Code No: 157BF

R18

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B. Tech IV Year I Semester Examinations, July/August - 2023
DIGITAL IMAGE PROCESSING
(Electronics and Communication Engineering)

Time: 3 Hours **Max. Marks: 75**

Note: i) Question paper consists of Part A, Part B.
ii) Part A is compulsory, which carries 25 marks. In Part A, Answer all questions.
iii) In Part B, Answer any one question from each unit. Each question carries 10 marks and may have a, b as sub questions.

PART – A (25 Marks)

1.a) How to represent an image? [2]
b) What is the neighborhood criterion? Write some examples. [3]
c) What is the main difference between brightness correction and gray-scale transformation? [2]
d) Why the histogram of a discrete image is not flat after histogram equalization? [3]
e) What is restoration? [2]
f) What are the causes of degradation of an image? [3]
g) Write the masks for Roberts and Sobel operators. [2]
h) Why smoothing typically blurs image edges? [3]
i) What are symmetric and asymmetric image compression applications? [2]
j) What are the four compression modes available in the JPEG compression standard? [3]

PART – B (50 Marks)

2.a) Discuss the various factors that influence the brightness of a pixel in an image.
b) Define the following metrics with respect to image:
(i) Euclidean (ii) city block (iii) chessboard [4+6]

OR

3.a) Determine the Slant transform for the following image segment:

$$\begin{bmatrix} 1 & 2 & 4 & 1 \\ 2 & 1 & 3 & 5 \\ 4 & 2 & 5 & 6 \\ 6 & 5 & 3 & 2 \end{bmatrix}$$

b) How Haar transform is used in image processing? [6+4]

4.a) Determine how much smoothing is necessary to suppress turning points in the histogram due to small-scale image effects.
b) How point processing is used for image enhancement and explain with examples [5+5]

OR

5. Write a different filter masks used for image smoothing and sharpening in frequency domain? What are advantages of them compared to time domain image processing? [10]

6. How image restoration techniques are classified? Explain and compare them. [10]

OR

7.a) Show that an inverse filtering works well for images that are not corrupted by noise.

b) Explain the principles of image restoration based on Wiener filtration [5+5]

8.a) What are the different methods are there to find the line in an image? Explain them.

b) Explain why LoG is a better edge detector than Laplace edge detector? [5+5]

OR

9.a) How to smoothen the image? Explain any two methods in detail.

b) What are the Hit or Miss transformations? How these operators are used in an image processing? [5+5]

10.a) What is fidelity criterion? How it is useful in Image processing?

b) Derive the relation between redundancy and compression ratio. Explain the significance of compression ration in an image processing. [5+5]

OR

11. Explain lossless and lossy predictive coding for image compression and compare them.[10]

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