不确定规划课程作业 9

方言
2021210929

2022 年 6 月 13 日

给定 Uncertain Quantifiers:

$$\lambda_{\text{half}}(x) = \begin{cases} 20(x-0.4), & 0.4 \le x \le 0.45 \\ 1, & 0.45 \le x \le 0.55 \\ 20(0.6-x), & 0.55 \le x \le 0.6 \\ 0, & \text{otherwise} \end{cases}$$

$$\lambda_{\text{most}}(x) = \begin{cases} 20(x-0.7), & 0.7 \le x \le 0.75 \\ 1, & 0.75 \le x \le 0.85 \\ 20(0.9-x), & 0.85 \le x \le 0.9 \\ 0, & \text{otherwise} \end{cases}$$

$$\lambda_{\text{all}}(x) = \begin{cases} 1, & x = 1 \\ 0, & 0 \le x < 1 \end{cases}$$

给定 Uncertain Subjects:

$$\nu_{\text{young}}(y) = \begin{cases} (y-15)/5, & 15 \le y \le 20 \\ 1, & 20 \le y \le 35 \\ (45-y)/10, & 35 \le y \le 45 \\ 0, & \text{otherwise} \end{cases}$$

$$\nu_{\text{middle}}(y) = \begin{cases} (y-40)/5, & 40 \le y \le 45 \\ 1, & 45 \le y \le 55 \\ (60-y)/5, & 55 \le y \le 60 \\ 0, & \text{otherwise} \end{cases}$$

$$\nu_{\text{old}}(y) = \begin{cases} (y-55)/5, & 55 \le y \le 60 \\ 1, & 60 \le y \le 80 \\ (85-y)/10, & 80 \le y \le 85 \\ 0, & \text{otherwise} \end{cases}$$

给定 Uncertain Predictes:

$$\mu_{\text{old}}(z) = \begin{cases} (z-145)/5, & 145 \le z \le 150 \\ 1, & 150 \le z \le 155 \\ (160-z)/10, & 155 \le z \le 160 \\ 0, & \text{otherwise} \end{cases}$$

$$\mu_{\text{old}}(z) = \begin{cases} (z-180)/5, & 180 \le z \le 185 \\ 1, & 185 \le z \le 195 \\ (200-z)/10, & 195 \le z \le 200 \\ 0, & \text{otherwise} \end{cases}$$

计算可得, 对于 $Q =$ 'about half', $S =$'middle', $P =$ 'short':

$$T(Q,S,P) = \sup_{0\le w\le 1}\left(w \wedge \sup_{K\in\mathbb{K}_w}\inf_{a\in K}\mu(a) \wedge \sup_{K\in\mathbb{K}_w^\star}\inf_{a\in K}\neg\mu(a)\right)$$

考虑 $w=1$ 时，此时 $S_w = \{a\in A|\nu(a)\ge w\} = \emptyset$，因此:

$$\inf_{a\in\emptyset}\mu(a) = \inf_{a\in\emptyset}\neg\mu(a) = 1$$

由此可得:

$$\begin{aligned} T(Q,S,P) &= \sup_{0\le w\le 1}\left(w \wedge \sup_{K\in\mathbb{K}_w}\inf_{a\in K}\mu(a) \wedge \sup_{K\in\mathbb{K}_w^\star}\inf_{a\in K}\neg\mu(a)\right) \\ &\ge (1\wedge 1\wedge 1) \\ &= 1 \\ &\ge 0.8 \end{aligned}$$

由此可以得到一个 linguistic summary: 'about half middel-aged students are short'