

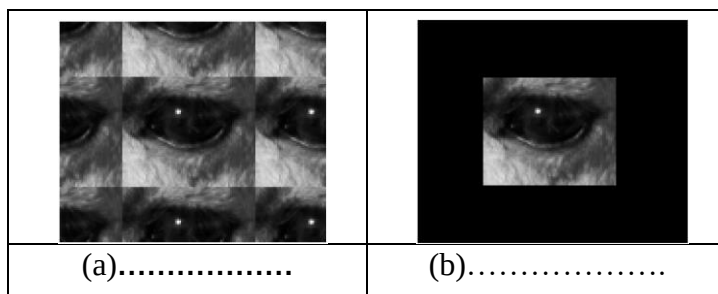


Attempt all the following questions:

Question 1: Complete the following sentences:

(15 Marks)

1. The Second Derivative of Image Sharpening called
2. The primary objective of sharpening of an image is
3. Second derivative of $I(x)$ has a at edge.
4. The shows the distribution of grey levels in an image.
5. The spatial coordinates of a digital image (x,y) are proportional to
6. The Laplacian of Gaussian (or Mexican hat) filter uses the Gaussian for and the Laplacian for
7. Single value thresholding only works for histograms.
8. The first and foremost step in image processing is
9. The type of mean filters that works well for salt noise but fails for pepper noise is
10. What to do at image boundaries?



11. In Alpha-Trimmed Mean Filter, given a set of 16 points, trimming by 25% would compute the mean of the remaining points.
12. In Contraharmonic Mean, negative values of Q eliminate noise.
13. In morphological processing, any on pixel in the structuring element covers an on pixel in the image in
14. In morphological processing, there are two basic morphological operations which are and
15. Dilation objects while Dilation objects.



Attempt all the following questions:

Question 2: Choose the best answer:

(20Marks)

1. What is pixel?

- a. Pixel is the elements of a digital image
- b. Pixel is the elements of an analog image
- c. Pixel is the cluster of an analog image
- d. Pixel is the cluster of a digital image

2. By default, Matlab stores most data in arrays of class

- a. uint8
- b. uint16
- c. double
- d. logical

3. Which of the following is not a valid response when we apply a second derivative?

- a. Zero response at onset of gray level step
- b. Nonzero response at onset of gray level step
- c. Zero response at flat segments
- d. Nonzero response along the ramps

4. What is the output of a smoothing, linear spatial filter?

- a. Median of pixels
- b. Maximum of pixels
- c. Minimum of pixels
- d. Average of pixels

5. What is the thickness of the edges produced by first order derivatives when compared to that of second order derivatives?

- a. Finer
- b. Equal
- c. Thicker
- d. Independent

6. Structuring elements runs over image's

- a. rows
- b. columns
- c. every element
- d. edges

7. Negative of the image having intensity values $[0, L-1]$ is expressed by

- a. $s = L-1$
- b. $s = 1-r$
- c. $s = L-1-r$
- d. $s = L-r$

8. Smallest value of gamma will produce

- a. contrast
- b. darker image
- c. brighter image
- d. black and white image

9. In spatial domain, which of the following operation is done on the pixels in sharpening the image?

- a. Integration
- b. Average
- c. Median
- d. Differentiation

10. Which one is not process of image processing

- a. high level
- b. low level
- c. last level
- d. mid level

11. Smoothing spatial filters are useful for

- a. image enhancement
- b. image restoration
- c. highlight gross details
- d. highlight fine details

12. Which is first fundamental step in image processing?

- a. filtration
- b. image enhancement
- c. image acquisition
- d. image restoration



Attempt all the following questions:

13. Which of the following depicts the main functionality of the Bit-plane slicing?
- Highlighting a specific range of gray levels in an image
 - Highlighting the contribution made to total image appearance by specific bits
 - Highlighting the contribution made to total image appearance by specific byte
 - Highlighting the contribution made to total image appearance by specific pixels
14. In image we notice that the components of histogram are concentrated on the low side on intensity scale.
- bright
 - colourful
 - all of the mentioned
 - dark
15. Histogram is the technique processed in
- intensity domain
 - undefined domain
 - frequency domain
 - spatial domain
16. For edge detection we use
- first derivative
 - second derivative
 - third derivative
 - Both A and B
17. Method in which images are input and attributes are output is called
- low level processes
 - edge level processes
 - high level processes
 - mid level processes
18. First derivative of $I(x)$ has a at the edge.
- none of them
 - valley
 - zero crossing
 - peak
19. The type of noise in which pixel values multiplied by random noise is.....
- speckle noise.
 - periodic noise
 - gaussian noise
 - none of them
20. Which of the following shows three basic types of functions used frequently for image enhancement?
- Linear, logarithmic and inverse law
 - Power law, logarithmic and inverse law
 - Linear, logarithmic and power law
 - Linear, exponential and inverse law

Question 3:

(15Marks)

- (5 marks) What linear transformation will change an image $f(x,y)$ with gray levels ranging from 30 through 40 to an image $g(x,y)$ with gray levels ranging from 20 through 60?
- (5 marks) Consider the image shown below; compute the equalized image with eight possible gray levels. Show each step carefully. Draw the histograms of the original and equalized images.

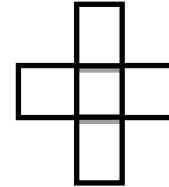
0	2	1	1	2	0
6	1	0	1	5	5
0	6	6	7	1	0



Attempt all the following questions:

c. (5 marks) A 4x4 image is given by

10	50	50	20
20	80	100	160
40	60	50	200
20	80	150	180



Filter the image using a **Max** filter (padding with zeros), use the filter mask given.

Question 4:

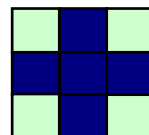
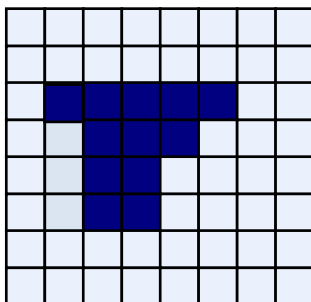
(30Marks)

- (6 marks) Is the threshold obtained with the basic global thresholding algorithm independent of the starting point?
If your answer is yes, prove it. If your answer is no, give an example.
- (6 marks) In a given application an averaging mask is applied to input images to reduce noise, and then a Laplacian mask is applied to enhance small details. Would the result be the same if the order of these operations were reversed?
- (6 marks) What is the difference between enhancement from restoration.
- (6 marks) What are the types of noise models?
- (6 marks) Define the “Skeletonization” and state its main equations.

Question 5:

(20Marks)

- (5 marks) Give a single intensity transformation function for spreading the intensities of an image so the lowest intensity is 0 and the highest is $L - 1$.
- (5 marks) Given a color as $R=100$, $G=50$, and $B=0$, calculate its HSI model.
- (10 marks) Define the “opening” operation and apply it to the image shown below using the following structure element:



Structuring Element

Good Luck
Dr. Shady Yehia Elmashad