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University of Asia Pacific
Dept. of Computer Science and Engineering

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University of Asia Pacific
Dept. of Computer Science and Engineering
Class Test - 04, Spring 24

Course Code: CSE 403 Course Title: Artificial Intelligence and Expert Systems
Total Marks: 10 Date: 1/12/2024 Time: 30 Mins

Answer **any one** of the following questions

1. Consider the following two fuzzy sets, A and B, (written in standard *Zadeh* notation). Calculate the following fuzzy sets: i) (NOT A) AND B ii) A OR B iii) Dilation (A) and iv) Concentration (B) [10]
A= {0.2/1 + 0.4/2 + 0.5/3 + 0.6/4 + 0.8/5 + 0.7/6 + 0.3/7}
B= {0.3/1 + 0.7/2 + 0.4/3 + 0.2/4 + 0.5/5 + 0.8/6 + 0.9/7}

OR

2. A group of 5 students of CSE 403 have been found to be **very good** at problem solving with membership values {0.3, 0.5, 0.3, 0.7, 0.8} respectively. Estimate what would be membership values in order to represent them to be: i) **extremely good** problem solver ii) **good** problem solver and iii) **more or less good** problem solver [10]

Answer the question no - 2

A and B without zadeh notation:

A = {0.2, 0.4, 0.5, 0.6, 0.8, 0.7, 0.3}

B = {0.3, 0.7, 0.4, 0.2, 0.5, 0.8, 0.9}

(i) NOT A = 1 - A

= {0.8, 0.6, 0.5, 0.4, 0.2, 0.3, 0.7}

(NOT A) AND B = MIN (NOT A, B)

= {0.3, 0.6, 0.4, 0.2, 0.2, 0.3, 0.7}

ii) A OR B = MAX (A, B)

= {0.3, 0.7, 0.5, 0.6, 0.8, 0.8, 0.9}

iii) Dilation (A) = $A^{\frac{1}{n}}$ [n = 7, A has 7 elements]

= $\{0.2^{\frac{1}{7}}, 0.4^{\frac{1}{7}}, 0.5^{\frac{1}{7}}, 0.6^{\frac{1}{7}}, 0.8^{\frac{1}{7}}, 0.7^{\frac{1}{7}}, 0.3^{\frac{1}{7}}\}$

