

Fuzzy Addition

CSE 4237
Soft Computing

Extension Principle

Addition of fuzzy numbers using the extension principle

$$A = 3 = 0.3/1 + 0.7/2 + 1.0/3 + 0.7/4 + 0.3/5 + 0/6$$

$$B = 7 = 0.2/5 + 0.6/6 + 1.0/7 + 0.6/8 + 0.2/9 + 0/10$$

Addition of fuzzy numbers using the extension principle

$$A = 3 = 0.3/1 + 0.7/2 + 1.0/3 + 0.7/4 + 0.3/5 + 0/6$$

$$B = 7 = 0.2/5 + 0.6/6 + 1.0/7 + 0.6/8 + 0.2/9 + 0/10$$

Final output

$$C = 0/5 + 0.2/6 + 0.3/7 + 0.6/8 + 0.7/9 + 1.0/10 + 0.7/11 + 0.6/12 + 0.3/13 + 0.2/14 + 0/15$$

Step 1

$$A = 3 = 0.3/1 + 0.7/2 + 1.0/3 + 0.7/4 + 0.3/5 + 0/6$$

Step 1

$$B = 7 = 0.2/5 + 0.6/6 + 1.0/7 + 0.6/8 + 0.2/9 + 0/10$$

Step 1

Step 2

Support of B

		Support of B										
		B	y=1	y=2	y=3	y=4	y=5	y=6	y=7	y=8	y=9	y=10
Support of A	A	0.0	0.0	0.0	0.0	0.2	0.6	1.0	0.6	0.2	0.0	
	x=1	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	
	x=2	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	
	x=3	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	
	x=4	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	
	x=5	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	
	x=6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
	x=7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
	x=8	0.0	0.0	0.0	0.0	0.0	0.2	0.6	1.0	0.6	0.2	
	x=9	0.0	0.0	0.0	0.0	0.0	0.2	0.6	1.0	0.6	0.2	
	x=10	0.0	0.0	0.0	0.0	0.0	0.2	0.6	1.0	0.6	0.2	

Step 2

$$\mu_A(1) \wedge \mu_B(8) = 0.3 \wedge 0.6 = 0.3$$

$$\mu_A(2) \wedge \mu_B(7) = 0.7 \wedge 1.0 = 0.7$$

$$\mu_A(3) \wedge \mu_B(6) = 1.0 \wedge 0.6 = 0.6$$

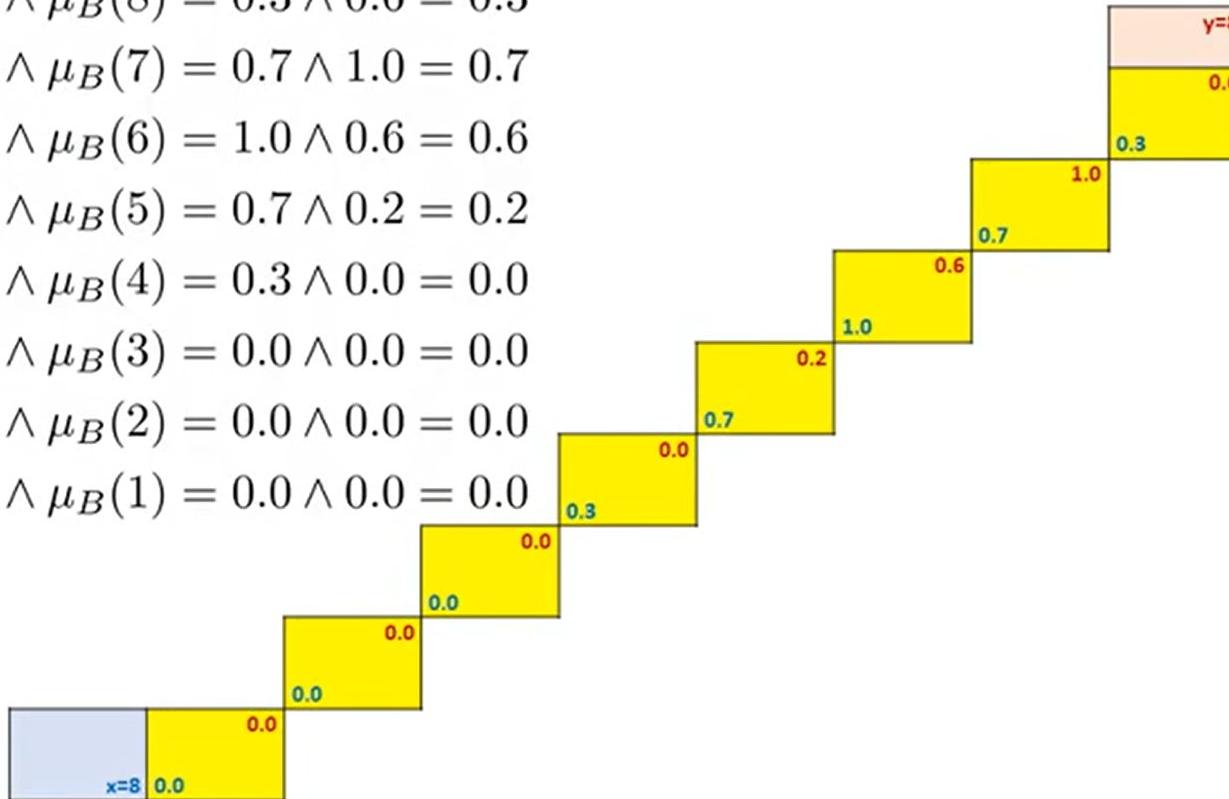
$$\mu_A(4) \wedge \mu_B(5) = 0.7 \wedge 0.2 = 0.2$$

