ECE 657 A4Q1

July 27, 2021 10:02 PM

With Mandani Inferencing, get output(t_1) with MOM and COM defuzzification methods.

Assumption 1: assuming Singleton membership function for sensor readings.

$$\mu_{in}(x) : \delta(x-x_0) = \begin{cases} 1 & \text{when } x=x_0 \\ 0 & \text{elsewhere} \end{cases}$$

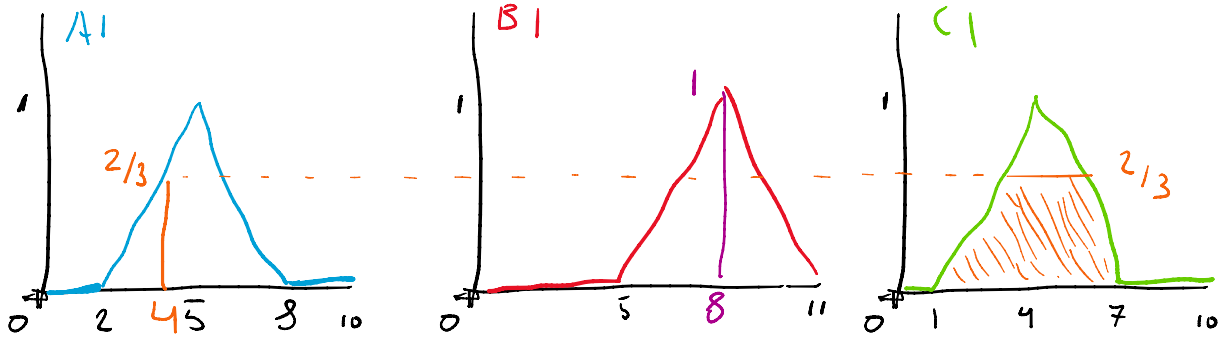
$$\mu_{in}(y) : \delta(y-y_0) = \begin{cases} 1 & \text{when } y=y_0 \\ 0 & \text{elsewhere} \end{cases}$$

$$\mu_{A_1}(x) = \begin{cases} \frac{x-2}{3} & 2 \le x \le 5 \\ \frac{8-x}{3} & 5 < x \le 8 \end{cases} \qquad \mu_{A_2}(x) = \begin{cases} \frac{x-3}{3} & 3 \le x \le 6 \\ \frac{9-x}{3} & 6 < x \le 9 \end{cases}$$

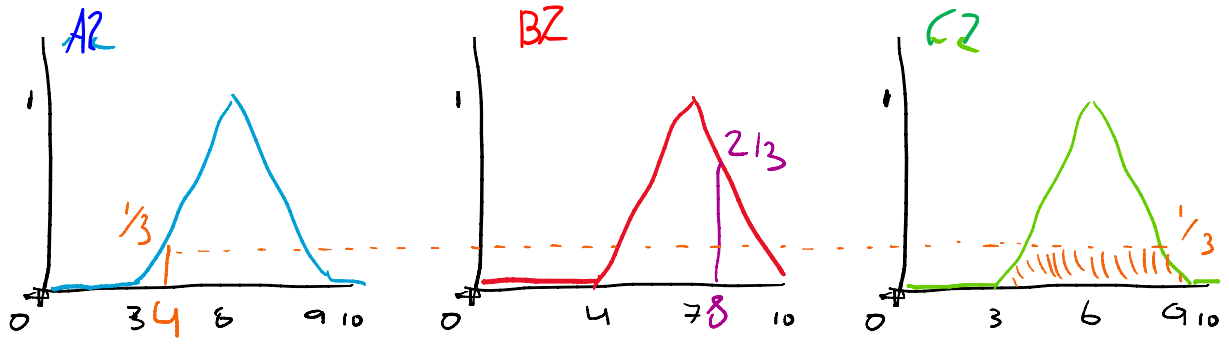
$$\mu_{B_1}(y) = \begin{cases} \frac{y-5}{3} & 5 \le y \le 8 \\ \frac{11-y}{3} & 8 < y \le 11 \end{cases} \qquad \mu_{B_2}(y) = \begin{cases} \frac{y-4}{3} & 4 \le y \le 7 \\ \frac{10-y}{3} & 7 < y \le 10 \end{cases}$$

