Image Processing
Home work 08

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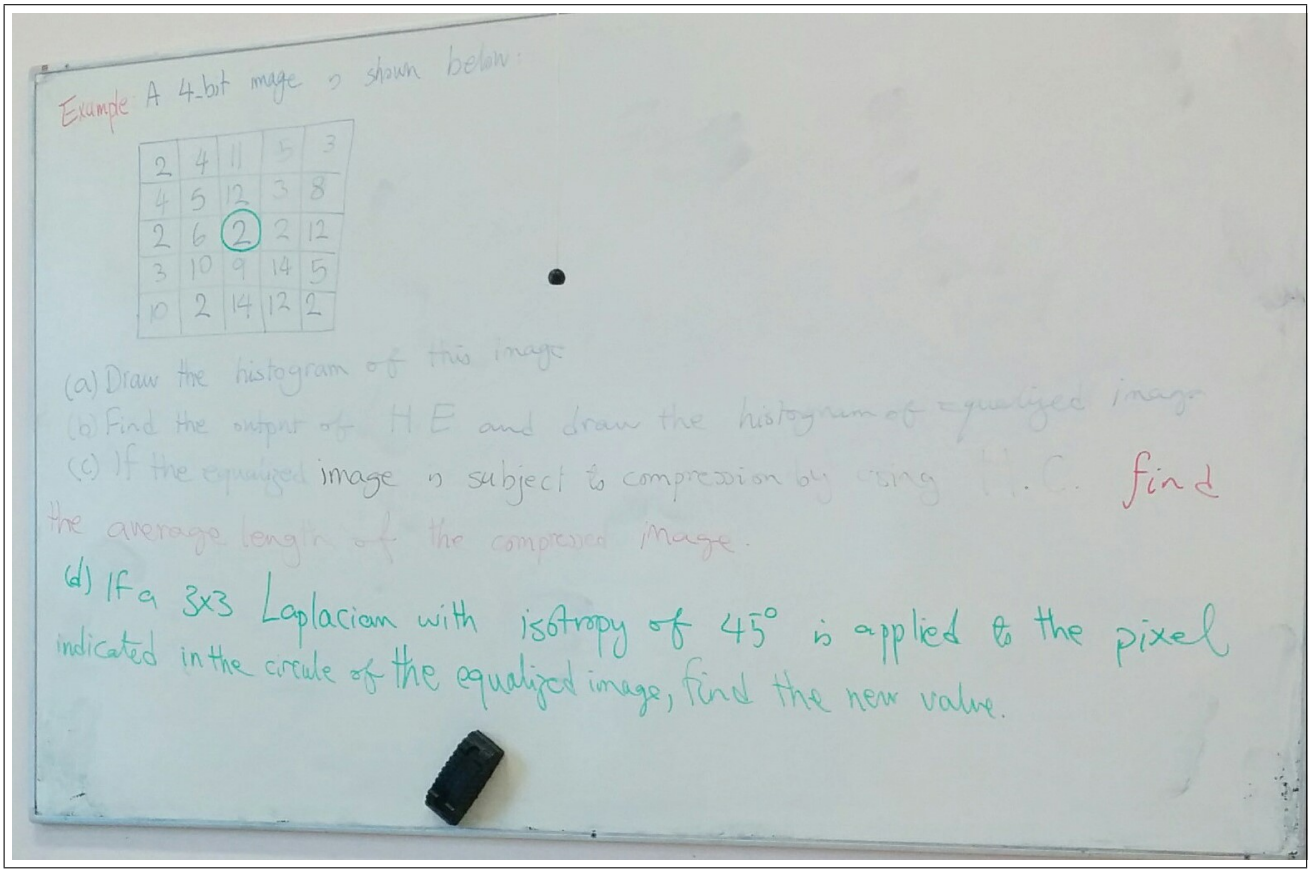

A

The histogram is just the frequency vs Value. The values as in the following table :