$$\mu_A(5) \wedge \mu_B(4) = 0.3 \wedge 0.0 = 0.0$$

$$\mu_A(6) \wedge \mu_B(3) = 0.0 \wedge 0.0 = 0.0$$

$$\mu_A(7) \wedge \mu_B(2) = 0.0 \wedge 0.0 = 0.0$$

$$\mu_A(8) \wedge \mu_B(1) = 0.0 \wedge 0.0 = 0.0$$



Step 3

$$\mu_A(1) \wedge \mu_B(8) = 0.3 \wedge 0.6 = 0.3$$

$$\mu_A(2) \wedge \mu_B(7) = 0.7 \wedge 1.0 = 0.7$$

$$\mu_A(3) \wedge \mu_B(6) = 1.0 \wedge 0.6 = 0.6$$

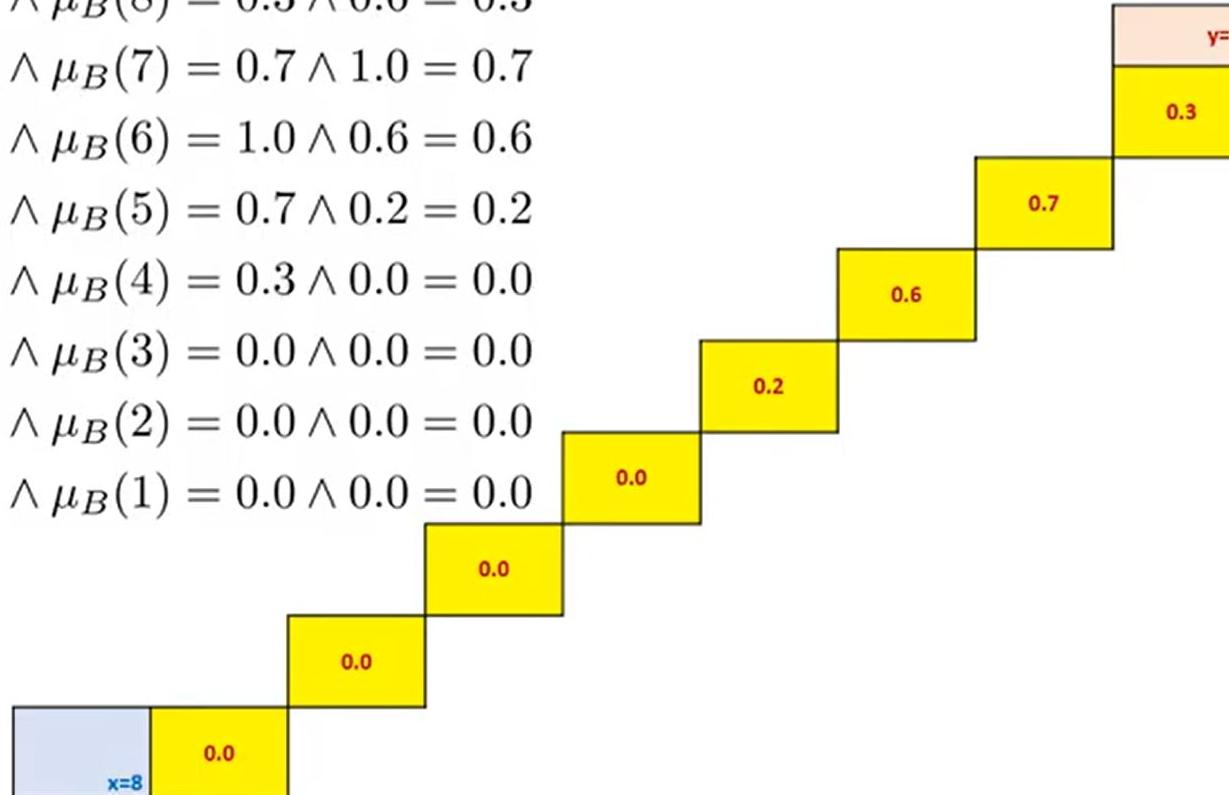
$$\mu_A(4) \wedge \mu_B(5) = 0.7 \wedge 0.2 = 0.2$$

