# Q. No. 1.

Grayscal image

Image : [0, 0, 1, 1, 2, 2, 3, 3, 4, 4, 5]

so the histogram is

| Pixel value | 0 | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|---|
| Frequency $P_{(i)}$ | 2 | 2 | 2 | 2 | 2 | 1 |

## Calculating Threshold using otsu method.

## Given Data:

Pixel Value : [0, 1, 2, 3, 4, 5]

Frequency : [2, 2, 2, 2, 2, 1]

Date: __/__/20__ Day: _____

## step I

Total Pixel $N = 2+2+2+2+2+1 = 11$

## Mean intensity

$$\mu T = \frac{(0\times2)+(1\times2)+(2\times2)+(3\times2)+(4\times2)+(5\times1)}{11}$$

$$\mu T = \frac{2+4+6+8+5}{11} = \frac{25}{11} = 2.27$$

## step3:

Try threshold at different values it compute between. class varience for each threshold

threshold $T=2$ (optimal guess)

class 1 : [0, 1, 2]

class 2 : [3, 4, 5]

class 1

$$\omega_1 = \frac{2+2+2}{11} = \frac{6}{11}$$

$$\mu_1 = \frac{(0\times2)+(1\times2)+(2\times2)}{6} = 1$$

$$\mu_1 = 1$$

class 2 :

$$\omega_2 = \frac{2+2+1}{11} = \frac{5}{11}$$

$$\mu_2 = \frac{(3\times2)+(4\times2)+(5\times1)}{5} = 3.8$$

Day: _____

Date: __/__/20__

step 4.

calculate between class

variance.

$$\sigma^2 B = w_1 \times w_2 \times (u_1 - u_2)^2$$

$$\sigma^2 B = \frac{6}{11} \times \frac{5}{11} (1 - 3.8)^2$$

$$= 0.122.$$

conclusion:

optimal threshold is $T = 2$.