Value	Count
2	6
3	3
4	2
5	3
6	1
8	1
9	1
10	2
11	1
12	3
14	2

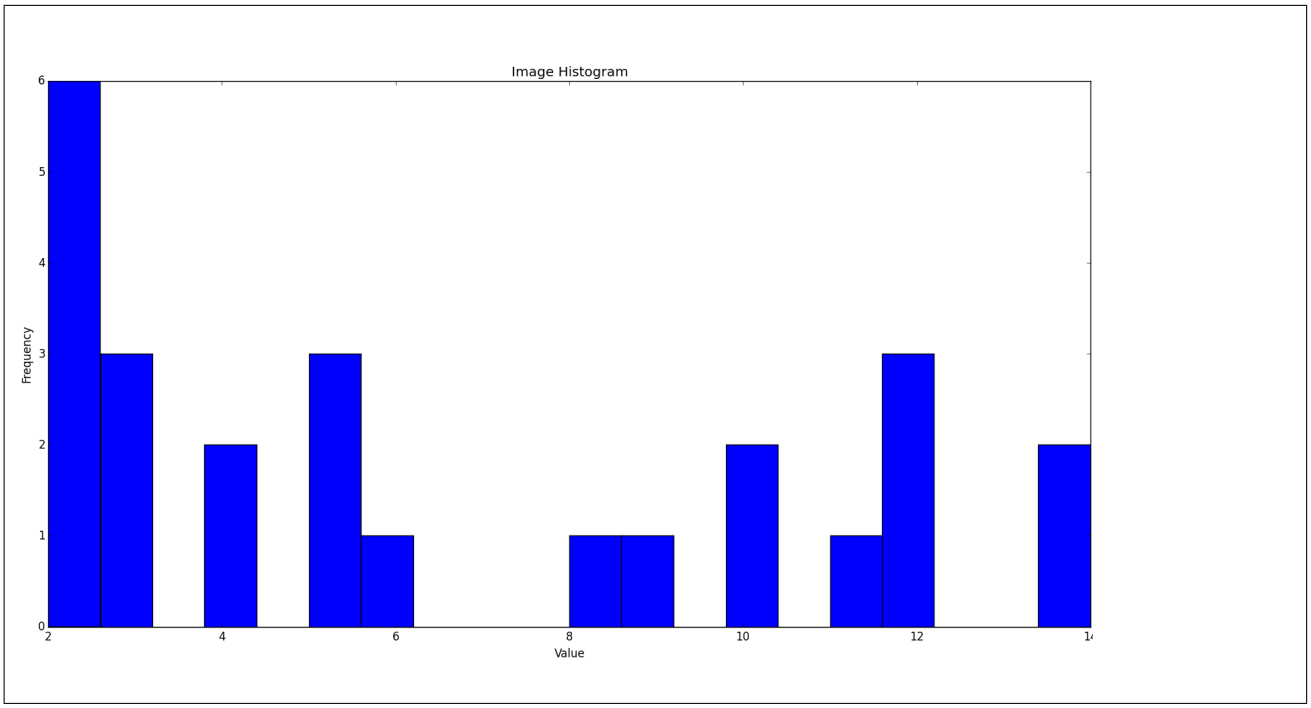

Fig. 1: Histogram of the image

B

First here is the values :

value	Count	Probablitiy	CDF	HE
2	6	0.24	0.24	0
3	3	0.12	0.36	2
4	2	0.08	0.44	4
5	3	0.12	0.56	6
6	1	0.04	0.60	7
8	1	0.04	0.64	8
9	1	0.04	0.68	9
10	2	0.08	0.76	10
11	1	0.04	0.80	11
12	3	0.12	0.92	13
14	2	0.08	1.00	15

And here is the historam of the equalized image :