$$\mu_A(5) \wedge \mu_B(4) = 0.3 \wedge 0.0 = 0.0$$

$$\mu_A(6) \wedge \mu_B(3) = 0.0 \wedge 0.0 = 0.0$$

$$\mu_A(7) \wedge \mu_B(2) = 0.0 \wedge 0.0 = 0.0$$

$$\mu_A(8) \wedge \mu_B(1) = 0.0 \wedge 0.0 = 0.0$$



Step 3

$$\mu_A(1) \wedge \mu_B(8) = 0.3 \wedge 0.6 = 0.3$$

$$\mu_A(2) \wedge \mu_B(7) = 0.7 \wedge 1.0 = 0.7$$

$$\mu_A(3) \wedge \mu_B(6) = 1.0 \wedge 0.6 = 0.6$$

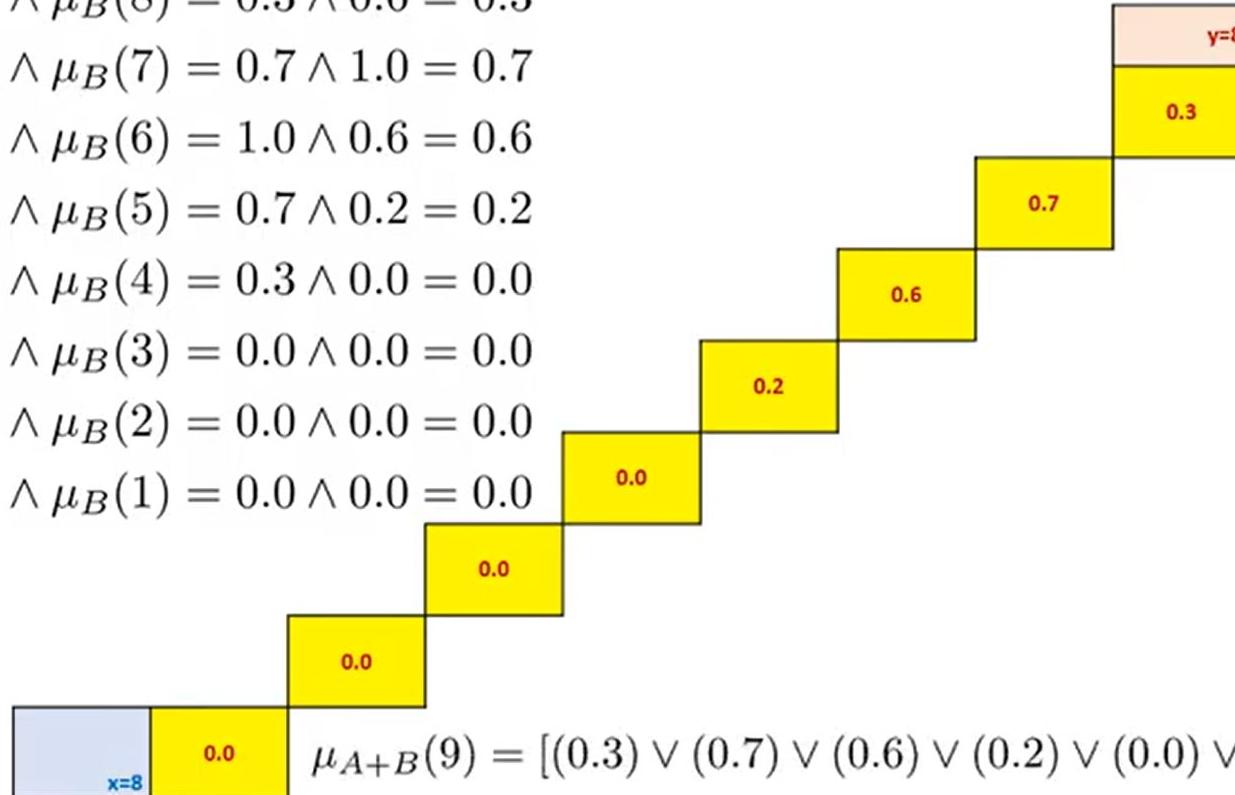
$$\mu_A(4) \wedge \mu_B(5) = 0.7 \wedge 0.2 = 0.2$$

$$\mu_A(5) \wedge \mu_B(4) = 0.3 \wedge 0.0 = 0.0$$

$$\mu_A(6) \wedge \mu_B(3) = 0.0 \wedge 0.0 = 0.0$$

$$\mu_A(7) \wedge \mu_B(2) = 0.0 \wedge 0.0 = 0.0$$

$$\mu_A(8) \wedge \mu_B(1) = 0.0 \wedge 0.0 = 0.0$$



$$\mu_{A+B}(9) = [(0.3) \vee (0.7) \vee (0.6) \vee (0.2) \vee (0.0) \vee (0.0) \vee (0.0) \vee (0.0)]$$

Step 3

$$\mu_A(1) \wedge \mu_B(8) = 0.3 \wedge 0.6 = 0.3$$

$$\mu_A(2) \wedge \mu_B(7) = 0.7 \wedge 1.0 = 0.7$$

$$\mu_A(3) \wedge \mu_B(6) = 1.0 \wedge 0.6 = 0.6$$

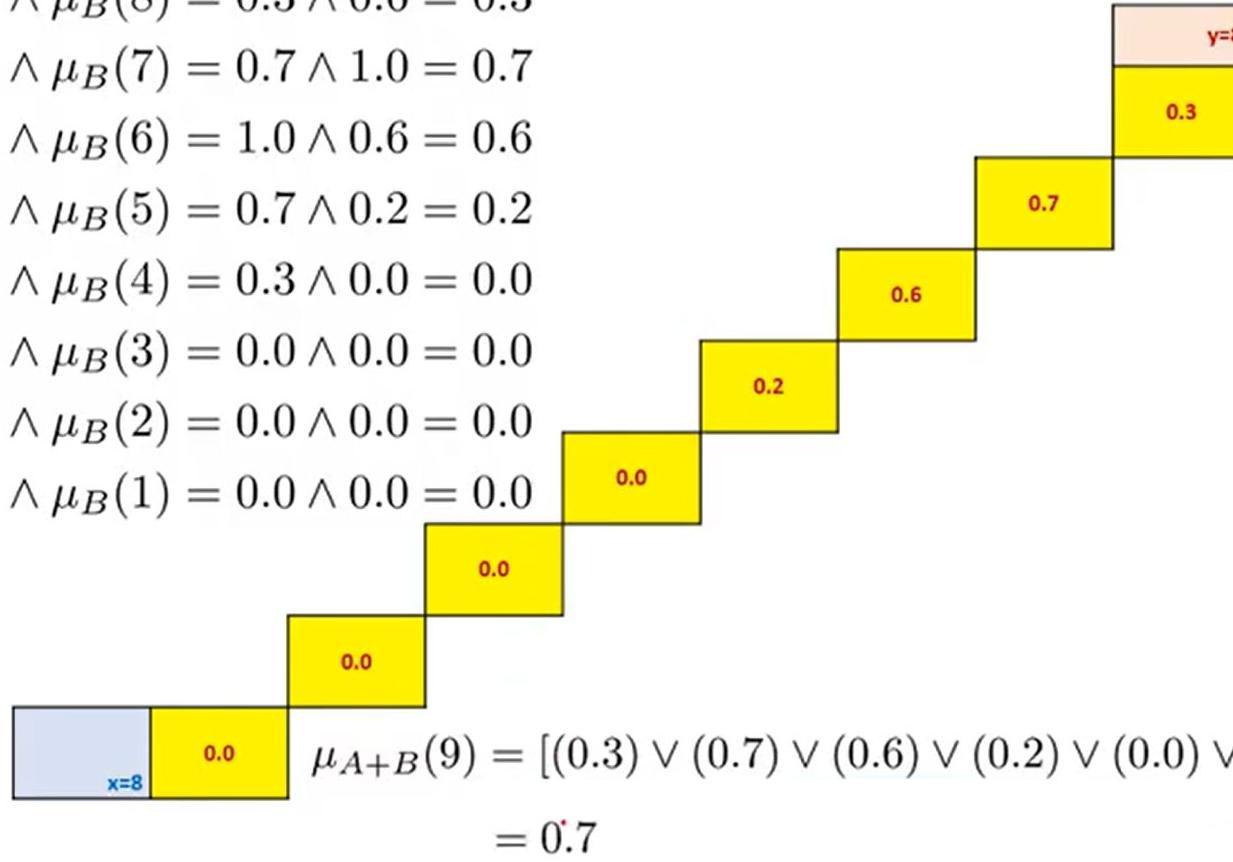
$$\mu_A(4) \wedge \mu_B(5) = 0.7 \wedge 0.2 = 0.2$$

