Suez Canal University
Faculty of Computers and Informatics
Computer Science Dept.

Final Exam

Program: Computer Science	Course: Digital Image Processing	Course code: **CS443**
Level: **Four**	Lecturer: Prof. Ghada Eltaweel	Date: 15/1/2020
Total pages: **Twelve pages**	Total marks: 80	Time allowed: 180 minute

Answer the following questions:

Multiple choice questions(MCQs) [72 Marks]

1-Consider the original image affected by salt and pepper noise. Most likely, the Fourier transform of this image will look:

a) as in Fig. 1.a b) as in Fig. 1.b c) as in Fig.1.c d) as in Fig. 1.d

Fig.1.a

Fig.1.b

Fig.1.c

Fig.1.d

2-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

3- Image processing approaches operating directly on pixels of input image work directly in

a) Transform domain b) Spatial domain
c) Inverse transformation d) None of the Mentioned

4-The output of a smoothing, linear spatial filtering is _____ of the pixels contained in the neighborhood of the filter mask.

a) Sum b) Product c) Average d) Dot Product

5-Which of the following is the disadvantage of using smoothing filter?

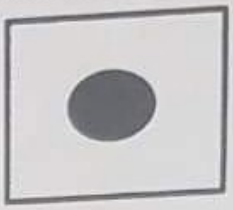
a) Blur edges b) Blur inner pixels c) Remove sharp transitions d) Sharp edges

6- H(u,v) is a filter applied to the image in frequency domain by point multiplication
What is the filter type?

a) high pass
b) low pass
c)band pass
d) none of the mentioned

7-H(u,v) is a filter applied to the image in frequency domain by point multiplication
What is the filter type?

a) high pass
b) low pass
c)band pass
d) none of the mentioned



8- The mask shown in the figure below belongs to which type of filter?

a) Sharpening spatial filter
b) Median filter
c) Smoothing spatial filter
d) Sharpening frequency filter

$\frac{1}{9}\times$

1	1	1
1	1	1
1	1	1

9-Which of the following is best suited for salt-and-pepper noise elimination?
a) Average filter b) Box filter c) Max filter d) Median filter

10-Smoothing filter is used for which of the following work(s)?
a) Blurring b) Noise reduction c) All of the mentioned d) None of the mentioned

11-A frequency domain filter of the corresponding filter in spatial domain can be obtained by applying which of the following operation(s) on filter in spatial domain?
a) Fourier transform
b) Inverse Fourier transform
c) None of the mentioned
d) All of the mentioned

12-An image contains noise having appearance as black and white dots superimposed on the image. Which of the following noise(s) has the same appearance?
a) Salt-and-pepper noise
b) Gaussian noise
c) All of the mentioned
d) None of the mentioned

13- What Does Image Differentiation enhance?
a) Edges b) Pixel Density c) Contours d) None of the mentioned

14-Which of the following filter(s) attenuates high frequency while passing low frequencies of an image?
a) Un-sharp mask filter
b) Low-pass filter
c) Zero-phase-shift filter
d) All of the mentioned

15-Which of the following filter(s) attenuates low frequency while passing high frequencies of an image?
a) Un-sharp mask filter
b) High-pass filter
c) Zero-phase-shift filter
d) All of the mentioned

16-Which of the following filter have a less sharp detail than the original image because of attenuation of high frequencies?
a) High-pass filter b) Low-pass filter c) Zero-phase-shift filter d) None of the mentioned

17-Which of the following is/are considered as type(s) of low-pass filters?
a) Ideal b) Butterworth c) Gaussian d) All of the mentioned

18- If an image contains K disjoint regions, what does the union of all the regions represent?
a) Background b) Foreground c) Outer Border d) Inner Border

19-Which of the following fact is true for an image?
a) An image is the addition of illumination and reflectance component
b) An image is the subtraction of illumination from reflectance
c) An image is the subtraction of reflectance from illumination
d) An image is the multiplication of illumination and reflectance component

20-In Homomorphic filtering which of the following operations is used to convert input image to discrete Fourier transformed function?
a) Logarithmic operation b) Exponential operation
c) Negative transformation d) None of the mentioned

21- What is Histogram Equalization also called as?
a) histogram matching b) image enhancement c) histogram linearization d)none of mentioned

