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18SCS254

Second Semester M.Tech. Degree Examination, June/July 2019
Advances in Digital Image Processing

Time: 3 hrs. Max. Marks: 100

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

Module-1

1 a. What is digital image processing? Explain any two fields that uses digital image processing **(10 Marks)**

b. With a Block diagram, explain the fundamental steps in digital image processing. **(10 Marks)**

OR

2 a. Describe the Image sampling and Quantization process. **(05 Marks)**

b. Explain simple Image formation model. **(05 Marks)**

c. Consider the two image subsots S_1 and S_2 shown in the following Fig Q2(c). For V = {1}, determine whether these two subsots are i) 4-adjacent ii) 8-ajacent or iii) m-adjacent

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

Fig Q2(c) **(05 Marks)**

d. Explain the different relationship between pixels in digital image processing. **(05 Marks)**

Module-2

3 a. How arithmetic and logical operations are applicable in an image enhancement? **(08 Marks)**

b. Explain spatial image smoothing operations, why it is Required. **(06 Marks)**

c. Describe image histogram and histogram equalization and use of equalization. **(06 Marks)**

OR

4 a. What is spatial filtering? Compare smoothing and sharpening in spatial domain. **(10 Marks)**

b. Derive and explain the two dimensional discrete Fourier transform and its inverse? **(10 Marks)**

Module-3

5 a. Explain the image degradation model, with a neat diagram. **(05 Marks)**

b. Explain Weiner filter (minimum mean square error). **(05 Marks)**

Describe the various noise model available, Draw the noise probability density function. **(10 Marks)**

OR

6 a. Explain in brief, the three principal ways to estimate the degradation function for use in image restoration. **(10 Marks)**

b. Explain the brief Inverse filtering and geometric mean filter. **(10 Marks)**

Module-4

7 a. Discuss the functional block diagram for pseudocolor image processing. **(10 Marks)**

b. Explain RGB and HSI color models, how HSI to RGB conversion is done? **(10 Marks)**

OR

8 a. Explain a general image compression system with a functional block diagram. **(08 Marks)**

b. What are different image compression methods? Explain two different image compression models. **(08 Marks)**

c. i) Compute the Haar transform of the 2 × 2 image $f(x, y) = \begin{bmatrix} 2 & -3 \\ 5 & 4 \end{bmatrix}$

ii) The inverse Haar transform is $F = H^T T H$, where T is the Haar transform of F and H^T is the matrix inverse of H. Show that $H_2^{-1} = H_2^T$ and use it to compute the inverse Haar transform of the result in (i) **(04 Marks)**

Module-5

9 a. Explain dilation and erosion process in image morphology. **(06 Marks)**

b. Explain matching scheme for edge detection. **(06 Marks)**

c. Explain region growing and region splitting merging scheme of region based segmentation. **(08 Marks)**

OR

10 a. Discuss with neat diagram, the important operations opening and closed in morphological. **(10 Marks)**

b. Explain the Hit – or – miss transformation. **(05 Marks)**

c. Explain Boundary extractions in brief. **(05 Marks)**

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