Set → A

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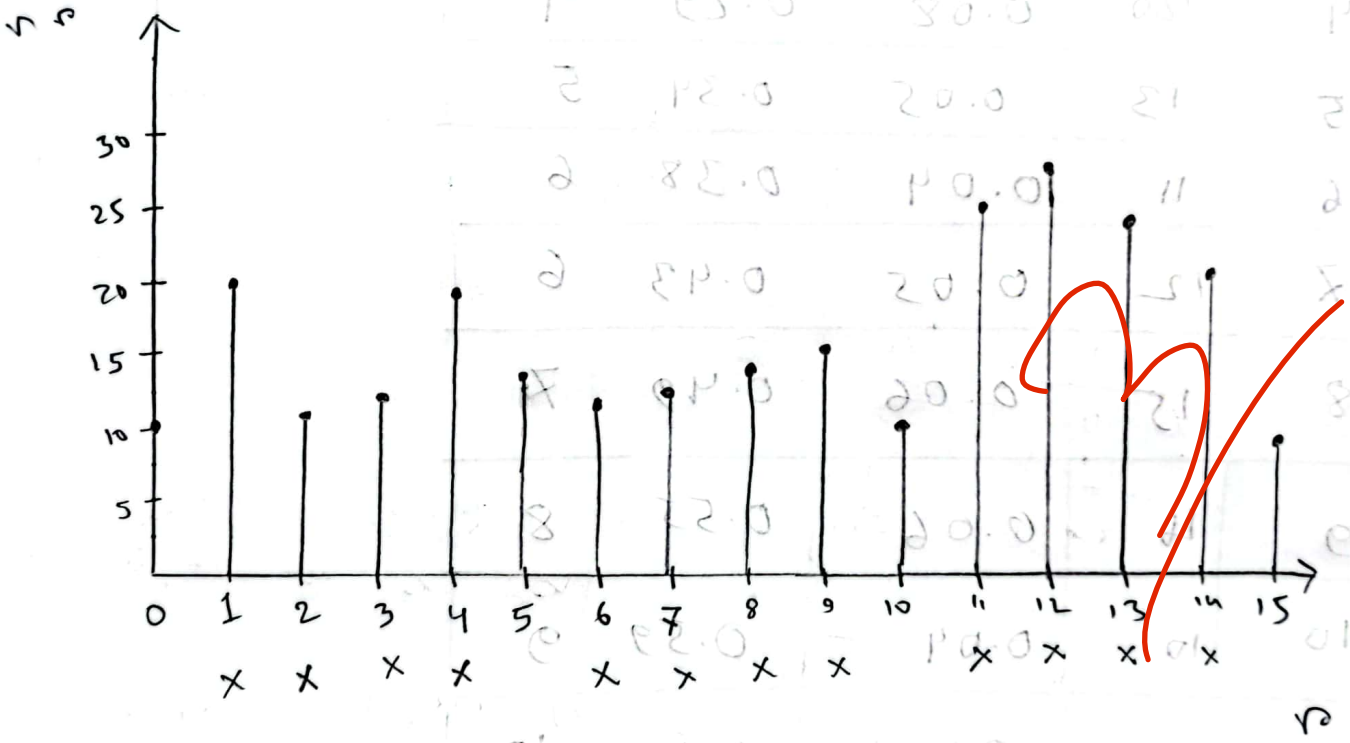
Section: 02 (CSE428)

Q1

(a)



(b) + (c) $N_T = 13 \times 20 = 260$

n	n_n	PDF	CDF	HE
0	10	$\frac{10}{260} = 0.04$	0.04	$(0.04 \times 15) = 0.6 \approx 1$
1	20	0.08	0.12	1
2	11	0.04	0.16	2
3	13	0.05	0.21	3
4	20	0.08	0.29	4
5	13	0.05	0.34	5
6	11	0.04	0.38	6
7	12	0.05	0.43	6
8	15	0.06	0.49	7
9	16	0.06	0.55	8
10	10	0.04	0.59	9
11	26	0.1	0.69	10
12	28	0.1	0.79	12
13	25	0.1	0.87	13
14	21	0.08	0.97	15
15	9	0.03	1	15

