

2023-2024 S1

1.

Solution (a)

grey level : 0.7, 0, 0.8, 1, 0.9

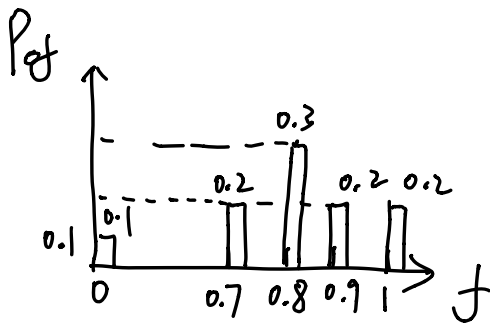
$f_{\min} = 0$, $f_{\max} = 1$

grey level numbers : 5

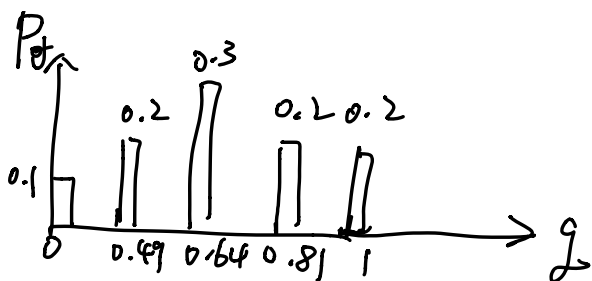
(b) Due to the sum of probability is 1

$$\text{So } 0.2 + 0.1 + 0.3 + c + 0.2 = 1$$

thus $c = 0.2$



c) Original	0	0.7	0.8	0.9	1
Corrected	0	0.49	0.64	0.81	1



$$cd) \quad g = T(f) = \text{round} \left[\frac{cf - c_{min}}{1 - c_{min}} L \right], \quad L = 5$$

$$f : 0 \quad 0.4 \quad 0.6 \quad 0.8 \quad 1$$

$$p : 0.1 \quad 0.2 \quad 0.3 \quad 0.2 \quad 0.2$$

$$cf : 0.1 \quad 0.3 \quad 0.6 \quad 0.8 \quad 1$$

$$g : 0 \quad 1 \quad 3 \quad 4 \quad 5$$

$$g_1 = \text{round} \left[\frac{0.1 - 0.1}{1 - 0.1} \times 5 \right] = 0$$

$$g_2 = \text{round} \left[\frac{0.3 - 0.1}{1 - 0.1} \times 5 \right] = \text{round} \left[\frac{0.2}{0.9} \times 5 \right] = \text{round} \left[\frac{10}{9} \right] = 1$$

$$g_3 = \text{round} \left[\frac{0.6 - 0.1}{1 - 0.1} \times 5 \right] = \text{round} \left[\frac{5}{9} \times 5 \right] = 3$$

$$g_4 = \text{round} \left[\frac{0.8 - 0.1}{1 - 0.1} \times 5 \right] = 4$$

$$g_5 = \text{round} \left[\frac{1.0 - 0.1}{1 - 0.1} \times 5 \right] = 5$$

这个 L 为啥是5, 是最后的灰度值啊

应该映射到[0, 1]区间

L=1, 最后就是应该是小数

区间是不变的

$$g_1=0$$

$$g_2=2/9=0.22$$

$$g_3=5/9=0.56$$

$$g_4=7/9=0.78$$

$$g_5=1$$

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$$1. P_{\text{of}}(f) = 0.2 \delta(f - 0.7) + 0.1 \delta(f - 1) + 0.3 \delta(f - 0.8) + c \delta(f - 1) + 0.2 \delta(f - 0.9)$$

(ii), Determine grey levels Min and Max, How many grey levels it have?

Ans: (i) include (0, 0.7, 0.8, 1, 0.9),

$$\text{So } f_{\text{min}} = 0, f_{\text{max}} = 1$$

There is 5 different levels, 0, 0.7, 0.8, 1, 0.9

2. Determine the value of c and plot the histogram $P_{\text{of}}(f)$

$$0.2 + 0.1 + 0.3 + c + 0.2 = 1$$

$$c = 0.2$$

$$f = 0.7, P_{\text{of}}(0.7) = 0.2$$

$$f = 0, P_{\text{of}}(0) = 0.1$$

$$f = 0.8, P_{\text{of}}(0.8) = 0.3$$

$$f = 1, P_{\text{of}}(1) = 0.2$$

$$f = 0.9, P_{\text{of}}(0.9) = 0.2$$