~~= {0.8,~~

= {0.79, 0.87, 0.91, 0.93, 0.97, 0.95, 0.84}

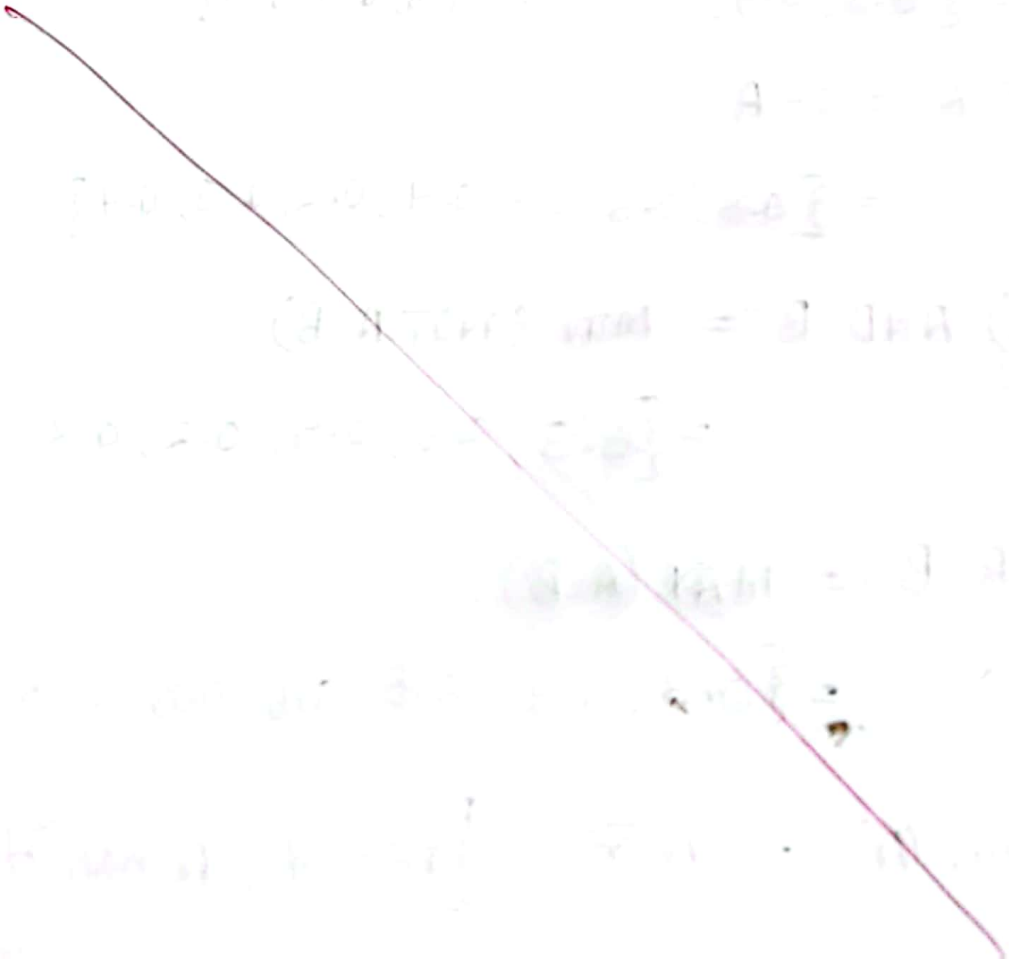
ID: 2116042

(iv) Concentration (B) = B^n

$= \{0.3^7, 0.7^7, 0.4^7, 0.2^7, 0.5^7, 0.8^7, 0.9^7\}$

$= \{0.0002187, 0.082354, 0.00164, 0.0000128,$
$0.0078125, 0.2097, 0.4783\}$

Ans.



ID: 21101028

University of Asia Pacific
Dept. of Computer Science and Engineering
Class Test – 04, Spring-24

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Total Marks: 10 Date: 1/12/2024 Time: 30 Mins

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OR

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Ans to the Q.NO-2

Here, given,

very good = [0.3, 0.5, 0.3, 0.7, 0.8]

We know,

good = a
very good = a^2
extremely good = a^3
more or less good = $a^{\frac{1}{2}}$

Now, good = $\sqrt{\text{very good}}$

$= [\sqrt{0.3}, \sqrt{0.5}, \sqrt{0.3}, \sqrt{0.7}, \sqrt{0.8}]$

$= [0.5, 0.7, 0.5, 0.8, 0.9]$

i) Extremely good = $(\text{good})^3$

$= [(0.5)^3, (0.7)^3, (0.5)^3, (0.8)^3, (0.9)^3]$

$= [0.13, 0.34, 0.13, 0.51, 0.73]$

ii) From above we can see that,

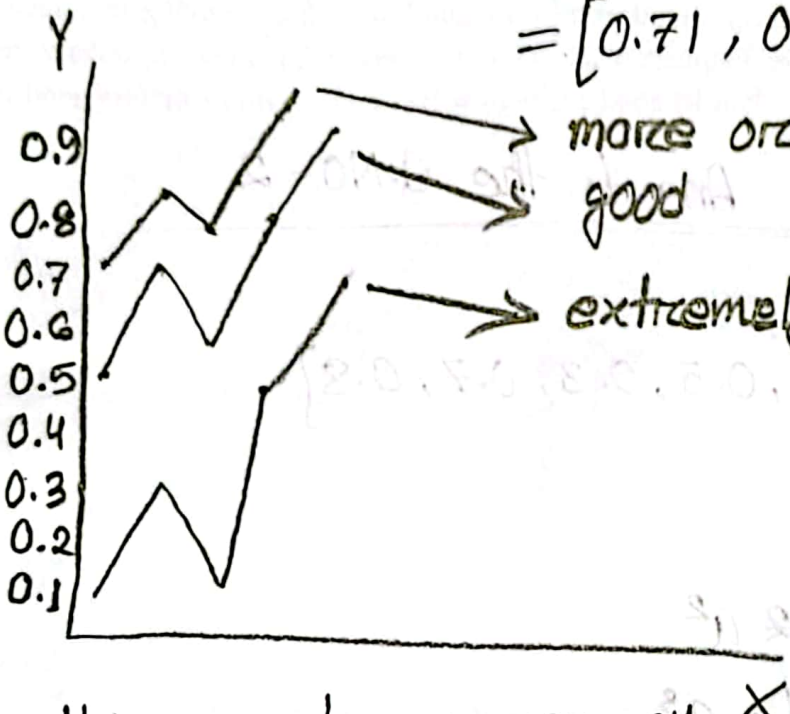
good = [0.5, 0.7, 0.5, 0.8, 0.9]

iii) more or less good = $(\text{good})^{\frac{1}{2}}$

$= [(0.5)^{\frac{1}{2}}, (0.7)^{\frac{1}{2}}, (0.5)^{\frac{1}{2}}, (0.8)^{\frac{1}{2}}, (0.9)^{\frac{1}{2}}]$

