2   [11]

    a). Perform training using Perceptron learning rule for the data given below   [7]
    for 2 cycles.
    Weight W1 = 1 -1 0 0.5
    Learning Rate N= 0.1
    Inputs & Outputs are as follows:
    X1= 1 -2 0 1
    D1= -1
    X2= 0 1.5 -0.5 -1
    D2= -1
    X3= -1 1 0.5 -1
    D3= 1
    Transfer function= Biopolar hard limit

    b). Write notes on Error correction learning rule.   [4]

OR

Que. – 2

[11]

a). State & Explain Hebbian learning rule giving example. [6]

b). Discuss the application of neural network in disease diagnosis system giving example [5]

Que. – 3

[12]

a). Discuss Hard-limit transfer function and sigmoid transfer function. [4]

b). What is Madaline? Draw & explain three Madaline model. [4]

c). Compare Supervised learning and unsupervised learning [4]

Section – II

Que. – 4

[12]

a). Explain the difference between classical set theory and fuzzy set theory with the help of suitable example. [4]

b). Develop reasonable membership function for the fuzzy sets underweight person, normal person, overweight person and obesity person based on BMI (Body Mass Index). [4]

c). Explain the following with example: [4]
(1) Convex fuzzy set (2) Support and core of fuzzy set

OR

Que. – 4

[12]

a). What are linguistic hedges? Explain in detail with the help of example. [4]

b). Given the following fuzzy set: [4]
Tall man A= {0.0/165, 0.0/170, 0.0/175, 0.2/180, 0.5/185, 1.0/190}
Average man B= {0.0/165, 0.5/170, 1.0/175, 0.5/180, 0.0/185, 0.0/190}
Derive the following fuzzy set:
(1)Not tall man (2)Tall man or average man (3)Average man and not tall man

c). Enlist and explain most frequently used T-norm and T-conorm (s-norm) operators [4]

Que. – 5

[12]

a). Fuzzy set A,B and C are represented as, [6]

A= {0.2/30, 0.7/60, 1.0/100, 0.2/120}
B= {0.2/20, 0.4/40, 0.6/60, 0.8/80, 1.0/100, 0.1/120}
C= {0.33/500, 0.67/1000, 1.0/1500, 0.15/1800}

Find: R-relation between A&B, S-relation between B&C

b). Define fuzzy composition. Given three universe of discourse $X=\{x1,x2\}$, [6] $Y=\{y1, y2\}$ and $Z=\{z1, z2, z3\}$. Let R and S be two fuzzy relation on the Cartesian space (XXY) and (YXZ) respectively. T is a fuzzy relation defined on Cartesian space (XXZ). Find T using max-min composition and max-product composition where,

$$R=\begin{bmatrix} 0.7 & 0.5 \\ 0.8 & 0.4 \end{bmatrix} \quad S=\begin{bmatrix} 0.9 & 0.6 & 0.2 \\ 0.1 & 0.7 & 0.5 \end{bmatrix}$$

OR

[12]

Que. – 5

a). Show that the following operators on fuzzy sets satisfy Demorgan's law: [6]
   1. Dombi's T-norm and T-conorm, with $N(a) = 1 - a$
   2. Hamacher's T-norm and T-conorm, with $N(a) = 1 - a$ Max and min, with $N(a)$ as sugeno's complement.

b). Find an operator contrast diminisher DIM that is the inverse of contrast [6] intensifier INT. Show the effect of INT and DIM on the membership function using suitable example.

[11]

Que. – 6

a). In the field of hydrology the study of rain fall patterns is most important. [5] The rate of rainfall, in mm/h falling in a particular geographic region could be describe using linguistic variable "heavy" and "light" as follow.
   "heavy" = $\{0.2/5, 0.4/8, 0.6/12, 0.8/20, 1/30\}$
   "light" = $\{0/30, 0.1/20, 0.5/12, 0.8/8, 1/5\}$
   Develop membership function for the following linguistic phrases.
      (1) Very heavy (2) Fairly heavy (3) Not very light

b). Explain the concept of mamdani fuzzy model and sugeno fuzzy model in [6] detail with the help of neat diagram.

END OF PAPER