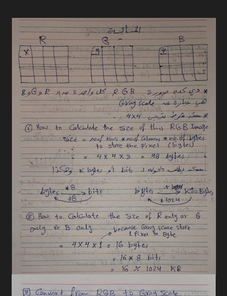
نوايا المذاكرة:

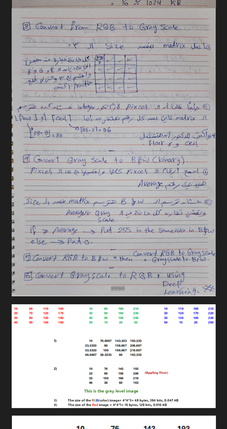
- أن أبر أبي و أمه جعلهما الله علي و أسعدهما
- أن ألهمني مسلم متحدر فألهمن صورة جيدة للمسلم بإذن الله
- أن أعمل بهذا العلم فأكتسب به BBB و أفيد به نفسي و أهلي من المحترم و الطالب من الناس
- أن أعلم بهذا العلم و أعمل بمقتضى تلك الكفاءة التي منحني الله فيه
- أن أتوجه بالشكر و بأحسن الدعوات و أخص الكفاءة الذي منحني الله فيه
- أن أشكر نعمة الله علي بأستعمالها فيما يرضيه
- أن أساعد غيري زاميا أن يحمانني الله سببا في فرج و سعادة أهل من أساعدهم و التخفيف عنهم
- أن أتبع الأمة بنفسي
- أدعو إلي الله

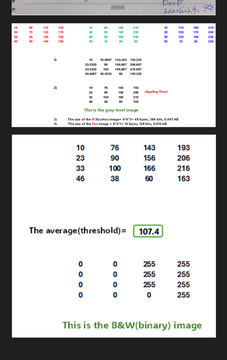
R G B
Image Processing for final 😮

تركيز من جديد!

RGB, GreyScale, and B&W







10	76	143	193
23	90	156	206
33	100	166	216
46	38	60	163

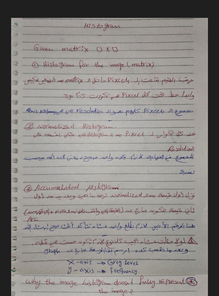
The average(threshold)= 107.4

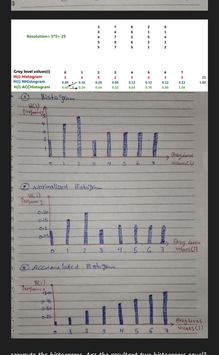
0	0	255	255
0	0	255	255
0	0	255	255
0	0	0	255

This is the B&W(binary) image

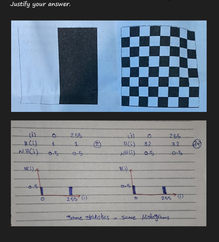
⭐ هل تعلم أن PDF اختصار لـ ⭐
Portable Document Format

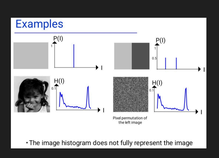
Histogram





compute the histogram. Are the matched two histograms equal? justify your answer.

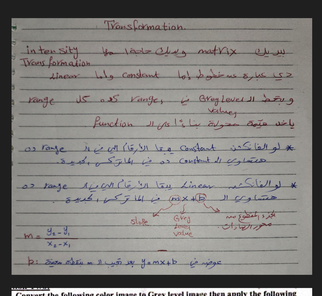




Examples

The image histogram does not fully represent the image

Transformation

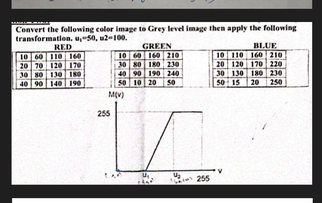


Convert the following color image in Grey level image then apply the following transformation, with $c=255$, $a=100$, $b=200$

R			
24	14	135	150
20	30	72	108
30	20	108	72
40	10	144	36

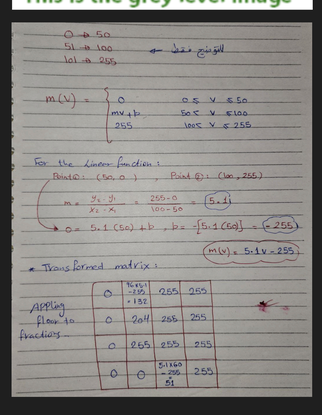
G			
10	40	36	144
20	30	72	108
30	20	108	72
40	10	144	36