~~$= [0.71, 0.84, 0.71, 0.89, 0.94]$~~

$= [0.71, 0.84, 0.71, 0.89, 0.95]$



From this graph, we can say,

good to extremely good, it ~~beco~~ decrease

[Concentration $(x^n) \Rightarrow a^3$]

good to more or less good, it increase

[Dilation $(x^{\frac{1}{n}}) \Rightarrow a^{\frac{1}{2}}$]

ID: 2110142

University of Asia Pacific
Dept. of Computer Science and Engineering
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   A= {0.2/1 + 0.4/2 + 0.5/3 + 0.6/4 + 0.8/5 + 0.7/6 + 0.3/7}
   B= {0.3/1 + 0.7/2 + 0.4/3 + 0.2/4 + 0.5/5 + 0.8/6 + 0.9/7} **OR**

2. A group of 5 students of CSE 403 have been found to be **very good** at problem solving with membership values: [0.3, 0.5, 0.3, 0.7, 0.8] respectively. Estimate what would be membership values in order to represent them to be: i) **extremely good** problem solver ii) **good** problem solver and iii) **more or less good** problem solver. [10]

Ans. To. The. Q. N-2.

given very good = [0.3, 0.5, 0.3, 0.7, 0.8]

Let,
good = a
very good = a^2
extremely good = a^3
more or less good = $a^{1/2}$

good(a) = $\sqrt{\text{very good}} \Rightarrow \sqrt{a^2}$
= [$\sqrt{0.3}$ $\sqrt{0.5}$ $\sqrt{0.3}$ $\sqrt{0.7}$ $\sqrt{0.8}$]

$\therefore$ good(a) = [0.5 0.7 0.5 0.8 ~~0.9~~ 0.9] [$\because \sqrt{a^2} = a$.]

D extremly good (a^3) = [$(0.5)^3$ $(0.7)^3$ $(0.5)^3$ $(0.8)^3$ $(0.9)^3$]

= [0.12 0.34 0.12 0.51 0.72]

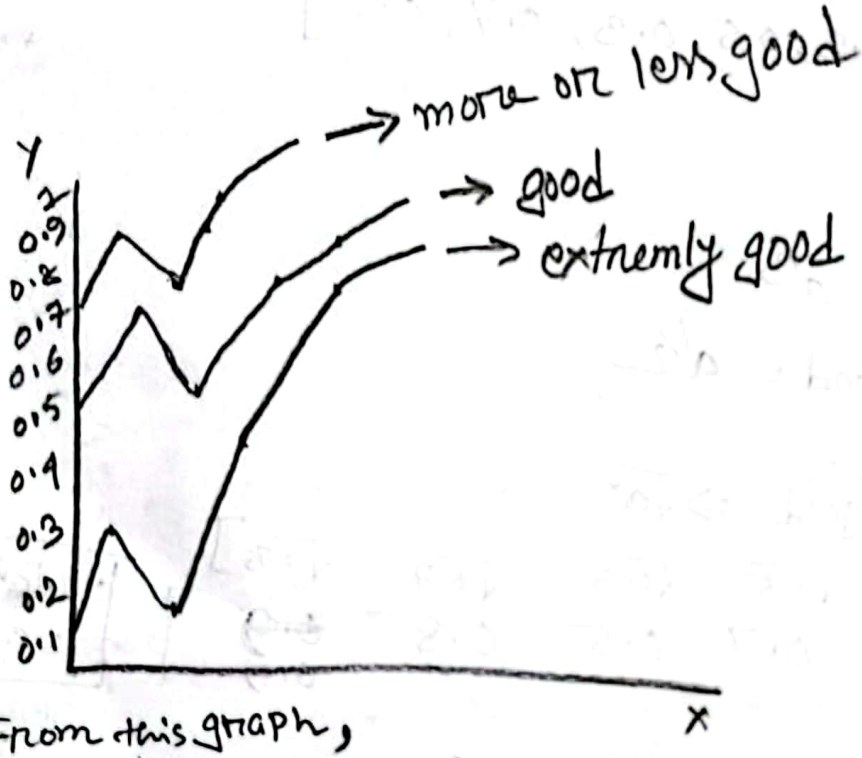
ii) good (a), from ~~above~~ above we found,

$$good(a) = [0.5 \quad 0.7 \quad 0.5 \quad 0.8 \quad 0.9]$$

iii) more or less good $(a^{1/2})$

$$= [(0.5)^{1/2} \quad (0.7)^{1/2} \quad (0.5)^{1/2} \quad (0.8)^{1/2} \quad (0.9)^{1/2}]$$

$$= [0.70 \quad 0.83 \quad 0.70 \quad 0.89 \quad 0.94]$$



From this graph,

good to extremly good, it decrease. [concentration $(x^n) \Rightarrow a^3$]

good to more or less good it increase [Dilation $(x^{1/n}) \Rightarrow a^{1/2}$]