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18EC733

Seventh Semester B.E. Degree Examination, July/August 2022

Digital Image Processing

Time: 3 hrs.

Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

- 1 a. With a neat diagram, explain how image is acquired using sensor strip. (07 Marks)
- b. Find the time required to transmit a monochrome image of size $2.5'' \times 2''$ scanned at 150 DPI sent at 28kilo bits per second. (03 Marks)
- c. Explain fundamental steps in digital image processing using a block diagram. (10 Marks)

OR

- 2 a. Explain how image is formed in human eye. Suppose a camera is focused at a pillar of height 10m situated 50m away. Find the height of the image produced in camera if the focal length of the camera is 17mm. (08 Marks)
- b. Explain false contouring and checker board effect in image processing. How these effects can be minimized. (06 Marks)
- c. Explain in detail five fields that use digital image processing. (06 Marks)

Module-2

- 3 a. Using second derivative, develop a Laplacian mask for image sharpening. (08 Marks)
- b. What is histogram equalization? Show that equalization yields a flat response. (06 Marks)
- c. With necessary equations and graphs, explain the following : (06 Marks)
 - i) Lag transformation
 - ii) Bit plane slicing
 - iii) Contrast stretching.

OR

- 4 a. When is averaging filter? Explain two types of averaging filters with suitable masks. (10 Marks)
- b. Histogram of a eight level image of size 64×64 is shown below. Draw the histogram of equalized image.

K	0	1	2	3	4	5	6	7
N_K	123	78	281	417	639	1054	816	688

(10 Marks)

Define :

- i) Neighbours pixels
- ii) Connectivity of pixels
- iii) Distance measure.

Module-3

- 5 a. With the help of neat diagram, explain steps involved in frequency domain filtering. (08 Marks)
- b. List and explain any three properties of 2D – DFT. (06 Marks)
- c. With the expression of transfer function explain Laplacian in frequency domain. (06 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and /or equations written eg. 42+8 = 50, will be treated as malpractice.

OR

- 6 a. With a neat diagram, explain homomorphic filtering approach for image enhancement. What are advantages of these filters? (10 Marks)
- b. Explain smoothing of images in frequency domain using :
- Ideal low pass filter
 - Butterworth low pass filter
 - Gaussian low pass filter.
- (10 Marks)

Module-4

- 7 a. With necessary equations and graphs, explain any four noise probability density functions. (08 Marks)
- b. What are adaptive filters? Explain adaptive mean filter and its advantages. (08 Marks)
- c. What are order statistics filters? (04 Marks)

OR

- 8 a. Define the process of image restoration how is restoration different from enhancement. (08 Marks)
- b. Explain minimum mean square error (Wiener) filtering in image processing. (08 Marks)
- c. Explain how restoration is done in presence of only noise. (04 Marks)

Module-5

- 9 a. With the help of equations, explain how HSI color model is converted to RGB color model. (08 Marks)
- b. Explain reflection and translation of a set with respect to morphological image processing. (06 Marks)
- c. What is pseudo color image processing? Explain any one method of pseudo color image processing. (06 Marks)

OR

- 10 a. Explain RGB color model in detail. (10 Marks)
- b. Explain erosion and dilation operations for morphological image processing with the help of an example. (10 Marks)

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