(d)

HE:

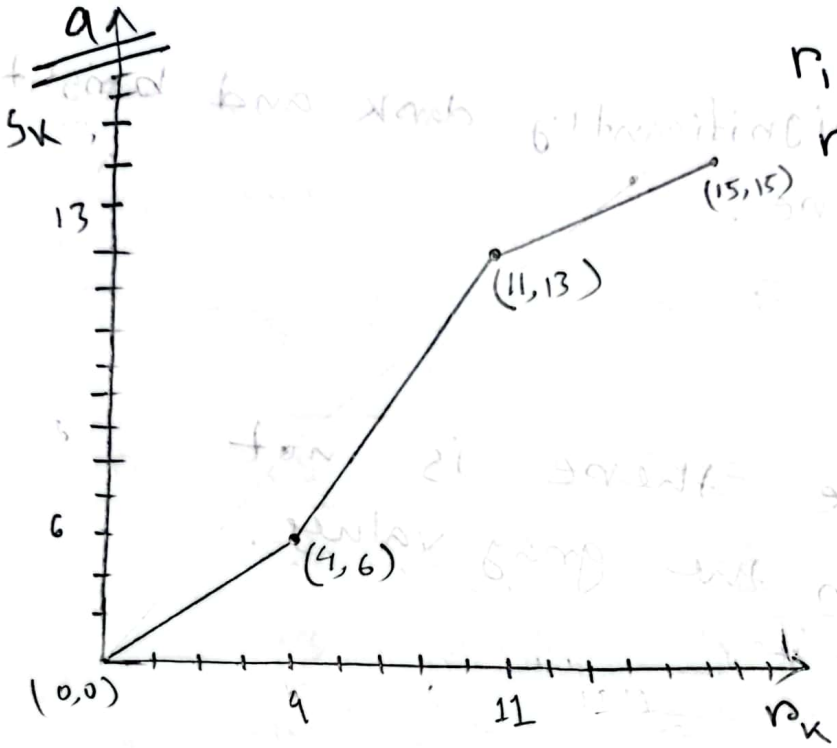
Information of significantly dark and bright pixel is lost here.

AHE:

AHE fails where there is not much variation in the gray values.

q2

a



$r_1 = 4$, $s_1 = 6$

$r_2 = 11$, $s_2 = 13$

b

$$\alpha = \frac{4-0}{6-0} = \frac{4}{6} = \frac{2}{3}$$

$$\beta = \frac{11-4}{13-6} = 1$$

$$\gamma = \frac{15-11}{15-13} = 2$$

Now, $$S = \begin{cases} \alpha r & \text{if } 0 \le r < 4 \\ \beta(r-r_1)+s_1 & \text{if } 4 \le r < 11 \\ \gamma(r-r_2)+s_2 & \text{if } 11 \le r < 15 \end{cases}$$

Now the output:

n_k	s_k
0	$\frac{2}{3} \times 0 \approx 0$
1	$\frac{2}{3} \times 1 \approx 1$
2	$\frac{2}{3} \times 2 \approx 1$
3	$\frac{2}{3} \times 3 \approx 2$
4	$(4-4)+6 \approx 6$
5	$(5-4)+6 \approx 7$
6	$(6-4)+6 \approx 8$
7	$(7-4)+6 \approx 9$
8	$(8-4)+6 \approx 10$
9	$(9-4)+6 \approx 11$
10	$(10-4)+6 \approx 12$
11	$2(11-11)+13 \approx 13$
12	$2(12-11)+13 \approx 15$
13	$2(13-11)+13 \approx 15$
14	$2(14-11)+13 \approx 15$
15	$2(15-11)+13 \approx 15$

Q3

a

(i) The image has high range gray level values.