$$\mu_A(5) \wedge \mu_B(4) = 0.3 \wedge 0.0 = 0.0$$

$$\mu_A(6) \wedge \mu_B(3) = 0.0 \wedge 0.0 = 0.0$$

$$\mu_A(7) \wedge \mu_B(2) = 0.0 \wedge 0.0 = 0.0$$

$$\mu_A(8) \wedge \mu_B(1) = 0.0 \wedge 0.0 = 0.0$$



Step 2

Support of B

Step 3

$$\mu_A(1) \wedge \mu_B(7) = 0.3 \wedge 1.0 = 0.3$$

$$\mu_A(2) \wedge \mu_B(6) = 0.7 \wedge 0.6 = 0.6$$

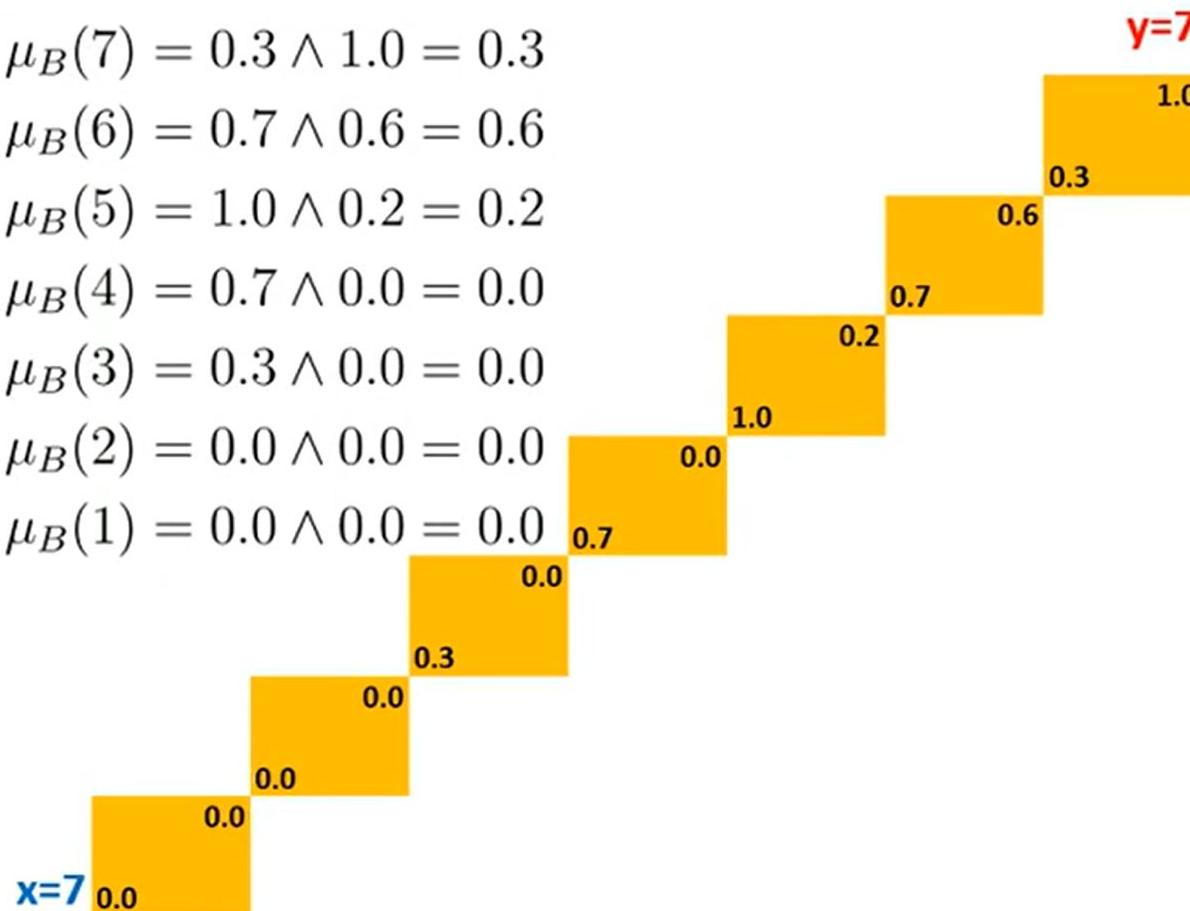
$$\mu_A(3) \wedge \mu_B(5) = 1.0 \wedge 0.2 = 0.2$$

