S T Q Q S S D   __/__/__

LISTA DE EXERCÍCIOS 2 - SISTEMAS NEBULOSOS

MATHEUS BRITO FARIA

1- $\mu_q(u,v) = \begin{array}{c|cccc|} & PARIS & BEIJ & OTAW & LON \\ \hline PARIS & 0 & 0,8 & 0,6 & 0,25 \\ NY & 0,7 & 0,98 & 0,15 & 0,5 \end{array}$

↳ MUITO LONGE

$\mu_r(v,w) = \begin{array}{c|ccc|} & BRU & STO & MOS \\ \hline PARIS & 1 & 0,4 & 0,2 \\ BEIJ & 0,1 & 0,4 & 0,7 \\ OTAW & 0,4 & 0,15 & 0,05 \\ LON & 0,85 & 0,3 & 0,1 \end{array}$

↳ MUITO PERTO

$\mu_l(u,v) = \begin{array}{c|cccc|} & PAR & BEIJ & OTAW & LON \\ \hline PARIS & 1 & 0,2 & 0,6 & 0,8 \\ NY & 0,85 & 0,3 & 0,8 & 0,88 \end{array}$

↳ CULTURAMENTE AFINS

$M(U,V)$ = "MUITO LONGE" E "NÃO CULTURALMENTE AFINS"

$$\mu_m(u,v) = \mu_q(u,v) \wedge \eta_l(u,v)$$

$\mu_m(u,v) = \begin{array}{c|cccc|} & PAR & BEIJ & OTAW & LON \\ \hline PARIS & 0 & 0,8 & 0,4 & 0,2 \\ NY & 0,15 & 0,7 & 0,15 & 0,12 \end{array}$

$P = Q \circ R$ (COMPOSIÇÃO MAX-PRODUTO DE $Q(U,V)$ E $R(U,W)$)

$$\vee[\mu_q(u,v)\,\mu_r(v,w)] = \begin{pmatrix} a_{00} & a_{01} & a_{02} \\ a_{10} & a_{11} & a_{12} \end{pmatrix}$$

$a_{00} = mx(0 \cdot 1; 0,8 \cdot 0,1; 0,6 \cdot 0,4; 0,25 \cdot 0,85)$

$mx(0; 0,08; 0,24; 0,2125) = \underline{\underline{0,24}}$

__/__/__ S T Q Q S S D

$$\mu_P(u,w) = \begin{array}{cccc} BRU & STO & MOS & \\ \left(\begin{matrix} 0{,}24 & 0{,}32 & 0{,}56 \\ 0{,}7 & 0{,}392 & 0{,}686 \end{matrix}\right) & & & \begin{matrix} PARIS \\ NY \end{matrix} \end{array}$$

2- $\mu_{A\circ R} = MAX(MIN(\mu_A, \mu_R))$

$\mu_{A\circ R} = (a_0 \quad a_1 \quad a_2 \quad a_3)$

$$a_0 = max(1\wedge 1;\ 0{,}5\wedge 0{,}8;\ 0{,}4\wedge 0;\ 0{,}2\wedge 0)$$
$$= max(1;\ 0{,}5;\ 0;\ 0)$$
$$= 1$$

$\mu_{A\circ R} = (1 \quad 0{,}8 \quad 0{,}5 \quad 0{,}4)$

5- $\mu_{A1}(x) = (0{,}2 \quad 0{,}4 \quad 0{,}5)$

$\mu_{A2}(x) = (1 \quad 1 \quad 0{,}3)$

$\mu_{B1}(y) = (0{,}1 \quad 0{,}3)$

$\mu_{B2}(y) = (0{,}6 \quad 0{,}2)$

$\mu_{A'}(x) = (0 \quad 1 \quad 0)$

SE X É A1 ENTÃO Y É B1 (1)

SE X É A2 ENTÃO Y É B2 (2)

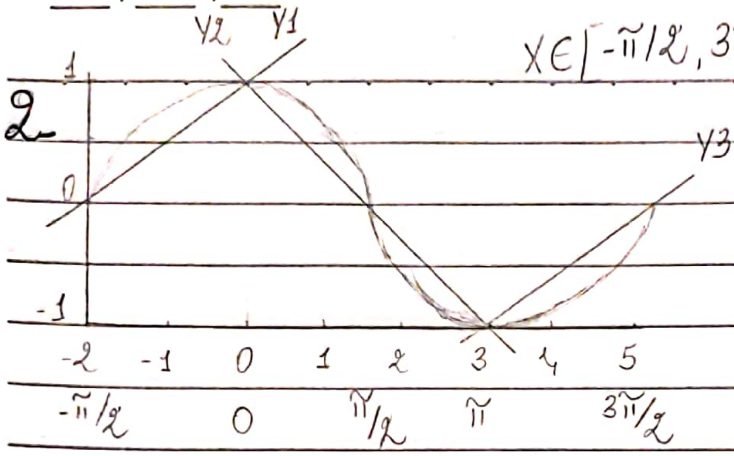
$$(1)\ \underbrace{\begin{bmatrix} 0 & 1 & 0 \end{bmatrix}}_{\mu_{A'}} \circ \underbrace{\begin{bmatrix} 0{,}1 & 0{,}2 \\ 0{,}1 & 0{,}3 \\ 0{,}1 & 0{,}3 \end{bmatrix}}_{MIN(\mu_A, \mu_B)} \overset{MINMAX}{=} \begin{bmatrix} 0{,}1 \\ 0{,}3 \end{bmatrix} \xrightarrow{MAX} \begin{bmatrix} 0{,}6 \\ 0{,}3 \end{bmatrix} = B'$$