B			
15	128	180	210
20	30	72	108
30	20	108	72
50	0	180	0

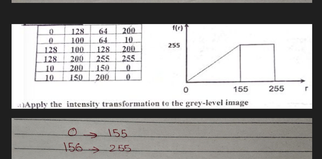


10	76	143	193
23	90	156	206
33	100	166	216
46	38	60	163

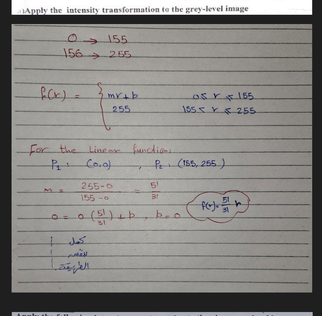
This is the grey level image



0	128	44	200
128	200	128	200
128	100	128	200
128	200	255	128
128	200	128	200
128	255	200	0

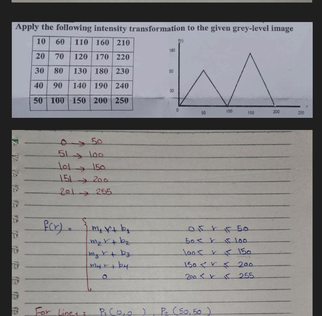


Apply the intensity transformation to the grey-level image



Apply the following intensity transformation to the gray-grey level image

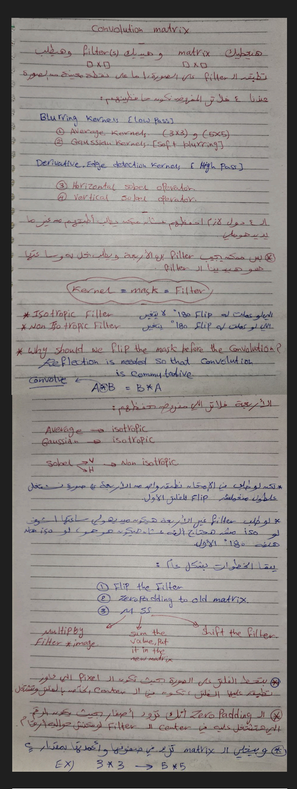
10	40	144	210
20	70	120	170
30	80	130	180
40	90	140	190
50	100	150	200



Transformed Matrix

10	40	36	144	0
20	30	72	108	0
30	20	108	72	0
40	10	144	36	0
50	0	180	0	0

Convolution Matrix [Filters]



*If at any question in the course the output of a pixel= negative **then** right "After clipping" ☺*

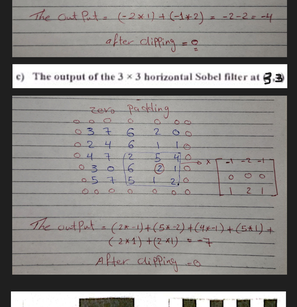
***else** if at any question the output of a pixel= fraction **then** make floor or ceil and tell the doctor which you are used.*

0	2	4	6	8
1	3	5	7	9
2	4	6	8	10
3	5	7	9	11
4	6	8	10	12

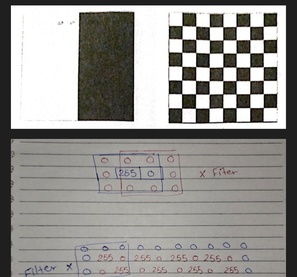
Laplacian filter		
0	1	0
1	-4	1
0	1	0

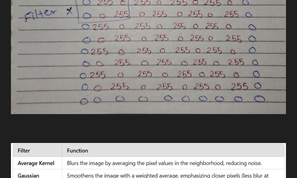
Low pass filter		
0.05	0.1	0.05
0.10	0.50	0.10
0.05	0.1	0.05

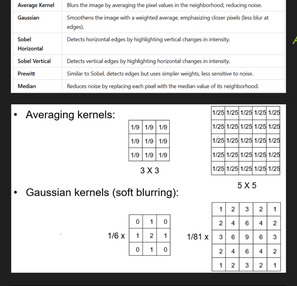
c) The output of the 3 × 3 vertical Sobel filter at (4,4)



c) The output of the 3 × 3 horizontal Sobel filter at (3,3)







Filter	Function
Average Kernel	Blurs the image by averaging the pixel values in the neighborhood, reducing noise.
Gaussian	Applies a Gaussian kernel, a weighted average, emphasizing closer pixels (less blur at edges).
Sobel Horizontal	Detects horizontal edges by highlighting vertical changes in intensity.
Sobel Vertical	Detects vertical edges by highlighting horizontal changes in intensity.
Prewitt	Similar to Sobel, detects edges but uses simpler weights, less sensitive to noise.
Median	Replaces noise by replacing each pixel with the median value of its neighborhood.