$$\mu_A(4) \wedge \mu_B(4) = 0.7 \wedge 0.0 = 0.0$$

$$\mu_A(5) \wedge \mu_B(3) = 0.3 \wedge 0.0 = 0.0$$

$$\mu_A(6) \wedge \mu_B(2) = 0.0 \wedge 0.0 = 0.0$$

$$\mu_A(7) \wedge \mu_B(1) = 0.0 \wedge 0.0 = 0.0$$



Step 3

$$\mu_A(1) \wedge \mu_B(7) = 0.3 \wedge 1.0 = 0.3$$

$$\mu_A(2) \wedge \mu_B(6) = 0.7 \wedge 0.6 = 0.6$$

$$\mu_A(3) \wedge \mu_B(5) = 1.0 \wedge 0.2 = 0.2$$

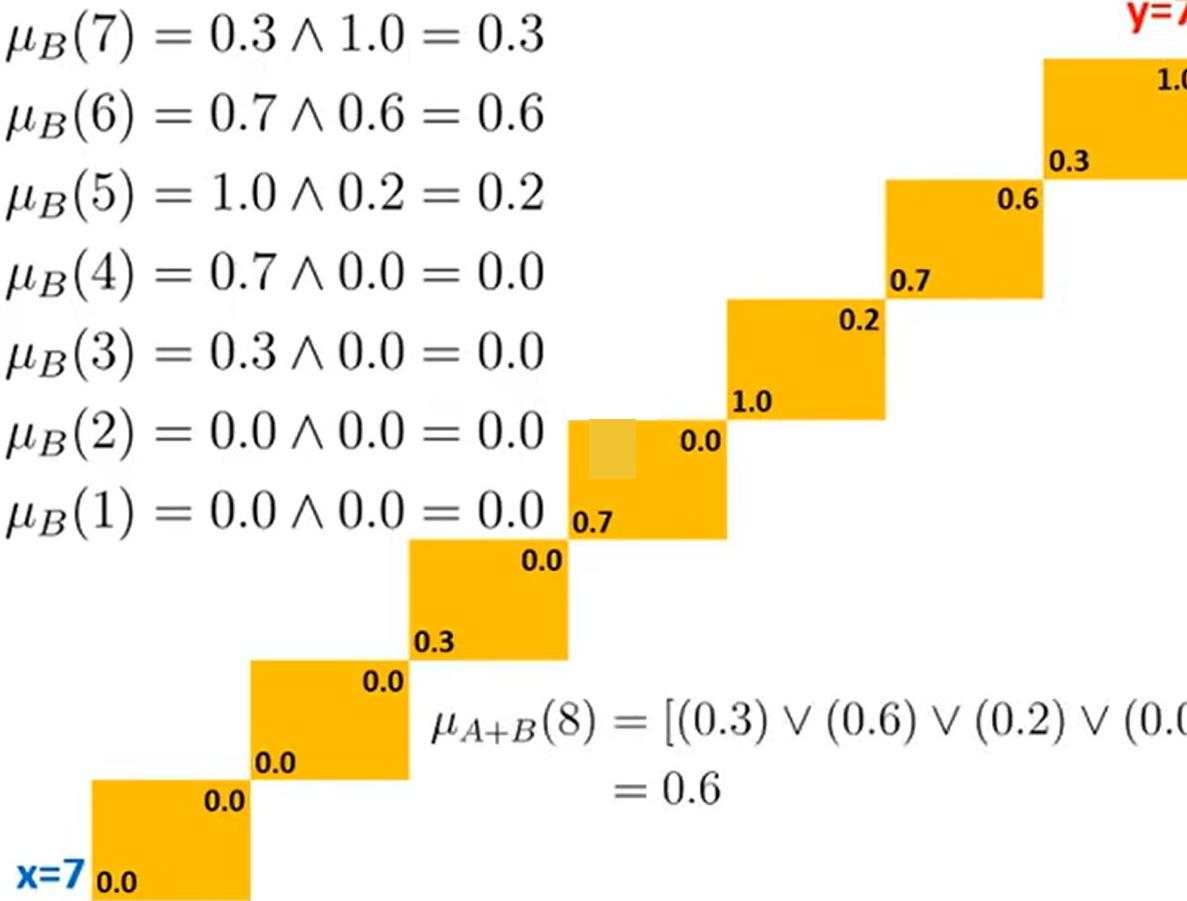
$$\mu_A(4) \wedge \mu_B(4) = 0.7 \wedge 0.0 = 0.0$$

$$\mu_A(5) \wedge \mu_B(3) = 0.3 \wedge 0.0 = 0.0$$

$$\mu_A(6) \wedge \mu_B(2) = 0.0 \wedge 0.0 = 0.0$$

$$\mu_A(7) \wedge \mu_B(1) = 0.0 \wedge 0.0 = 0.0$$

y=7



	Support of B										
	B	y=1	y=2	y=3	y=4	y=5	y=6	y=7	y=8	y=9	y=10
Support of A	A	0.0	0.0	0.0	0.0	0.2	0.6	1.0	0.6	0.2	0.0
	x=1	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
	x=2	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7
	x=3	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
	x=4	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7
	x=5	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
	x=6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	x=7	0.0	0.0	0.0	0.0	0.0	0.2	0.6	1.0	0.6	0.2
	x=8	0.0	0.0	0.0	0.0	0.0	0.2	0.6	1.0	0.6	0.2
	x=9	0.0	0.0	0.0	0.0	0.0	0.2	0.6	1.0	0.6	0.2
	x=10	0.0	0.0	0.0	0.0	0.0	0.2	0.6	1.0	0.6	0.2

		Support of B										
		B	y=1	y=2	y=3	y=4	y=5	y=6	y=7	y=8	y=9	y=10
Support	A	0.0	0.0	0.0	0.0	0.2	0.6	1.0	0.6	0.2	0.0	
	x=1	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	
	x=2	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	
	x=3	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	
		0.0	0.0	0.0	0.0	0.2	0.6	1.0	0.6	0.2	0.0	

Final output

$$C = 0/5 + 0.2/6 + 0.3/7 + 0.6/8 + 0.7/9 + 1.0/10 + 0.7/11 + 0.6/12 + 0.3/13 + 0.2/14 + 0/15$$

Alpha Cut Principle

Addition of fuzzy numbers using the α -cuts principle

$$A = 3 = 0.3/1 + 0.7/2 + 1.0/3 + 0.7/4 + 0.3/5 + 0/6$$

$$B = 7 = 0.2/5 + 0.6/6 + 1.0/7 + 0.6/8 + 0.2/9 + 0/10$$

$$A + B = \left[a_1^{(\alpha)} + b_1^{(\alpha)}, a_2^{(\alpha)} + b_2^{(\alpha)} \right]$$

Addition of fuzzy numbers using the α -cuts principle

$$A = 3 = 0.3/1 + 0.7/2 + 1.0/3 + 0.7/4 + 0.3/5 + 0/6$$

$$B = 7 = 0.2/5 + 0.6/6 + 1.0/7 + 0.6/8 + 0.2/9 + 0/10$$

$$A + B = \left[a_1^{(\alpha)} + b_1^{(\alpha)}, a_2^{(\alpha)} + b_2^{(\alpha)} \right]$$

