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Question Paper Code: 99215

B.E./B.Tech. DEGREE EXAMINATION, NOV 2023

Professional Elective

Computer Science and Engineering

19UCS915 - IMAGE PROCESSING

(Régulations 2019)

Duration: Three hours

Maximum: 100 Marks

Answer All Questions

PART A - (10 x 2 = 20 Marks)

1. Define sampling and quantization CO1 -U
2. Find the RGB coordinate of a color at (0.25, 0.5, and 0.75) in CMY space. CO1 -App
3. What is the difference between spatial and frequency domains in filtering? CO1- U
4. List the different types of spatial filters CO1- U
5. How the spatial domain signal is converted into frequency domain? CO1- U
6. Write a matlab code for median filter. CO1 -App
7. What is image segmentation? CO1- U
8. Enumerate the steps in the region growing algorithm. CO1- U
9. What are the five morphological operations? CO1- U
10. What are the advantages of morphological image processing? CO1- U

PART – B (5 x 16= 80 Marks)

11. (a) Use the following components R= 24, G=98 and B=118 and CO2- App (16)
convert into HSI component, CMY, YIQ

Or

- (b) Consider the two image subsets S1 and S2 shown below. For $V=\{1\}$, determine how many 4-connected, 8-connected, m-connected Components there are in S1 and S2. Are S1 and S2 adjacent? CO2 -App (16)

	S_1					S_2				
0	0	0	0	0	0	0	0	1	1	0
1	0	0	1	0	0	0	1	0	0	1
1	0	0	1	0	0	1	1	0	0	0
0	0	1	1	1	0	0	1	1	1	1
0	0	1	1	1	0	0	1	1	1	1

12. (a) Consider the following image and perform different types of basic gray level transformation -Logarithmic($c=1$ and $c=L/\log_{10}(1+L)$)
Power -low ($\Gamma=0.5$)
Digital negative CO1-U (16)

[4	4	4	4	4]
	3	4	5	4	3	
	3	5	5	5	3	
	3	4	5	4	3	
	4	4	4	4	4	

Or

- (b) Obtain Histogram and Histogram equalization for a given image (4 x 4) – 4 bit per pixel is given by CO1-U (16)

(i)

4	3	5	2
3	6	4	6
2	2	6	5
7	6	4	1

(ii)

10	12	8	9
10	12	12	14
12	13	10	9
14	12	10	12

13. (a) Convert the given spatial domain image using Fourier transform and perform Ideal low pass filter to smoothen the image choose D_0 as 0.5. Show the step by step procedure for doing the same. CO2 -App (16)

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

Or

- (b) Convert the given spatial domain image using Fourier transform and perform Gaussian low pass filter to smoothen the image choose D_0 as 0.5. Show the step by step procedure for doing the same. CO2 -App (16)

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

14. (a) Construct the Huffman code for the given image CO2- App (16)

4	4	4	4	4
3	4	5	4	3
3	5	5	5	3
3	4	5	4	3
4	4	4	4	4

Or

- (b) Detect edge in the following image using strength (Magnitude) and direction of gradient. Use prewitt operator. Find an edge in horizontal direction. $(M_x(x,y)=$ CO2- App (16)

-1	-1	-1
0	0	0
1	1	1

$f(x,y)=$

0	30	60
5	32	62
10	38	64

15. (a) Explain the morphological transform that uses morphological CO1- U (16)

erosion operation for detecting a given pattern in an image

Or

- (b) Explain about region filling for morphological processing with a suitable example CO1- U (16)