22-If D0 is the cutoff distance measured from origin of frequency rectangle and D(u, v) is the distance from point(u, v). Then what value does an Ideal High-pass filter will give if $D(u, v) \leq D0$ and if $D(u, v) > D0$?
a) 0 and 1 respectively b) 1 and 0 respectively c) 1 in both case d) 0 in both case

23-The Image sharpening in frequency domain can be achieved by which of the following method(s)?
a) Attenuating high frequency components b) Attenuating low-frequency components
c) All of the mentioned d) None of the mentioned

24- High frequencies in image represents
a) Edges b) Noise c) Both a and b d) None of the mentioned

25-What is the basis for numerous spatial domain processing techniques?
a) Transformations b) Scaling c) Histogram d) None of the Mentioned

26-Which of the following occurs in Un-sharp Masking?
a) Blurring original image b) Adding a mask to original image
c) Subtracting blurred image from original d) All of the mentioned

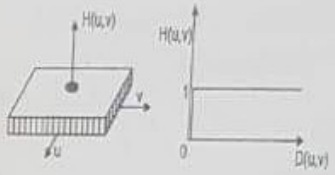
27- Convolution in spatial domain is equivalent to multiplication in
a) frequency domain b) time domain
c)spatial domain d) plane

28-One of the following filters is nonlinear
a) Gaussian Filter b) Averaging Filter c) Laplacian Filter d) Median

29- To remove "salt-and-pepper" noise without blurring we use
a) Max Filter b) Median Filter c) Min Filter d) Smoothing Filter

30-If the image is noisy, what kind of filter should be applied to the image before applying the Laplacian filter.
a) High pass filter b) Low pass filter c) Gradient filter d) None of the mentioned

31-H(u,v) is a filter applied to the image in frequency domain by point multiplication What is the filter type?
a) high pass b) low pass
c)band pass d) none of the mentioned



32- Gradient have some important features. Which of the following is/are some of them?
a) Enhancing small discontinuities b) Enhancing prominent edges
c) All of the mentioned d) None of the mentioned

33- Salt and pepper noise contains
a)White spots in dark regions b) Dark spots in white regions
c)Both of the above d) None of the above

34- Gaussian noise is referred to as
a)red noise b)black noise c)white noise d)normal noise

35- Spatial filtering is used in presence of
a) additive random noise b) Gamma noise c)black noise d)exponential noise

36- Which of the following is the disadvantage of using smoothing filter?
a) Blur edges b) Blur inner pixels c) Remove sharp transitions d) Sharp edges

37- Which of the following filter(s) attenuates very low and very high frequencies while retains a middle range band of frequencies?
a) Un-sharp mask filter b) Band pass filter c) Zero-phase-shift filter d) All of mentioned

38-Image can be blurred using
a) Low pass filter b) contouring c) high pass filter d) band pass filter

39- Spatial filtering method uses
a) low pass filter b) high pass filter c)band pass filter d)spatial filter

40-A spatial domain filter of the corresponding filter in frequency domain can be obtained by applying which of the following operation(s) on filter in frequency domain?
a) Fourier transform b) Inverse Fourier transform
c) None of the mentioned d) All of the mentioned

41-A frequency domain filter of the corresponding filter in spatial domain can be obtained by applying which of the following operation(s) on filter in spatial domain?
a) Fourier transform b) Inverse Fourier transform
c) None of the mentioned d) All of the mentioned

42-Compressed image can be recovered back by
a) image enhancement b) image decompression
c)image contrast d) image equalization

43-Dividing image into its objects is called
a) Division b) segmentation c)extraction d)recognition

44-In frequency domain terminology, which of the following is defined as "obtaining a high-pass filtered image by subtracting from the given image a low-pass filtered version of itself"?
a) Emphasis filtering b) Un-sharp masking c) Butterworth filtering d) None

45-Sub-band of input image, showing $d^H(m,n)$ is called
a) approximation b) vertical detail c) horizontal detail d) diagonal detail

46-Spatial domain refers to
a) Manipulations on whole image b) Direct manipulation of image pixel
c)Modifications on Fourier transform of an image d) Contrast shrinking

47-Histogram processing works in
a) Frequency domain b) Spatial domain c)Both of the above d) None of the above