Final output

$$C = 0/5 + 0.2/6 + 0.3/7 + 0.6/8 + 0.7/9 + 1.0/10$$

$$+ 0.7/11 + 0.6/12 + 0.3/13 + 0.2/14 + 0/15$$

$$A = 3 = 0.3/1 + 0.7/2 + 1.0/3 + 0.7/4 + 0.3/5 + 0/6$$

	0.4	0.7	1.0	0.7	0.3	0	0	0	0
$\alpha = 1.0$			1						
$\alpha = 0.9$			1						
$\alpha = 0.8$			1						
$\alpha = 0.7$		1	1	1					
$\alpha = 0.6$		1	1	1					
$\alpha = 0.5$		1	1	1					
$\alpha = 0.4$		1	1	1					
$\alpha = 0.3$	1	1	1	1	1				
$\alpha = 0.2$	1	1	1	1	1				
$\alpha = 0.1$	1	1	1	1	1				
$\alpha = 0.0$	1	1	1	1	1	1	1	1	1
	1	2	3	4	5	6	7	8	9

Tabular representation of fuzzy number 3

$$A = 3 = 0.3/1 + 0.7/2 + 1.0/3 + 0.7/4 + 0.3/5 + 0/6$$

	0.4	0.7	1.0	0.7	0.3	0	0	0	0
$\alpha = 1.0$			1						
$\alpha = 0.9$			1						
$\alpha = 0.8$			1						
$\alpha = 0.7$		1	1	1					
$\alpha = 0.6$		1	1	1					
$\alpha = 0.5$		1	1	1					
$\alpha = 0.4$		1	1	1					
$\alpha = 0.3$	1	1	1	1	1				
$\alpha = 0.2$	1	1	1	1	1				
$\alpha = 0.1$	1	1	1	1	1				
$\alpha = 0.0$	1	1	1	1	1	1	1	1	1
	1	2	3	4	5	6	7	8	9

Tabular representation of fuzzy number 3

$$A_\alpha = \left[a_1^{(\alpha)}, a_2^{(\alpha)} \right]$$

$$B = 7 = 0.2/5 + 0.6/6 + 1.0/7 + 0.6/8 + 0.2/9 + 0/10$$

	0	0	0	0	0.2	0.6	1.0	0.6	0.2	0	0
$\alpha = 1.0$							1				
$\alpha = 0.9$							1				
$\alpha = 0.8$							1				
$\alpha = 0.7$							1				
$\alpha = 0.6$						1	1	1			
$\alpha = 0.5$						1	1	1			
$\alpha = 0.4$						1	1	1			
$\alpha = 0.3$						1	1	1			
$\alpha = 0.2$					1	1	1	1	1		
$\alpha = 0.1$					1	1	1	1	1		
$\alpha = 0.0$	1	1	1	1	1	1	1	1	1	1	1
	1	2	3	4	5	6	7	8	9	10	11

Tabular representation of fuzzy number 7

$$B = 7 = 0.2/5 + 0.6/6 + 1.0/7 + 0.6/8 + 0.2/9 + 0/10$$

	0	0	0	0	0.2	0.6	1.0	0.6	0.2	0	0
$\alpha = 1.0$							1				
$\alpha = 0.9$							1				
$\alpha = 0.8$							1				
$\alpha = 0.7$							1				
$\alpha = 0.6$						1	1	1			
$\alpha = 0.5$						1	1	1			
$\alpha = 0.4$						1	1	1			
$\alpha = 0.3$						1	1	1			
$\alpha = 0.2$					1	1	1	1	1		
$\alpha = 0.1$				1	1	1	1	1	1		
$\alpha = 0.0$	1	1	1	1	1	1	1	1	1	1	1
	1	2	3	4	5	6	7	8	9	10	11

Tabular representation of fuzzy number 7

$$B_\alpha = \left[b_1^{(\alpha)}, b_2^{(\alpha)} \right]$$

α -cut 0.4

	0	0	0	0	0	0.2	0.3	0.6	0.7	1.0	0.7	0.6	0.3	0.2	0	0
$\alpha = 1.0$																
$\alpha = 0.9$																
$\alpha = 0.8$																
$\alpha = 0.7$																
$\alpha = 0.6$																
$\alpha = 0.5$																
$\alpha = 0.4$																
$\alpha = 0.3$																
$\alpha = 0.2$																
$\alpha = 0.1$																
$\alpha = 0.0$	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16

	0.4	0.7	1.0	0.7	0.3	0	0	0	0
$\alpha = 1.0$			1						
$\alpha = 0.9$			1						
$\alpha = 0.8$			1						
$\alpha = 0.7$		1	1	1					
$\alpha = 0.6$	1	1	1						
$\alpha = 0.5$	1	1	1						
$\alpha = 0.4$	1	1	1						
$\alpha = 0.3$	1	1	1	1	1				
$\alpha = 0.2$	1	1	1	1	1				
$\alpha = 0.1$	1	1	1	1	1				
$\alpha = 0.0$	1	1	1	1	1	1	1	1	1
	1	2	3	4	5	6	7	8	9

Tabular representation of fuzzy number 3

	0	0	0	0	0.2	0.6	1.0	0.6	0.2	0	0
$\alpha = 1.0$								1			
$\alpha = 0.9$								1			
$\alpha = 0.8$								1			
$\alpha = 0.7$								1			
$\alpha = 0.6$							1	1	1		
$\alpha = 0.5$							1	1	1		
$\alpha = 0.4$							1	1	1		
$\alpha = 0.3$							1	1	1		
$\alpha = 0.2$							1	1	1	1	1
$\alpha = 0.1$							1	1	1	1	1
$\alpha = 0.0$	1	1	1	1	1	1	1	1	1	1	1
	1	2	3	4	5	6	7	8	9	10	11

