

Unit 5 - Week 3

Course outline

How does an NPTEL online course work?

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Week 3

Lecture 11 : Fuzzy logic controller

Lecture 12 : Fuzzy Logic Controller (Contd.)

Lecture 13 : Fuzzy logic controller (Contd.)

Lecture 14 : Concept of Genetic Algorithm

Lecture 15 : Concept of Genetic Algorithm (Contd.) and GA Strategies

Lecture material of Week 3

Quiz : Week 3 Assignment 3

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Week 3 Assignment 3

The due date for submitting this assignment has passed.
As per our records you have not submitted this assignment.

Due on 2020-02-19, 23:59 IST.

1) Two fuzzy sets P and Q are defined on X as follows:

$\mu(X)$	X1	X2	X3	X4	X5
P	0.1	0.2	0.7	0.5	0.4
Q	0.9	0.6	0.3	0.2	0.8

Then, according to λ -cut method, $(P \cap Q)_{0.4} = ?$

- a) $\{X1 \ X2 \ X3 \ X4\}$
 b) $\{X1 \ X2 \ X3 \ X4 \ X5\}$
 c) $\{X5\}$
 d) $\{X1 \ X2 \ X5\}$

- a)
 b)
 c)
 d)

No, the answer is incorrect.
Score: 0

Accepted Answers:
c)

2) Takagi-Sugeno approach to FLC design is computationally more expensive compared to Mamdani approach because

- a. Mamdani approach considers a less number of rules in fuzzy rule base
 b. Searching a rule in Mamdani approach is simple and hence less time consuming
 c. Takagi-Sugeno approach consider a large number of rules in fuzzy rule base
 d. Computation of each rule in Takagi-Sugeno approach is more time consuming

- a.
 b.
 c.
 d.

No, the answer is incorrect.
Score: 0

Accepted Answers:
d.

3) **The train is running fast.** Here **fast** can be represented by

- a. Fuzzy Set
 b. Crisp Set
 c. Fuzzy & Crisp Set
 d. None of the mentioned

- a.
 b.
 c.
 d.

No, the answer is incorrect.
Score: 0

Accepted Answers:
a.

4) Which of the following centroid method considers overlapping region twice?

- a. Center of sum
 b. Center of gravity
 c. Center of area

- a.
 b.
 c.

No, the answer is incorrect.
Score: 0

Accepted Answers:
a.

5) Suppose a fuzzy set **Young** is defined as follows:

$$Young = \{(10,0.5), (20,0.8), (30,0.8), (40,0.5), (50,0.3)\}$$

Then the crisp value of **Young** using MoM method is

- a. 25
 b. 20
 c. 35
 d. 50

- a.
 b.
 c.
 d.

No, the answer is incorrect.
Score: 0

Accepted Answers:
a.

6) Which defuzzification method can be used only for symmetrical output membership function?

- a. Height method
 b. Center of gravity method
 c. Weighted average method
 d. Center of area method

- a.
 b.
 c.
 d.

No, the answer is incorrect.
Score: 0

Accepted Answers:
c.

7) Which of the following is not a centroid method?

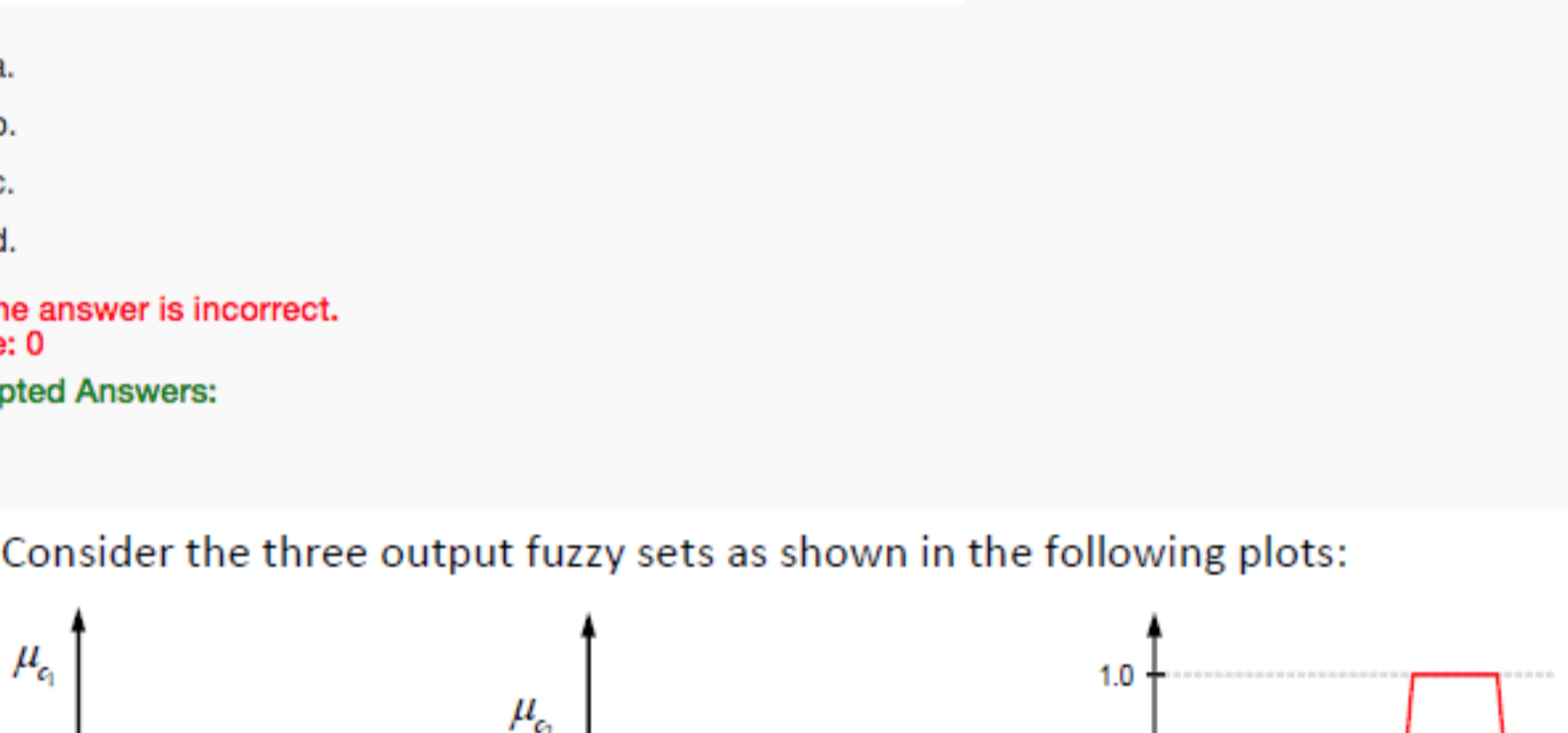
- a. Centre of gravity method (CoG)
 b. Centre of sum method (CoS)
 c. Centre of area method (CoA)
 d. Centre of Mass (CoM)