48-To improve the intensity and contrast of an image
a)Mean of variance are measured b)Mean of median are measured
c)Both of the above d) None of the above

49- Image compression comprised of
a)encoder b)decoder c)frames d)Both A and B

50- Decoder is used for
a)image enhancement b)image compression c)image decompression d)image equalization

51- Error of image is referred to as
a)pixels b)matrix c)frames d)noise

52- Reducing data required referred to
a)image enhancement b)image compression c)image contrast d)image equalization

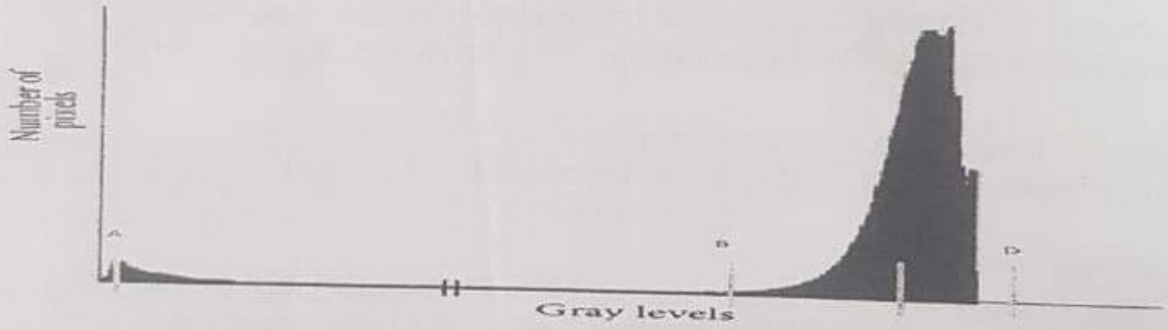
53- Encoder is used for
a)image enhancement b)image compression c)image decompression d)image equalization

54-If an image contains K disjoint regions, what does the union of all the regions represent?
a) Background b) Foreground c) Outer Border d) Inner Border

55- 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

56- What is the Second Derivative of Image Sharpening called?
a) Gaussian b) Laplacian c) Canny d) None of the mentioned

57- In Otsu thresholding technique, you remove the noise by thresholding the points which are irrelevant and keeping those which do not represent noise.



In the image given, at which point would you threshold on?
a) A b) B c) C d) D

58-._____is the starting pixel of region growing process.
a)seed pixel b)base pixel c)original pixel d)image

59-_____ has uni-model histogram
a)one pixel b)one peak c)one valley d)one intensity level

60- Low pass filters are used for image
a) contrast b)Sharpening c)blurring d)resizing

61- High pass filters are used for image
a) contrast b) sharpening c)blurring d)resizing

62- Figure.1(a) represents the grey level histogram of a digital image. After processing this image, one gets another grey level digital image with the grey level histogram shown in Figure.1(b) What is the most processing applied on the original image from the ones below?

a) Grey scale inversion b) Binary thresholding c) Histogram equalization d)None

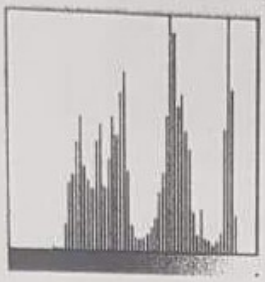


Figure.1(a)

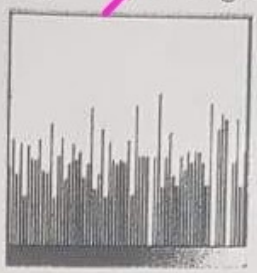


Figure.1(b)

63-If the original image is the one in Figure.2(a), and the resulting image after some processing is the one in Figure.2(b), what is the most likely processing from the list below to give this result?

a) Edge detection by a Laplacian operator b) High pass filtering

c) Median filtering then an edge detection d) Edge detection then a median filtering.

Figure.2(a)

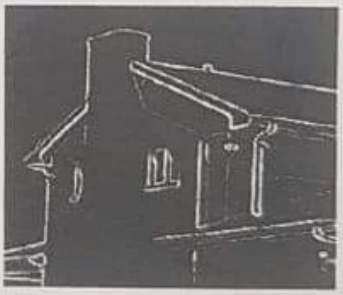


Figure.2(b)

64-The image in Figure.3(a) is an original grey scale digital image. Then, the image in Figure.3(b) is, most probable, the result of

a) thresholding segmentation b) an edge-based segmentation

c) a split-and-merge segmentation d) a region growing segmentation

Figure.3(a)

Figure.3(b)

65-In order to obtain the image in Fig. 4.b) from the original image in Fig. 6.a), the following point processing operation should be applied:
a) contrast compression b) negativation c) histogram equalization d) histogram modification.