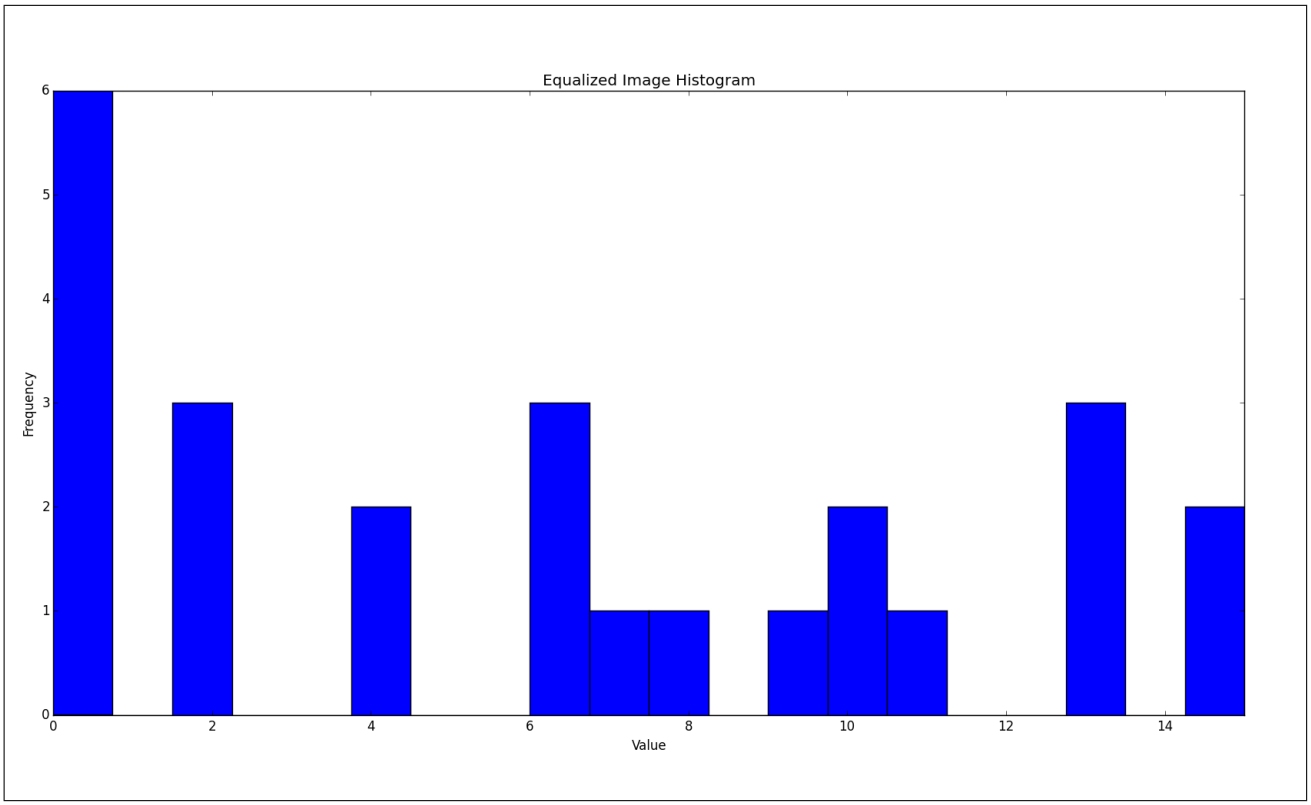

Fig. 2: Histogram of the equalized image

C

For Huffman coding I did it on the board

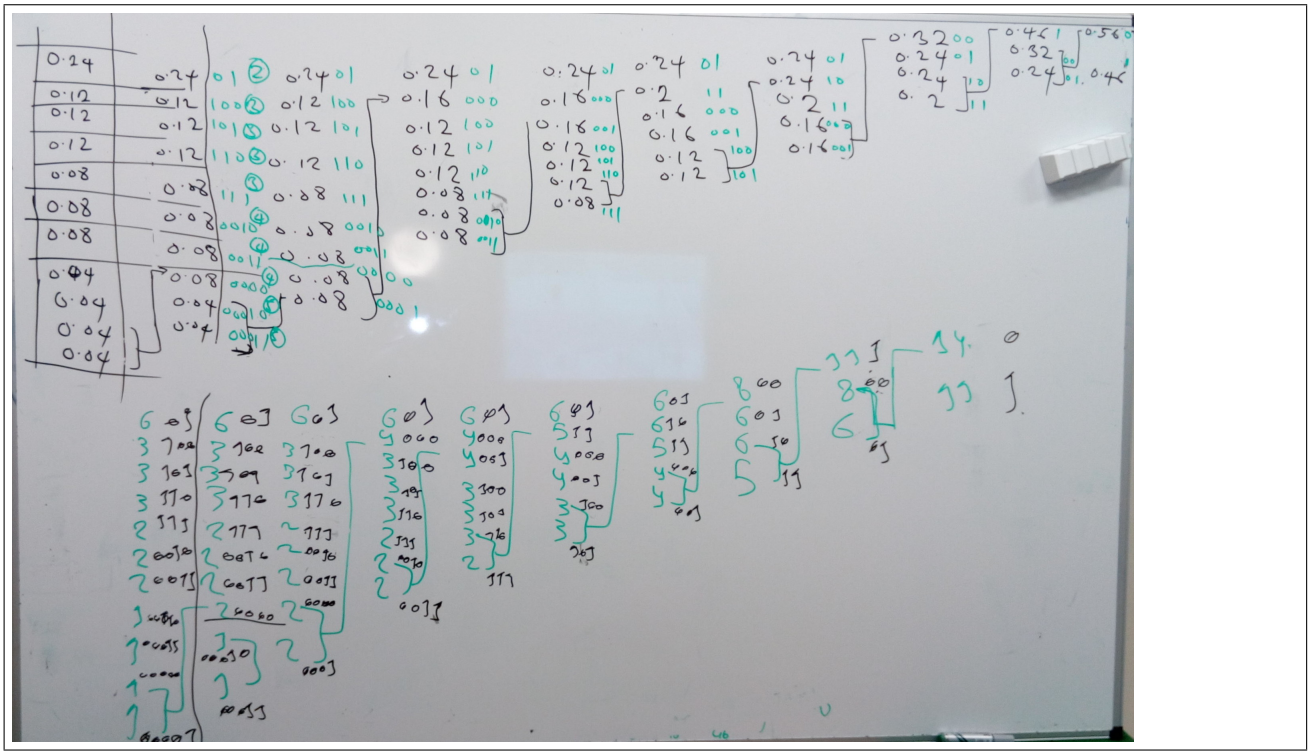

Fig. 3: Calculating Huffman code depending on probabilities and count , both lead to same result

Here is the values ordered depending on the count:

value	Count	Pr	Code_Length
0	6	0.24	2
2	3	0.12	3
6	3	0.12	3
13	3	0.12	3
4	2	0.08	3
10	2	0.08	4
15	2	0.08	4
7	1	0.04	5
8	1	0.04	5
9	1	0.04	5
11	1	0.04	5

From the previous table we can see that the average length is $3.2400000000000007 \approx 3.24$
Note: For more details please check my solution file (HTML in python with figures + tables at HW8.ipython git hub)

D)

The value of laplacian image for that specific pixel is 62 and the new value is -62.
Filter mask for digital laplacian :

L =

1	1	1
1	-8	1
1	1	1

The equalized image at the same point in circle :

IM =

6	13	2
7	0	0
10	9	15

$$Sum(L * IM) = 62$$

depending on the rule

$$g(x,y) = f(x,y) - \nabla^2 f(x,y) \text{ since the center coefficient of the laplacian mask is negative}$$

$$= -62$$

Note: All .py , .tex , .pdf , .png , etc.. exist on github

E.O.F