$$\mu_{C_1}(z) = \begin{cases} \frac{z-1}{3} & 1 \le z \le 4 \\ \frac{7-z}{3} & 4 < z \le 7 \end{cases} \qquad \mu_{C_2}(z) = \begin{cases} \frac{z-3}{3} & 3 \le z \le 6 \\ \frac{9-z}{3} & 6 < z \le 9 \end{cases}$$

Rule 1)



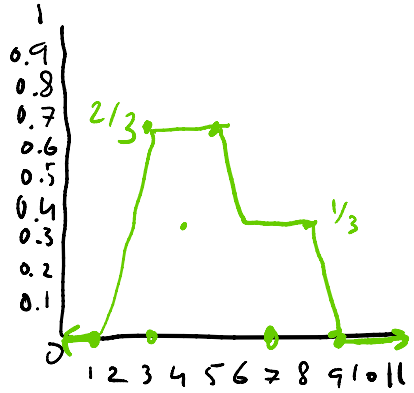
Kule 2)

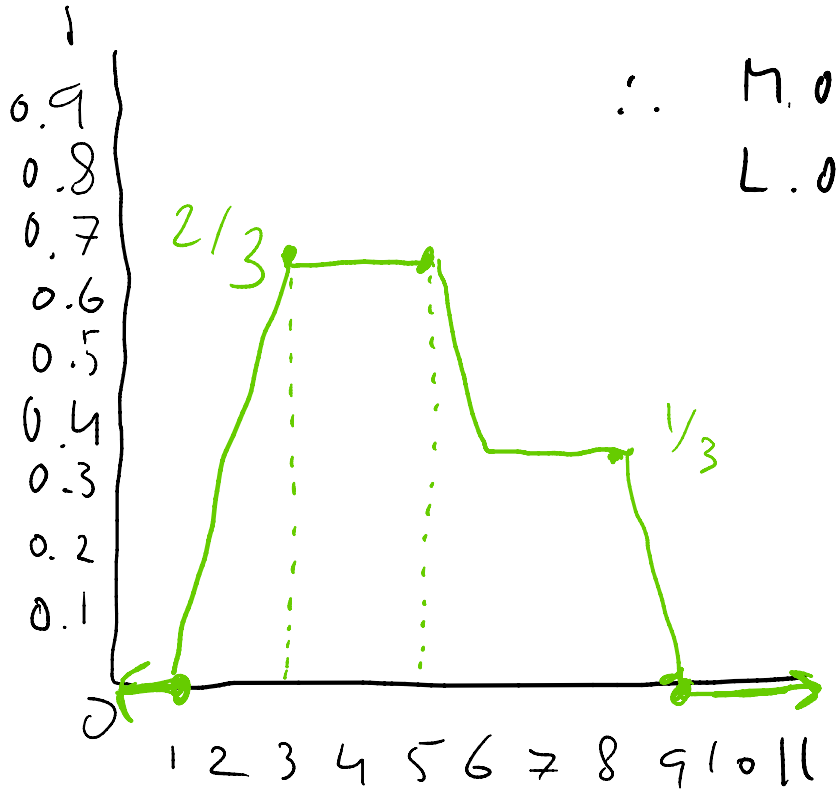


$x_0(t_1) = 4$ $\quad$ $y_0(t_1) = 8$

$C_1(3,5) = 2/3$ $\quad$ $C_2(4,8) = 1/3$

$C_1(1,7) = 0$ $\quad$ $C_2(3,9) = 0$





$\therefore$ M.O.M : 4

L.O.M : 5