$$(2)\ \begin{bmatrix} 0 & 1 & 0 \end{bmatrix} \begin{bmatrix} 0{,}6 & 0{,}2 \\ 0{,}6 & 0{,}2 \\ 0{,}3 & 0{,}2 \end{bmatrix} = \begin{bmatrix} 0{,}6 \\ 0{,}2 \end{bmatrix}$$

MATHEUS BRITO FARIA - PARTE 2

__/__/__ S T Q Q S S D

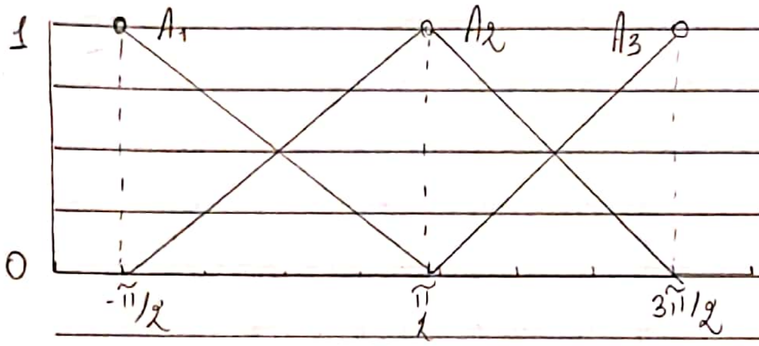
$X \in [-\pi/2, 3\pi/2]$



$$Y1 = \frac{0-1}{-\pi/2 - 0} X = \frac{2}{\pi} \cdot X + 1$$

$$Y2 = -\frac{2}{\pi} X + 1$$

$$Y3 = \frac{2}{\pi} X - 3$$



$$\mu_{A1} = -\frac{1}{\pi} x + \frac{1}{2}$$

$$\mu_{A2} = TRIMF(-\pi/2, \pi/2, 3\pi/2) = \begin{cases} 1/\pi \cdot X + 0{,}5 & SE\ -\pi/2 < X < \pi/2 \\ -1/\pi \cdot X + 1{,}5 & SE\ \pi/2 < X < 3\pi/2 \end{cases}$$

$$\mu_{A3} = \frac{1}{\pi} x - \frac{1}{2}$$

$$Y = \frac{\mu_{A1} \cdot Y1 + \mu_{A2} \cdot Y2 + \mu_{A3} \cdot Y3}{\mu_{A1} + \mu_{A2} + \mu_{A3}}$$

$$Y1 = \frac{\left[\left(-\frac{1}{\pi} \cdot x + \frac{1}{2}\right) \cdot \left(\frac{2}{\pi} \cdot x + 1\right)\right] + \left[\left(\frac{1}{\pi} x + \frac{1}{2}\right)\left(-\frac{2}{\pi} x + 1\right)\right]}{-\cancel{\frac{1}{\pi} x} + \frac{1}{2} + \cancel{\frac{1}{\pi} x} + \frac{1}{2}}$$

$$Y1 = -\frac{2x^2}{\pi^2} + \frac{1}{2} - \frac{2x^2}{\pi^2} + \frac{1}{2} = -\frac{4x^2}{\pi^2} + 1 \text{, PARA } -\pi/2 < x < \pi/2$$

$$Y2 = \left[\left(-\frac{x}{\pi}+\frac{3}{2}\right)\cdot\left(-\frac{2x}{\pi}+1\right)\right] + \left[\left(\frac{x}{\pi}-\frac{1}{2}\right)\cdot\left(\frac{2x}{\pi}-3\right)\right]$$

$$\cancel{-\frac{x}{\pi}} + \frac{3}{2} + \cancel{\frac{x}{\pi}} - \frac{1}{2}$$

$$Y2 = \frac{2x^2}{\pi^2} - \frac{4x}{\pi} + \frac{3}{2} + \frac{2x^2}{\pi^2} - \frac{4x}{\pi} + \frac{3}{2} = \frac{4x^2}{\pi^2} - \frac{8x}{\pi} + 3$$

$$Y = \begin{cases} -\dfrac{4x^2}{\pi^2} + 1, & \text{PARA } -\pi/2 < x < \pi/2 \\[2ex] \dfrac{4x^2}{\pi^2} - \dfrac{8x}{\pi} + 3, & \text{PARA } \pi/2 < x < 3\pi/2 \end{cases}$$