APJ Abdul Kalam Technological University

Ernakulam II Cluster

First Semester M.Tech Degree Examination December 2017

05CS 6001- COMPUTATIONAL INTELLIGENCE

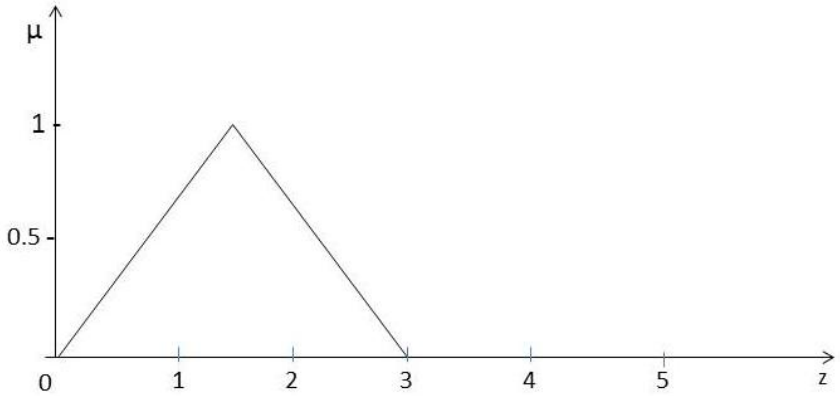
Time: 3 hrs. Max. Marks: 60

1.

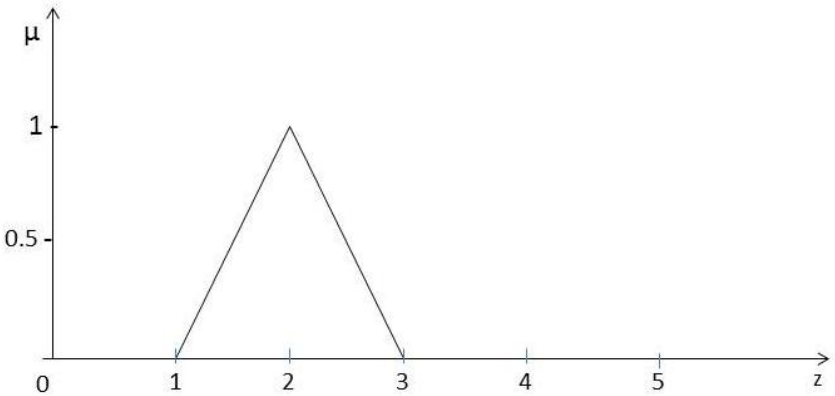
a) Let low = $\frac{1.0}{0} + \frac{0.5}{1} + \frac{0.2}{2} + \frac{0}{3} + \frac{0}{4}$ and high = $\frac{0}{0} + \frac{0}{1} + \frac{0.2}{2} + \frac{0.5}{3} + \frac{1.0}{4}$ be fuzzy sets defined on the universes U = V = {0, 1, 2, 3, 4}. If R: If 'x is low' Then 'y is high' be the fuzzy If-Then rule and the premise is 'x is very low', then what is the conclusion? The fuzzy predicate 'very low' is interpreted as the set

$$\text{very-low} = \frac{1.0}{0} + \frac{0.3}{1} + \frac{0}{2} + \frac{0}{3} + \frac{0}{4}$$ [4 Marks]

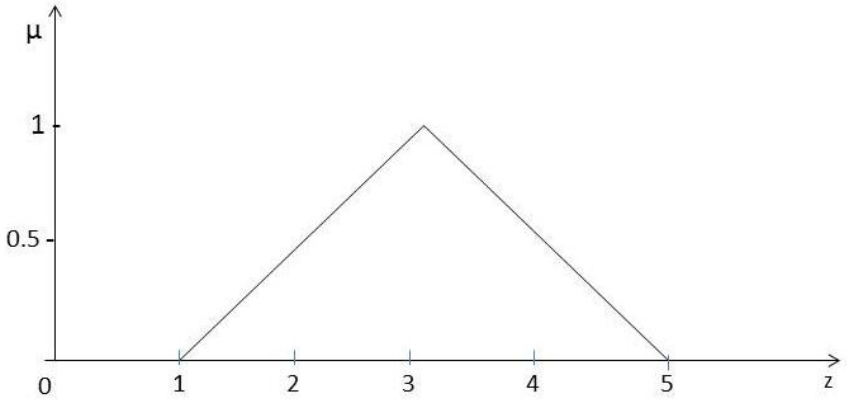
b) Many products, such as tar, petroleum jelly, and petroleum, are extracted from crude oil. In a newly drilled oil well, three sets of oil samples are taken and tested for their viscosity. The results are given in the form of the three fuzzy sets B1, B2, and B3, all defined on a universe of normalized viscosity, as shown in Figures below. Find the most nearly representative viscosity value for all three oil samples. [Hint : Find Z* by combining B1,B2 & B3 and defuzzifying.]



Membership in viscosity of oil sample 1, B1.



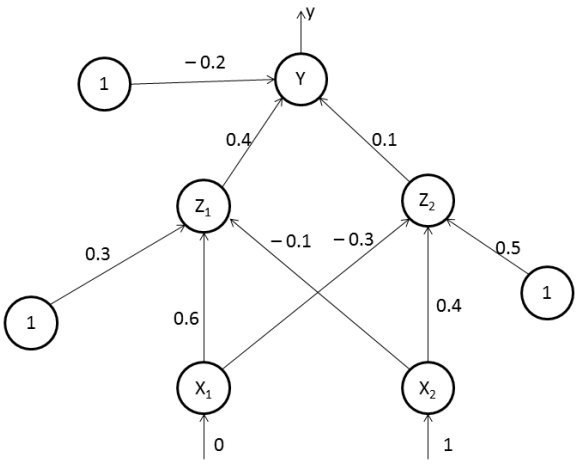
Membership in viscosity of oil sample 2, B2.



Membership in viscosity of oil sample 3, $\tilde{B}3$.

[8 Marks]

2. Using back-propagation network, Find the new weights for the net shown in figure. It is presented with the input pattern [0,1] and the target output is 1. Use a learning rate α= 0.25 and binary sigmoidal activation function. [12 Marks]



3.

a) Describe two methods used to select individuals from a population for the mating pool in Genetic Algorithms. [9 Marks]

b) How the kernels are useful for classification? Explain different kernels used in SVM classification. [9 Marks]

OR

4.

a) Derive the formula for survival probability of individuals that satisfy a schema under the operations of selection, crossover and mutation. **[**10 Marks**]**

b) Describe how support vector machines are designed to solve classification problems. **[**8 Marks**]**

5.

a) Describe the difference between pheromone evaporation and pheromone intensification. Explain how these methods help to explore new paths and reinforce current paths. Compare the pheromone updation in AS ranking model and MAX- MIN model.

[10 Marks]

b) What are the different operations involved in Particle Swarm Optimization? Describe the components that affect the velocity of the particle? [8 Marks]

OR

6. a) Explain the components of rule based expert systems. [6 marks]

b) Explain the development stages of expert systems. [6 marks]

c) Using forward chaining try to find the weather condition. Facts given are

1) Sun is behind the clouds.
2) Air is heavy.

Rules given are

1) IF pressure is low THEN chances of cyclone
2) IF temperature is low and humidity in air THEN chances of rain
3) IF cyclone THEN clouds at sky
4) IF sun is behind the clouds THEN temperature is low
5) IF air is heavy THEN humidity in air. [6 marks]