Tabular representation of fuzzy number 7

α -cut 0.4

$$A_{0.4} = \left[a_1^{(0.4)}, a_2^{(0.4)} \right] = [2, 4]$$

$$B_{0.4} = \left[b_1^{(0.4)}, b_2^{(0.4)} \right] = [6, 8]$$

$$C_{0.4} = \left[a_1^{(0.4)}, a_2^{(0.4)} \right] + \left[b_1^{(0.4)}, b_2^{(0.4)} \right]$$

$$= \left[a_1^{(0.4)} + b_1^{(0.4)}, a_2^{(0.4)} + b_2^{(0.4)} \right]$$

$$= [2 + 6, 4 + 8]$$

$$= [8, 12]$$

	0	0	0	0	0	0.2	0.3	0.6	0.7	1.0	0.7	0.6	0.3	0.2	0	0
$\alpha = 1.0$																
$\alpha = 0.9$																
$\alpha = 0.8$																
$\alpha = 0.7$																
$\alpha = 0.6$																
$\alpha = 0.5$																
$\alpha = 0.4$																
$\alpha = 0.3$																
$\alpha = 0.2$																
$\alpha = 0.1$																
$\alpha = 0.0$																
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16

	0.4	0.7	1.0	0.7	0.3	0	0	0	0
$\alpha = 1.0$			1						
$\alpha = 0.9$			1						
$\alpha = 0.8$			1						
$\alpha = 0.7$		1	1	1					
$\alpha = 0.6$	1	1	1						
$\alpha = 0.5$	1	1	1						
$\alpha = 0.4$	1	1	1						
$\alpha = 0.3$	1	1	1	1	1				
$\alpha = 0.2$	1	1	1	1	1				
$\alpha = 0.1$	1	1	1	1	1				
$\alpha = 0.0$	1	1	1	1	1	1	1	1	1
	1	2	3	4	5	6	7	8	9

Tabular representation of fuzzy number 3

	0	0	0	0	0.2	0.6	1.0	0.6	0.2	0	0
$\alpha = 1.0$								1			
$\alpha = 0.9$								1			
$\alpha = 0.8$								1			
$\alpha = 0.7$								1			
$\alpha = 0.6$							1	1	1		
$\alpha = 0.5$							1	1	1		
$\alpha = 0.4$							1	1	1		
$\alpha = 0.3$							1	1	1		
$\alpha = 0.2$							1	1	1	1	
$\alpha = 0.1$							1	1	1	1	
$\alpha = 0.0$	1	1	1	1	1	1	1	1	1	1	1
	1	2	3	4	5	6	7	8	9	10	11

Tabular representation of fuzzy number 7

α -cut 0.5

	0	0	0	0	0	0.2	0.3	0.6	0.7	1.0	0.7	0.6	0.3	0.2	0	0
$\alpha = 1.0$																
$\alpha = 0.9$																
$\alpha = 0.8$																
$\alpha = 0.7$																
$\alpha = 0.6$																
$\alpha = 0.5$																
$\alpha = 0.4$															1	1
$\alpha = 0.3$															1	1
$\alpha = 0.2$															1	1
$\alpha = 0.1$															1	1
$\alpha = 0.0$															1	1
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16

	0.4	0.7	1.0	0.7	0.3	0	0	0	0
$\alpha = 1.0$			1						
$\alpha = 0.9$			1						
$\alpha = 0.8$			1						
$\alpha = 0.7$		1	1	1					
$\alpha = 0.6$	1	1	1	1					
$\alpha = 0.5$	1	1	1	1					
$\alpha = 0.4$	1	1	1	1					
$\alpha = 0.3$	1	1	1	1	1				
$\alpha = 0.2$	1	1	1	1	1				
$\alpha = 0.1$	1	1	1	1	1				
$\alpha = 0.0$	1	1	1	1	1	1	1	1	1
	1	2	3	4	5	6	7	8	9

Tabular representation of fuzzy number 3

	0	0	0	0	0.2	0.6	1.0	0.6	0.2	0	0
$\alpha = 1.0$								1			
$\alpha = 0.9$								1			
$\alpha = 0.8$								1			
$\alpha = 0.7$								1			
$\alpha = 0.6$								1	1	1	
$\alpha = 0.5$								1	1	1	
$\alpha = 0.4$								1	1	1	
$\alpha = 0.3$								1	1	1	
$\alpha = 0.2$								1	1	1	
$\alpha = 0.1$								1	1	1	
$\alpha = 0.0$	1	1	1	1	1	1	1	1	1	1	1
	1	2	3	4	5	6	7	8	9	10	11

Tabular representation of fuzzy number 7

α -cut 0.5

$$A_{0.5} = \left[a_1^{(0.5)}, a_2^{(0.5)} \right] = [2, 4]$$

$$B_{0.5} = \left[b_1^{(0.5)}, b_2^{(0.5)} \right] = [6, 8]$$

$$C_{0.5} = \left[a_1^{(0.5)}, a_2^{(0.5)} \right] + \left[b_1^{(0.5)}, b_2^{(0.5)} \right]$$

$$= \left[a_1^{(0.5)} + b_1^{(0.5)}, a_2^{(0.5)} + b_2^{(0.5)} \right]$$

$$= [2 + 6, 4 + 8]$$

$$= [8, 12]$$

	0	0	0	0	0	0.2	0.3	0.6	0.7	1.0	0.7	0.6	0.3	0.2	0	0
$\alpha = 1.0$																
$\alpha = 0.9$																
$\alpha = 0.8$																
$\alpha = 0.7$																
$\alpha = 0.6$																
$\alpha = 0.5$																
$\alpha = 0.4$																
$\alpha = 0.3$																
$\alpha = 0.2$																
$\alpha = 0.1$																
$\alpha = 0.0$																
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16

	0.4	0.7	1.0	0.7	0.3	0	0	0	0
$\alpha = 1.0$									
$\alpha = 0.9$									
$\alpha = 0.8$									
$\alpha = 0.7$			1	1	1				
$\alpha = 0.6$		1	1	1	1				
$\alpha = 0.5$	1	1	1	1	1				
$\alpha = 0.4$	1	1	1	1	1				
$\alpha = 0.3$	1	1	1	1	1				
$\alpha = 0.2$	1	1	1	1	1				
$\alpha = 0.1$	1	1	1	1	1				
$\alpha = 0.0$	1	1	1	1	1	1	1	1	1
	1	2	3	4	5	6	7	8	9