As Help in solve the questions

- Averaging kernels:

$$\begin{bmatrix} 1/9 & 1/9 & 1/9 \\ 1/9 & 1/9 & 1/9 \\ 1/9 & 1/9 & 1/9 \end{bmatrix} \quad \begin{bmatrix} 1/25 & 1/25 & 1/25 & 1/25 & 1/25 \\ 1/25 & 1/25 & 1/25 & 1/25 & 1/25 \\ 1/25 & 1/25 & 1/25 & 1/25 & 1/25 \\ 1/25 & 1/25 & 1/25 & 1/25 & 1/25 \\ 1/25 & 1/25 & 1/25 & 1/25 & 1/25 \end{bmatrix}$$

3 x 3 — 5 x 5

- Gaussian kernels (soft blurring):

$$\frac{1}{16}\begin{bmatrix} 1 & 2 & 1 \\ 2 & 4 & 2 \\ 1 & 2 & 1 \end{bmatrix} \quad \frac{1}{81}\begin{bmatrix} 1 & 2 & 3 & 2 & 1 \\ 2 & 4 & 6 & 4 & 2 \\ 3 & 6 & 9 & 6 & 3 \\ 2 & 4 & 6 & 4 & 2 \\ 1 & 2 & 3 & 2 & 1 \end{bmatrix}$$

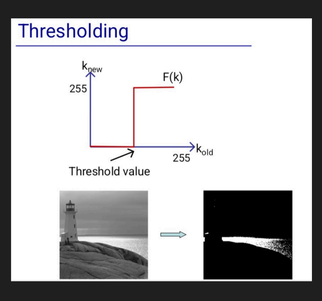
3 x 3 — 5 x 5

Sobel Operator

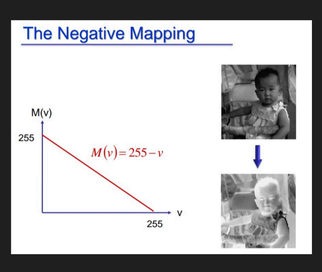
$$H_x^S = \begin{bmatrix} -1 & 0 & 1 \\ -2 & 0 & 2 \\ -1 & 0 & 1 \end{bmatrix} \quad \text{and} \quad H_y^S = \begin{bmatrix} -1 & -2 & -1 \\ 0 & 0 & 0 \\ 1 & 2 & 1 \end{bmatrix}$$

Vertical — Horizontal

Thresholding

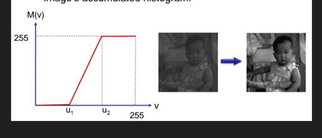


The Negative Mapping



Contrast Enhancement

- If most of the gray-levels in the image are in $[u_1, u_2]$, the following mapping increases the image contrast.
- The values u_1 and u_2 can be found by using the image's accumulated histogram.

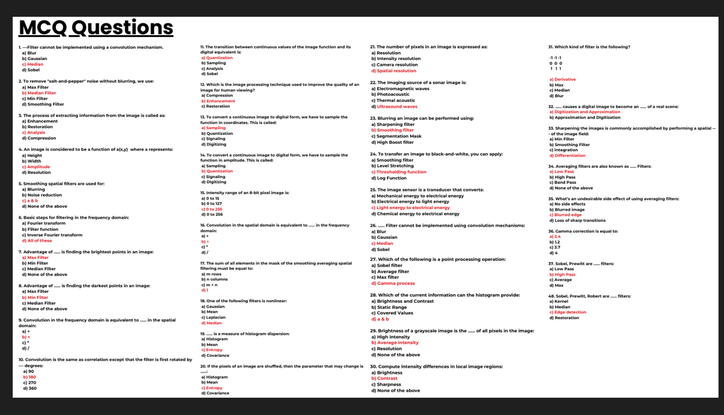


T&F Questions

1. Gradient filter replaces the pixel value by the average value in the neighborhood. (False)
2. A median filter is a convolution filter. (False)
3. Sobel filter is a convolution filter. (True)
4. The magnitude of the Fourier transform carries more information than its phase. (False)
5. The convolution in spatial domain is equivalent to convolution in frequency domain. (False)
6. The time complexity of the fast Fourier transform is O(log(N)). (False)
7. Convolution process is a point processing technique. (False)
8. The horizontal Sobel filter can be considered as a high pass filter. (True)
9. The vertical Sobel filter can be considered as a high pass filter. (True)
10. Flipping the kernel or the filter is an essential step in convolution when it is not symmetric around its center. (True)
11. Flipping the kernel or the filter is an essential step in correlation when it is not symmetric around its center. (False)
12. The contrast of an image is better when its dynamic range is high. (True)
13. Digitizing the coordinates in an image is called quantization while digitizing the grey level is called sampling. (False)
14. Digitizing the coordinates in an image is called sampling while digitizing the grey level is called quantization. (True)
15. Spatial resolution depends on the quantization step of the digitization process. (False)
16. Histogram equalization is one of the point processing techniques. (True)

احتياطي

MCQ Questions



وَاذْكُرُوهُ كَمَا هَدَاكُمْ