Figure.4(a)


Figure.4(b)

66-Multi-spectral (MS) image is a four-band image(Red, Green, Blue, and near Infrared) which has
a)lower spatial resolution b)lower frequency resolution c)higher spatial resolution d) none

67- K-nearest neighbor classifier is
a) parametric classifier b) non-parametric classifier c) both b and d d) None

68-Curvelet transform opens us possibility to analyze an image with different block sizes, but with
a) single transform b) double transform c) All of the mentioned d) none of the mentioned

69- Merging two or more images of a scene obtained from the same sensor at different times or from different sensors to form a single composite image
a) image fusion b) pan-sharpening c) All of the mentioned d) none of the mentioned

70- Statistical Techniques based on probability distribution models, which may be
a) parametric b) non-parametric c) parametric or nonparametric d) none of the mentioned

71- Purpose of restoration is to gain
a) degraded image b)original image c)pixels d)coordinates

72- Degraded image is produced using degradation process and
a)additive noise b)destruction c)pixels d)coordinates

73- Degraded image is given in a
a)frequency domain b)time domain c)spatial domain d)plane

74- Gradient magnitude images are more useful in
a)point detection b)line detection c)area detection d)edge detection

75- Computation of derivatives in segmentation is also called
a)spatial filtering b)frequency filtering c)low pass filtering d)high pass filtering

76- Discontinuity approach of segmentation depends upon
a)low frequencies b)smooth changes c)abrupt changes d)contrast

77- Example of discontinuity approach in image segmentation is
a)edge based segmentation b)boundary based segmentation
c)region based segmentation d)Both A and B

78-Image usually gets corrupted during
a)transmission b) degradation c)restoration d) acquisition

79- The degraded image in Frequency domain is
a) $G(u,v) = H(u,v)F(u,v) + N(u,v)$ b) $g(x,y) = f(x,y) * h(x,y) + \eta(x,y)$ c)None of mentioned

80-Distance functions are used to measure
a) similarity or dissimilarity between classes b) dissimilarity between classes
c) dissimilarity between classes d) none of mentioned

81- Contourlet transform successfully improves edges in
a) both location and direction b) location c)direction d) None of mentioned

82- Bi-level thresholding is employed on images which have
a) bimodal histograms b) multimodal histogram c) histogram d)None of mentioned

83- In multilevel thresholding, the image is partitioned into different segments using
a) multiple threshold value b)single threshold value c)none of the mentioned

84- The fundamental drawback of histogram-based region detection is that histograms provide
a)no spatial information b)spectral information c)spatial and spectral d)none of mentioned

85- If f(x,y) is an image function of two variables, then the first order derivative of a one dimensional function, f(x) is:
a) f(x+1)-f(x) b) f(x)-f(x+1) c) f(x-1)-f(x+1) d) f(x)+f(x-1)

86-The image in Fig. 12.a) is, most probable, obtained from:
a) The image in Fig. 12.b), after an edge detection
b) Subtracting, pixel by pixel, the image in Fig. 12.c) from the image in Fig. 12.b)
c) The segmentation through amplitude thresholding of the image in Fig. 12.b)
d) The image in Fig. 12.d), after an edge detection

87-In a dark image, the components of histogram are concentrated on which side of the grey scale?
a) High b) Medium c) Low d) Evenly distributed

88-An image contains noise having appearance as black and white dots superimposed on the image. Which of the following noise(s) has the same appearance?
a) Salt-and-pepper noise b) Gaussian noise c) All of the mentioned d) None of the mentioned

89-Sudden changes in intensity produces peak in
a) first derivative b) second derivative c)third derivative d)Both A and B

90-The edges and other abrupt changes in gray-level of an image are associated with_____
a) High frequency components b) Low frequency components
c) Edges with high frequency and other abrupt changes with low frequency
d) Edges with low frequency and other abrupt changes with high frequency

