Level: Bachelor

Semester: Fall

Year

: 2019

Programme: BE

Course: Image Processing and Pattern Recognition

Full Marks: 100 Pass Marks: 45

Time : 3hrs.

Candidates are required to give their answers in their own words as far as practicable.

The figures in the margin indicate full marks.

Attempt all the questions.

- 1. a) Define digital image processing? How is an image transformed into 8 Grey level image? Explain with an example and pseudo code.
 - b) What is zooming? Illustrate with an example by interpolation and 7 replication.
- 2. a) Compute the histogram equalization from the given data.

8

Input Image: - 4x4 Image

Gray Scale=[0,9]

-

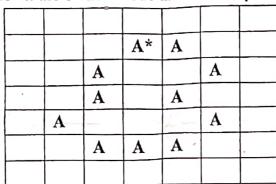
2	3	3	2
4	2	4	3
3	2	3	5
2	4	2	4

- b) Write algorithm of Haar Transform. Compute the Haar 7 Transformation for the order N=2.
- 3. a) What is histograms equalization? Write the algorithm and pseudo 8 code for histogram equalization with suitable example.
 - b) List out some importance noise probability density functions used in 7 image processing and sketch their plots.
- 4. a) What do you mean by predictive coding in image compression? 8
 Briefly explain the algorithm for lossy predictive coding using 7
 feedback.
 - b) With necessary figures, explain the opening and closing.
- 5. a) Construct Huffman code for each gray level and find the compression 8

ratio and coding efficiency.

Gray	0	1	2	3	4	5	6	7
Level								
No. of	113	139	142	145	181	105	50	1323
pixels								

- Explain Segmentation by thresholding with its feature thresholding and Amplitude thresholding.
- 6. a) How can you detect edges with gradient filters? Give different first order derivative based (gradient) filters.
 - b) Given an image, "A" represents its pixel position. If A* is the starting pixel, write down the 8-chain code and find shape number of it.



- 7. Write short notes on: (Any two)
 - a) Neural Network
 - b) Learning in perception network
 - c) Dilation and Erosion

		Level: Bachelor Programme: BE Course: Image Processin	Semester: Spring	Year: 2018 Full Marks: 100 Pass Marks: 45 Time: 3hrs.	
		Candidates are required as practicable.	l to give their answers in the	ir own words as far	
		The figures in the margi	n indicate full marks.		
	•	Attempt all the question	I.S.	"	
1.	a)	Define Digital Image Prosteps in DIP with block	rocessing. Also discuss the diagram.	various fundamental	8
	b)	Discuss the importance for histogram equalizati	of histogram modelling. Exon.	xplain the algorithm	7
2.	a)	Explain the term interaction adaptive median filter	nsity level slicing and bit play with suitable algorithm for it	0 1 "	.7
	b)		Orward and inverse Discrete What are the properties of DF		8
3.	a)	Define Hadamard Trans Hadamard Transform.	sform and derive the 8x8 trai	nsform matrix for	8
	b)	Explain about the nois occurring in an image c	se restoration model. How an be removed?	the periodic, noise	7
4.	a)	generate the symbol s1 p1=0.4, p2=0.2, p3=0.2	That are image compression, s2, s3, s4, s5 randomly with 2, p4=0.1 and p5=0.1 respectable using Huffman coding.	h probability	8
	b)	Discuss the important Predictive coding with	ce of image compression block diagram	. Explain lossless	7
5.	a)	With necessary figures	s, explain the opening and cl	osing.	8
	b)	How can you detect e order derivative based	edges with gradient filters? (gradient) filters.	Give different first	7

6.	a)	What do you understand by image segmentation? How discontinuity based segmentation approach is performed in image? Explain.	8
	b)	What is pattern and pattern classes? How is an object recognized by minimum distance classifier?	7
7.	Wr	ite short notes on: (Any two)	2×5
	a)	Pattern Recognition	

- Fourier Descriptor
- c) Bayesian Classifier

Semester: Fall

: 2017

Year

Level: Bachelor Full Marks: 100 Programme: BE Pass Marks: 45 Course: Image Processing and Pattern Recognition : 3hrs. Time Candidates are required to give their answers in their own words as far as practicable. The figures in the margin indicate full marks. Attempt all the questions. What is digital image? How is it represented? Explain briefly about 8 a) the elements used in image processing? What do you mean by distance measures in image processing system? 7 b) Explain with types. Define Point Operation. Explain the technique used by Bit plane 8 2. intensity level slicing for the purpose of image enhancement. 7 What is histogram? What is the importance of histogram modeling in image processing? Given the following gray level of an image. Compute the gray levels after histogram equalization. 7 5 6 Grey Level 2 3 1 () 245 122 81 65 329 850 Frequency 1024 790 Differentiate between Spatial domain enhancement and Frequency 7 3. domain enhancement. Mention the properties of Fourier transform 8 Explain different technique used to sharpen an image. Explain b) Hadamard Transform. Compare different types of Noise in terms of Spatial and frequency 8 a) Properties. Suggest Corresponding filtering techniques for each type of Noise. Explain the basic concept of differential predictive coding in terms of 7 b) lossless coding with suitable figure. Define Dilation, Erosion, Opening and Closing. Choose different 5. a) 8 objects and structuring elements to show the result of these operations. What is region based segmentation? Explain the types of region b) 7 segmentation. 1