- a.
 b.
 c.
 d.

No, the answer is incorrect.
Score: 0

Accepted Answers:
d.

8) Consider the three output fuzzy sets as shown in the following plots:



The crisp value of $C = C_1 \cup C_2 \cup C_3$ using CoG method is

- a. 4.9
 b. 5.2
 c. 3.9
 d. 5.8

- a.
 b.
 c.
 d.

No, the answer is incorrect.
Score: 0

Accepted Answers:
a.

9) For a fuzzy relation R

$$R = \begin{bmatrix} 0.7 & 0.2 & 0.3 \\ 0.9 & 0.5 & 1 \\ 0.8 & 0.3 & 0.7 \end{bmatrix}$$

λ -cut relations for $\lambda = 0.8$

a. $R_0 = \begin{bmatrix} 1 & 1 & 1 \\ 0 & 1 & 0 \\ 0 & 1 & 1 \end{bmatrix}$

b. $R_0 = \begin{bmatrix} 0 & 0 & 0 \\ 1 & 0 & 1 \\ 1 & 0 & 0 \end{bmatrix}$

c. $R_0 = \begin{bmatrix} 0 & 0 & 0 \\ 1 & 0 & 1 \\ 0 & 0 & 0 \end{bmatrix}$

d. $R_0 = \begin{bmatrix} 1 & 1 & 1 \\ 1 & 1 & 1 \\ 1 & 1 & 1 \end{bmatrix}$

- a.
 b.
 c.
 d.

No, the answer is incorrect.
Score: 0

Accepted Answers:
b.

10) What is the following sequence of steps taken in designing a fuzzy logic machine?

- a. Fuzzification->Rule evaluation->Defuzzification
 b. Rule evaluation->Fuzzification->Defuzzification
 c. Fuzzy Sets->Defuzzification->Rule evaluation
 d. Defuzzification->Rule evaluation->Fuzzification

- a.
 b.
 c.
 d.

No, the answer is incorrect.
Score: 0

Accepted Answers:
a.

11) If the output fuzzy set $C = C_1 \cup C_2 \cup \dots \cup C_n$, then the crisp value according to Centre of Sum (CoS) is defined as (Symbols have their usual meaning)

a. $x^* = \frac{\sum_{i=1}^n x_i(A_i)}{\sum_{i=1}^n A_i}$

b. $x^* = \frac{\sum x_i \mu_c(x_i)}{\sum \mu_c(x_i)}$

c. $x^* = \frac{\sum_{i=1}^n x_i A_i}{\sum_{i=1}^n A_i}$

d. $x^* = \frac{\sum_{i=1}^n \mu_{c_i}(x_i) x_i}{\sum_{i=1}^n \mu_{c_i}(x_i)}$

- a.
 b.
 c.
 d.

No, the answer is incorrect.
Score: 0

Accepted Answers:
c.

12) If A is a fuzzy set, then $(\overline{A})_\lambda \neq \overline{A}_\lambda$

- a. except for value of $\lambda = 0.5$
 b. except for value of $\lambda = 1$
 c. except for value of $\lambda = 0$
 d. for all values of λ

- a.
 b.
 c.
 d.

No, the answer is incorrect.
Score: 0

Accepted Answers:
a.

13) Assume, a fuzzy set A can be defined on x as follows.

$$A_1 = \{(x_1, 0.8), (x_2, 0.2), (x_3, 0), (x_4, 1)\}, \text{ and according to lambda cut method}$$

- a. $A_{0.5} = x_1, x_4$
 b. $A_{0.5} = x_1$
 c. $A_{0.5} = x_1, x_2$
 d. $A_{0.5} = x_4$

- a.
 b.
 c.
 d.

No, the answer is incorrect.
Score: 0

Accepted Answers:
a.

14) Which is the output of a fuzzy controller?

- a. A crisp set
 b. A fuzzy set
 c. Both crisp set and fuzzy set
 d. None of the above

- a.
 b.
 c.
 d.

No, the answer is incorrect.
Score: 0

Accepted Answers:
a.

15) Which defuzzification method is used in the problem of mobile robot?

- a. Weighted average method
 b. Centre of sum method
 c. Lambda cut method
 d. Maxima method

- a.
 b.
 c.
 d.

No, the answer is incorrect.
Score: 0

Accepted Answers:
b.