Tabular representation of fuzzy number 3

	0	0	0	0	0.2	0.6	1.0	0.6	0.2	0	0
$\alpha = 1.0$								1			
$\alpha = 0.9$								1			
$\alpha = 0.8$								1			
$\alpha = 0.7$								1			
$\alpha = 0.6$								1	1	1	
$\alpha = 0.5$								1	1	1	
$\alpha = 0.4$								1	1	1	
$\alpha = 0.3$								1	1	1	
$\alpha = 0.2$								1	1	1	
$\alpha = 0.1$								1	1	1	
$\alpha = 0.0$	1	1	1	1	1	1	1	1	1	1	1
	1	2	3	4	5	6	7	8	9	10	11

Tabular representation of fuzzy number 7

α -cut 0.8

$$A_{0.8} = \left[a_1^{(0.8)}, a_2^{(0.8)} \right] = [3, 3]$$

$$B_{0.8} = \left[b_1^{(0.8)}, b_2^{(0.8)} \right] = [7, 7]$$

$$C_{0.8} = \left[a_1^{(0.8)}, a_2^{(0.8)} \right] + \left[b_1^{(0.8)}, b_2^{(0.8)} \right]$$

$$= \left[a_1^{(0.8)} + b_1^{(0.8)}, a_2^{(0.8)} + b_2^{(0.8)} \right]$$

$$= [3 + 7, 3 + 7]$$

$$= [10, 10]$$

	0	0	0	0	0	0.2	0.3	0.6	0.7	1.0	0.7	0.6	0.3	0.2	0	0
$\alpha = 1.0$	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
$\alpha = 0.9$	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
$\alpha = 0.8$	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
$\alpha = 0.7$	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
$\alpha = 0.6$	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
$\alpha = 0.5$	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
$\alpha = 0.4$	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
$\alpha = 0.3$	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
$\alpha = 0.2$	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
$\alpha = 0.1$	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
$\alpha = 0.0$	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16

	0.4	0.7	1.0	0.7	0.3	0	0	0	0
$\alpha = 1.0$	1	1	1	1	1	1	1	1	1
$\alpha = 0.9$	1	1	1	1	1	1	1	1	1
$\alpha = 0.8$	1	1	1	1	1	1	1	1	1
$\alpha = 0.7$	1	1	1	1	1	1	1	1	1
$\alpha = 0.6$	1	1	1	1	1	1	1	1	1
$\alpha = 0.5$	1	1	1	1	1	1	1	1	1
$\alpha = 0.4$	1	1	1	1	1	1	1	1	1
$\alpha = 0.3$	1	1	1	1	1	1	1	1	1
$\alpha = 0.2$	1	1	1	1	1	1	1	1	1
$\alpha = 0.1$	1	1	1	1	1	1	1	1	1
$\alpha = 0.0$	1	1	1	1	1	1	1	1	1
	1	2	3	4	5	6	7	8	9

Tabular representation of fuzzy number 3

	0	0	0	0	0.2	0.6	1.0	0.6	0.2	0	0
$\alpha = 1.0$	1	1	1	1	1	1	1	1	1	1	1
$\alpha = 0.9$	1	1	1	1	1	1	1	1	1	1	1
$\alpha = 0.8$	1	1	1	1	1	1	1	1	1	1	1
$\alpha = 0.7$	1	1	1	1	1	1	1	1	1	1	1
$\alpha = 0.6$	1	1	1	1	1	1	1	1	1	1	1
$\alpha = 0.5$	1	1	1	1	1	1	1	1	1	1	1
$\alpha = 0.4$	1	1	1	1	1	1	1	1	1	1	1
$\alpha = 0.3$	1	1	1	1	1	1	1	1	1	1	1
$\alpha = 0.2$	1	1	1	1	1	1	1	1	1	1	1
$\alpha = 0.1$	1	1	1	1	1	1	1	1	1	1	1
$\alpha = 0.0$	1	1	1	1	1	1	1	1	1	1	1
	1	2	3	4	5	6	7	8	9	10	11

Tabular representation of fuzzy number 7

	0	0	0	0	0	0.2	0.3	0.6	0.7	1.0	0.7	0.6	0.3	0.2	0	0
$\alpha = 1.0$										1						
$\alpha = 0.9$											1					
$\alpha = 0.8$											1					
$\alpha = 0.7$										1	1	1				
$\alpha = 0.6$										1	1	1	1	1		
$\alpha = 0.5$										1	1	1	1	1		
$\alpha = 0.4$										1	1	1	1	1		
$\alpha = 0.3$										1	1	1	1	1	1	
$\alpha = 0.2$										1	1	1	1	1	1	1
$\alpha = 0.1$										1	1	1	1	1	1	1
$\alpha = 0.0$	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16

Tabular representation of fuzzy number 10

	0	0	0	0	0	0.2	0.3	0.6	0.7	1.0	0.7	0.6	0.3	0.2	0	0
$\alpha = 1.0$										1						
$\alpha = 0.9$											1					
$\alpha = 0.8$											1					
$\alpha = 0.7$										1	1	1				
$\alpha = 0.6$								1	1	1	1	1				
$\alpha = 0.5$							1	1	1	1	1					
$\alpha = 0.4$						1	1	1	1	1	1					
$\alpha = 0.3$					1	1	1	1	1	1	1					
$\alpha = 0.2$				1	1	1	1	1	1	1	1	1				
$\alpha = 0.1$			1	1	1	1	1	1	1	1	1	1				
$\alpha = 0.0$	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16

Tabular representation of fuzzy number 10

Final output
$$C = 0/5 + 0.2/6 + 0.3/7 + 0.6/8 + 0.7/9 + 1.0/10 + 0.7/11 + 0.6/12 + 0.3/13 + 0.2/14 + 0/15$$