		The American Explain Hough	8
6.	(a)	Explain edge detection techniques with its assumption. Explain Hough	
			7
	b)	What is pattern recognition? How does pattern/image is recognized by	
	-	a computer?	2×5
7.	Wri	te short notes on: (Any two)	_
	a)	Hopfield Network	
	b)	Run Length Coding	
	۵)	Chang number and chain codes	

Level: Bachelor

Semester:Fall

Year : 2020

Programme:BE

Full Marks: 100

Course: Image Processing and Pattern Recognition

Pass Marks: 45 Time : 3hrs.

8

Candidates are required to give their answers in their own words as far as practicable.

The figures in the margin indicate full marks.

Attempt all the questions.

- 1. a) What is a digital image? Explain spatial resolution and intensity level 7 resolution with examples.
 - b) State different types of Gray Level Transformations. Explain any 8 three of them in brief.
- 2. a) Given below are gray level frequencies of a 3 bit image. Equalize the 7 histogram over the range.

Gray Level (I)	0	1	2	3	4	5	6	7
Frequency n(I)	32	160	128	512	192	256	704	64

b) Perform Haar trans form and its Inverse for 4x4 image given below.

- 3. a) What are the steps involved in frequency domain filtering? Explain 7 the essential properties of 2-D Discrete Fourier Transform?
 - b) Compare image enhancement and image restoration. Explain different noise models in an image with their probability density functions.
- 4. a) Construct Huffman coding for each gray level and find compression 8 ratio and coding efficiency:

Gray level(r)	0	1	2	3	4	5	6	7
Frequency N _r	500	200	250	100	250	500	150	50

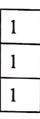
b) Differentiate between loss less and Lossy Compressions.

7

5. a) Find Dilation and Erosion for the following image A and structuring element B.

0	0	0	0	0	0
0	0	1	1	0	0
0	1	1	1	1	0
0	0	1	1	0	0
0	0	0	0	0	0

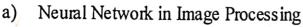
A



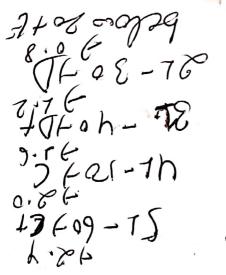
B

- b) Explain basic global thresholding and region splitting in image 8 segmentation with example.
- 6. a) Describe Edge Detection method for Image Segmentation 7
 - b) Define Chain codes. Explain 4 and 8-connectivity segments to explain 8 chain codes with suitable examples.
- 7. Write short notes on: (Any two)

2×5



- b) Pattern recognition in Image
- c) Spatial low pass filter.



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The figures in the margin indicate full marks.

Attempt all the questions.

- What is a digital Image? Explain the fundamental steps in Digital 1. a) Image Processing.
 - Compute the histogram equalization from the given data. b)

	0	1	2	3	4	5	_6	7
r_k	5320	1000	500	525	1236	956	128	856
n_{ν}	3320	1000	200			1 .1		<u> </u>

- What is zooming? Illustrate with an example the concept of zooming 2. a) by interpolation and replication.
 - What are the basic steps for filtering an image in frequency domain? b) Elaborate with examples.
- Calculate Haar transform T from given image matrix F. 3. a)

8

8

F=

1	0	0	1
1	1	0	1
1	0	1	0
1	0	1	1

- Explain the noise degradation and restoration model with necessary b) diagram in detail.
- Define Redundancy. Suppose a source generates the symbols s1, s2, 4. s3, s4, s5 randomly with probability p1=0.4, p2=0.2, p3=0.2, p4=0.1 and p5=0.1 respectively. Generate the code-word for each symbol using Huffman coding and also calculate entropy and efficiency.
 - Explain Lossy Predictive Coding along with required equations and b) suitable block diagram.
- 8 Compare and explain the process of Dilation and Erosion in image 5. a) processing with necessary equations and suitable figures.

	b)	Explain image segmentation by Threshold method.	7
6.	a)	explain the region growing technique for image segmentation. Whe are the problems associated with it?	
	b)	What is neural network? Explain how it can be used for patter recognition.	rn 7
7	Wri	rite short notes on: (Any two)	2×5
1.	a)	Pattern recognition system	
	b)	Shape number	
	c)	Decision Theoretic Method	

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