

Operation on fuzzy sets

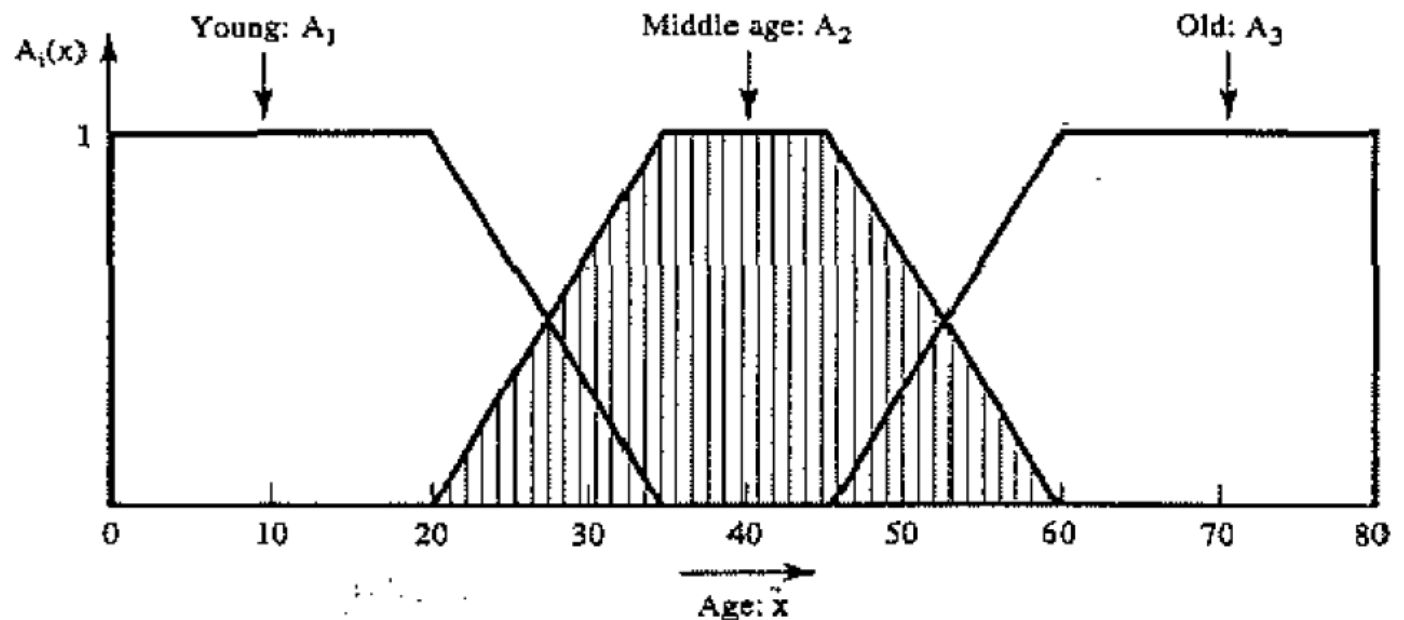
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α cut

$${}^{\alpha}A = \{x | A(x) \geq \alpha\}$$

$${}^{\alpha+}A = \{x | A(x) > \alpha\}.$$

$$\Lambda(A) = \{\alpha | A(x) = \alpha \text{ for some } x \in X\} \quad \alpha \in [0, 1]$$



• احسب α cut للمجموعات الضبابية التالية

$$A = .4/v + .2/w + .5/x + .4/y + 1/z;$$

$$A(x) = \frac{x}{x+2}$$

$$A(x) = \begin{cases} x - 1 & \text{when } x \in [1, 2] \\ 3 - x & \text{when } x \in [2, 3] \\ 0 & \text{otherwise.} \end{cases}$$

example I

- احسب قيم α cut و α^+ cut عند

- $\alpha = 0.2, 0.4, 0.5, 1$

$$A = .4/v + .2/w + .5/x + .4/y + 1/z;$$

- $^{0.2}A = \{v, w, x, y, z\}$
- $^{0.4}A = \{v, x, y, z\}$
- $^{0.5}A = \{x, z\}$
- $^1A = \{z\}$

اكتب برنامج ب MATLAB لحساب α cut

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function [Aalpha]=alpha (x,y)
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example2

اكتب برنامج بـ MATLAB لحساب cut α للتابع $A(x) = \frac{x}{x+2}$

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function [alpha]=alpha1(a,b,c)
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example3

$$A(x) = \begin{cases} x - 1 & \text{when } x \in [1, 2] \\ 3 - x & \text{when } x \in [2, 3] \\ 0 & \text{otherwise.} \end{cases}$$

$${}^{\alpha}A = [\alpha + 1, 3 - \alpha],$$

Composition example I

For every $A \in \mathcal{F}(X)$,

$$A = \bigcup_{\alpha \in [0,1]} \alpha A,$$

$$\alpha A(x) = \alpha \cdot {}^{\alpha}A(x).$$

$\cup$ denotes the standard fuzzy union.

$${}^{0.2}A = \{v, w, x, y, z\}$$

$${}^{0.4}A = \{v, x, y, z\}$$

$${}^{0.5}A = \{x, z\}$$

$${}^1A = \{z\}$$

$$^{0.2}A = 1/v + 1/w + 1/x + 1/y + 1/z \quad \bullet$$

$$^{0.4}A = 1/v + 0/w + 1/x + 1/y + 1/z \quad \bullet$$

$$^{0.5}A = 0/v + 0/w + 1/x + 0/y + 1/z \quad \bullet$$

$$^1A = 0/v + 0/w + 0/x + 0/y + 1/z \quad \bullet$$

•

$$^{0.2} \quad ^{0.2}A = 0.2/v + 0.2/w + 0.2/x + 0.2/y + 0.2/z \quad \bullet$$

•

$$^{0.4} \quad ^{0.4}A = 0.4/v + 0/w + 0.4/x + 0.4/y + 0.4/z \quad \bullet$$

•

$$^{0.5} \quad ^{0.5}A = 0/v + 0/w + 0.5/x + 0/y + 0.5/z \quad \bullet$$

•

$$^1 \quad ^1A = 0/v + 0/w + 0/x + 0/y + 1/z \quad \bullet$$

$$A = 0.4/v + 0.2/w + 0.5/x + 0.4/y + 1/z \quad \bullet$$