(ii) This is a Bright image.

(iii) This image has very low contrast. Because the difference between the darkest and brightest pixel is very low. (Intensity diffencnce).

b

$s = r + 2$

This will increase the gray values of the input image by 2 values.
example: 150+2 = 152.

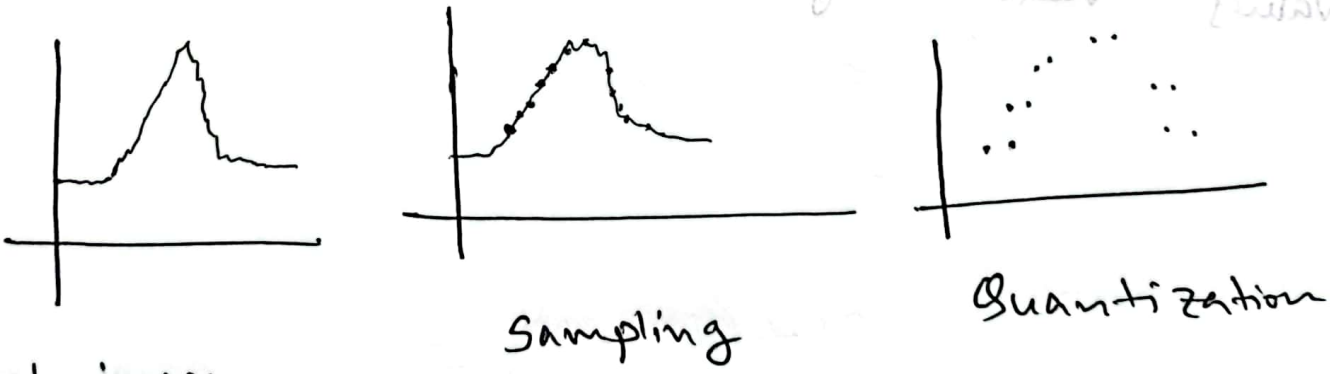
This will make the image more bright and some of the information will be lost. Because near 250 it will clip the value to 250.

c

Computer can not store all the color of a real image. It can only store some predefined values. While forming a digital image. There is 2 steps:

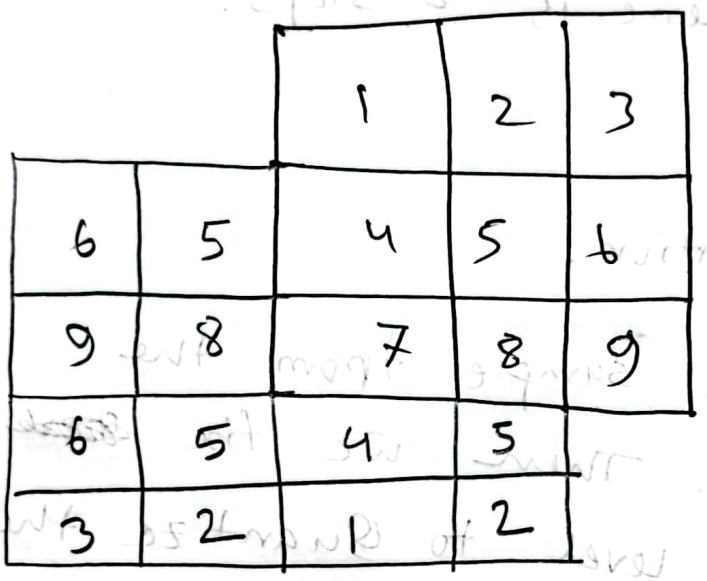
(i) sampling
(ii) Quantization.

We take some sample from the image (of color). Then we fix some range or level to Quantize the values. Like we devide the samples between 0-1, 0-7, 0-255 etc.



real image. Sampling Quantization

Mirror image:



In mirror padding we take the values near edge and mirror them.