

Exercises from conversion between representations of fuzzy sets

Exercise 1.1 Convert from vertical to horizontal representation, $A \in \mathcal{F}(\mathbb{R})$:

$$\mu_A(x) = \begin{cases} 1/3 & \text{if } x = 8 \text{ or } x = 12, \\ 2/3 & \text{if } x = 9 \text{ or } x = 11, \\ 1 & \text{if } x = 10, \\ 0 & \text{otherwise.} \end{cases}$$

Exercise 1.2 Convert from horizontal to vertical representation:

$$\mathcal{R}_B(\alpha) = \begin{cases} \{1, 2, 3, 4\} & \text{if } \alpha = 0, \\ \{1, 2, 3\} & \text{if } 0 < \alpha \leq 0.3, \\ \{1, 2\} & \text{if } 0.3 < \alpha \leq 0.7, \\ \{1\} & \text{if } 0.7 < \alpha \leq 1. \end{cases}$$

Exercise 1.3 Convert from horizontal to vertical representation:

$$\mathcal{R}_C(\alpha) = \begin{cases} \{1, 2, 3, 4\} & \text{if } \alpha = 0, \\ \{1, 2, 3\} & \text{if } 0 < \alpha \leq 0.3, \\ \{1, 2\} & \text{if } 0.3 < \alpha < 0.7, \\ \{1\} & \text{if } 0.7 \leq \alpha \leq 1. \end{cases}$$

Exercise 1.4 Convert from vertical to horizontal representation, $D \in \mathcal{F}(\mathbb{R})$:

$$\mu_D(x) = \begin{cases} 0 & \text{if } x \leq 0 \text{ or } x \geq 5, \\ x/2 & \text{if } 0 < x \leq 2, \\ 1 & \text{if } 2 < x \leq 3, \\ (5-x)/2 & \text{if } 3 < x < 5. \end{cases}$$

Exercise 1.5 Convert from horizontal to vertical representation:

$$\mathcal{R}_E(\alpha) = \begin{cases} \mathbb{R} & \text{if } \alpha = 0, \\ \langle 1 + \alpha, 4 - 2\alpha \rangle & \text{if } 0 < \alpha < 1, \\ \{2\} & \text{if } \alpha = 1. \end{cases}$$