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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 :
      i) Lag transformation
      ii) Bit plane slicing
      iii) Contrast stretching. **(06 Marks)**

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)**

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 :
   i) Ideal low pass filter
   ii) Butterworth low pass filter
   iii) 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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