91-The Image sharpening in frequency domain can be achieved by which of the following method(s)?
a) Attenuating high frequency b) Attenuating low-frequency
c) All of the mentioned d) None of the mentioned

92- k-means classification is
a) supervised learning algorithm b) unsupervised learning algorithm.
c)semi-supervised learning algorithm d) weakly supervised learning algorithm

93- Unsupervised classification can be termed as
a)distance measurement b)dimensionality reduction c)clustering d) none of the above

94-What is the Second Derivative of Image Sharpening called?
a) Gaussian b) Laplacian c) Canny d) None of the mentioned

95-What is the basis for numerous spatial domain processing techniques?
a) Transformations b) Scaling c) Histogram d) None of the Mentioned

96-Which of the following method is/are used for padding the image?
a) Adding rows and column of 0 or other constant
b) Simply replicating the rows or columns
c) All of the mentioned d) None of the mentioned

97- Edge detection is based on
a)abrupt changes b)smooths changes c)thickness of edges d)thinness of edges

98- Sobel gradient is not that good for detection of
a)horizontal lines b)vertical lines c)Diagonal lines d)edges

99- Computation of derivatives in segmentation is also called
a)spatial filtering b)frequency filtering c)low pass filtering d)high pass filtering

100-The edges and other abrupt changes in gray-level of an image are associated with_____
a)High frequency components b) Low frequency components

c) Edges and other abrupt changes with low frequency components
d) Edges and other abrupt changes with high frequency components

101-The edges and other abrupt changes in gray-level of an image are associated with
a) High frequency components b) Low frequency components
c) Edges with high frequency d) Edges with low frequency

102- Sobel gradient is not that good for detection of
a) horizontal lines b) vertical lines c) Diagonal lines d) edges

103-Edge detection in images is commonly accomplished by performing a spatial -----
of the image field.
a) Smoothing Filter b) Integration c) Differentiation d) Min Filter

104- Regions of image must be
a) joint b)disjoint c)connected d)overlapped

105-Image having gradient pixels is called
a) sharp image b)blur image c) gradient image d)binary image

106- Both the -------- and ---filters are used to enhance horizontal edges (or vertical if transposed).
a) Prewitt and Sobel b) Sobel and Gaussian c) Prewitt and Laplacian d) Sobel and Laplacian

107-If the images are displayed using 8-bits, then, what is the range of the value of an image if the image is a result of subtraction operation?
a) 0 to 255 b) 0 to 511 c) -255 to 0 d) None of the mentioned

108-The Laplacian is which of the following operator?
a) Nonlinear operator b) Order-Statistic operator c) Linear operator d) None of the mentioned

109- Sobel gradient is not that good for detection of
a)horizontal lines b)vertical lines c)Diagonal lines d)edges

110- If F is an image with average gray value of 10. What is the average gray value of the image G obtained by convolving F with:

$$\begin{bmatrix} 2 & 2 & 2 \\ 2 & 2 & 2 \\ 2 & 2 & 2 \end{bmatrix}$$

a)G=20 b)G=10 c)G=2 d)none of the mentioned

111- Which of the following techniques is based on the Fourier transform?
a) Structural b) Spectral c) Statistical d) Topological

112- Gradient have some important features. Which of the following is/are some of them?
a) Enhancing small discontinuities b) Enhancing prominent edges
c) All of the mentioned d) None of the mentioned

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State which of the following statements are true or false [8 Marks]

113-Edges in images are located in the extremes of frequency spectra, while noise is located at the middle of spectra?

a) True b) False

114-Fourier transform is considered as lossless transform since the image can be transformed into frequency domain and re-transformed back without any loose in information.

a) True b) False

115-Passes low frequency while attenuating medium frequency is a function of Low Pass Filter.

a) True b) False

116- Wavelet transform is better than Fourier Transform in terms of detecting small frequencies that Fourier transform can not

a) True b) False

117- Fourier Transform is not suitable for non-stationary signal since no time information is introduced.

a) True b) False

118- Noise reduction is obtained by blurring the image using smoothing filter.

a) True b) False

119-Image differentiation enhances the edges, discontinuities and deemphasizes the pixels with slow varying grey levels.

a) True b) False

120- Contourlet successfully improves edges in both location and direction

a) True b) False

Good Luck

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