ELH 501

Third Semester M.Sc. Degree Examination, December 2018/January 2019
(CBCS Scheme)
ELECTRONICS
Digital Image Processing

Time : 3 Hours   Max. Marks : 70

PART – A

Answer **all** questions.   **(5×2=10)**

1. a) What is the need for image processing ? Mention any two applications of digital image processing.

   b) Name the light receptors of human visual system. Among these, mention the receptors that are responsible for photopic vision.

   c) Write a 3 × 3 Prewitt mask and mention the advantage of using Sobel mask over Prewitt mask in image segmentation.

   d) Write the principle of inverse filtering used for image restoration.

   e) What is pseudocolour processing ? What is the use of it ?

PART – B

(3×20=60)

2. a) Explain the brightness adaptation and discrimination feature of human visual system.

   b) With a neat sketch explain the distribution of light receptors in the human eye.

   c) With relevant expression and illustrative example, define 4-adjacency, 8-adjacency, mixed-adjacency, digital path and connected component with respect to a digital image.   **(6+6+8)**

OR

P.T.O.

3. a) What is image enhancement ? Write a note on power law transformation used for image enhancement.

   b) What is histogram equalization ? Perform the histogram equalization for an image with 8 distinct intensity levels, r = 0, 1, 2, . . ., 7 and PDF of the image is $P_r(0) = 0$, $P_r(1) = P_r(2) = 0.2$, $P_r(3) = 0.3$, $P_r(4) = P_r(5) = 0$, $P_r(6) = 0.3$ and $P_r(7) = 0.1$.

   c) Distinguish between linear and non-linear spatial filters and then write a brief note on min-filtering a digital image.   **(6+8+6)**

4. a) What is image restoration ? With the functional block diagram, explain the image restoration process.

   b) With a relevant flow diagram, explain the procedure of homomorphic filtering of an image.

   c) Define 2D-DFT and hence find the 2D-DFT of a 4 × 4 image.   **(7+7+6)**

                    OR

5. a) Define arithmetic mean filter. Filter image C in spatial domain using arithmetic mean filter of size 3 × 3.

   b) With relevant expressions explain the Wiener filtering method of restoring the degraded images.

   c) Write a note on salt and pepper noise.   **(8+7+5)**

6. a) Explain the procedure of detecting isolating point in an image by using Laplacian mask.

   b) What is image gradient ? Explain the procedure of generating the gradient image using Sobel mask.

   c) Write a note on RGB colour model.   **(7+7+6)**

                    OR

7. a) Explain the procedure of edge detection in colour images.

   b) Explain the erosion and dilation operations used in image processing.

   c) Explain the procedure of boundary extraction in a digital image.   **(8+6+6)**

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