Marathwada Institute of Technology
Computer Science & Engineering
Year 2015-16

Class: TE CSE Sem-I
Subject: Digital Image Processing
Subject In charge: Prof. L. B. Randive

Unit 1
Digital Image Fundamental

2 Marks Questions

1) Define Digital Image Processing & Image elements?
2) What are different arithmetic and logical operations applicable to images?
3) Define Sampling & Quantization?
4) Define Neighbors of a pixel?
5) What is digital path & region?
6) What are the components of Digital Image Processing system?
7) What is image transform?
8) What is digital image?
9) What is image sensing and digitization?
10) Explain the term subjective brightness, brightness adaptation?
11) What is image negative?
12) What is log transformation?
13) Give the expression for Euclidean & D4 distance measures.
14) What is image histogram?
15) What is need of image transform? Define DFT.
16) Find the number of bits required to store a 256x256 image of 32 gray levels (i.e. A 5-bit Image)

7 to 8 Marks Question

1. With neat block diagram explain the fundamental steps involved in digital image processing?
2. How an image can be enhanced by the following intensity transformation:
   a. Gray level slicing
   b. Bit plane slicing
   c. Contrast Stretching

Prepared By

Prof. L. B. Randive

3. What is image histogram? Derive the histogram equalization $S_k = \sum P_r(r_j)$
4. Write Short note on

a. Histogram Equalization

b. Image Sampling and Quantization

c. Adjacency and connectivity between pixels

d. Neighbour of pixels

e. Application of image transforms

f. Distance Measure

5. What is image histogram? If all the pixels in an image are shuffled, will there be any change in the histogram? Justify your answer
6. Explain distance measures along with suitable examples.
7. Consider the two image subsets S1 and S2 shown in figure for v={1}, determine whether the two subsets are

   I) 4- Adjacent

   II) 8- Adjacent

   III) m-Adjacent

Prepared By

Prof. L. B. Randive

Marathwada Institute of Technology
Computer Science & Engineering
Year 2015-16

Class: TE CSE Sem-I
Subject: Digital Image Processing
Subject Incharge: Prof. L. B. Randive

Unit 2
Image Enhancement

2 Marks Questions

1. What is difference between spatial and frequency domain?
2. Explain the purpose of Image enhancement.
3. Define first order gradient derivative operator.
4. Give the mask used for high boost filtering.
5. What is unsharp masking? Give its expression
6. What is purpose of image averaging?
7. Differentiate between low pass and high pass filters.
8. What is the role of image enhancement step? How it differs from image restoration?
9. What is mean filter? Why it is known as a linear spatial filter.

7 to 8 Marks Questions

1. What is image filtering? Explain basic steps for filtering in frequency domain. Give transform function for all low-pass filters
2. Explain different linear and non linear smoothing spatial filters with suitable examples.
3. What are the different image sharpening spatial filters? Explain any application of sharpening filter in brief.
4. Explain image enhancement in frequency domain along with filter transfer function for each of the low pass filter.
5. A 4x4, 4 bits/pixel original image is given by

10	12	8	9
10	12	12	14
12	13	10	9
14	12	10	12

i. Apply histogram equalization to the image by rounding image pixels to integers

ii. Sketch the histogram of the original image and histogram equalized image

6. Explain low pass filter and high pass filter in detail.

7. Consider an image that uses a window of size 5x5. The gray level values inside the 5x5 sub image are 15,17,15,17,16,10,8,9,18,15,16,12,14,16,12,14,11,15,14,15,11,100,15,14,13,12,12,17 What values could

a. A local averaging filter(Mean)

b. A median filter

c. A mode filter

d. A max filter

e. A min filter

Assign to the central pixel of this sub image

8. Elaborate different derivative based image sharpening filters.

9. With suitable example explain median, mode, max and min filters. Why are they called as order statistics filters?

10. Elaborate how first and second order derivatives are used for image enhancement purpose.

11. Write short note on

1. Order statistics
2. Sharpening spatial filter.
3. Noise models

Prepared By

Prof. L. B. Randive

Marathwada Institute of Technology
Computer Science & Engineering
Year 2015-16

Class: TE CSE Sem-I
Subject: Digital Image Processing
Subject Incharge: Prof. L. B. Randive

Unit 3
Image Compression

2 Marks Questions

1. What is a fidelity criterion?
2. What is entropy?
3. What is image compression?
4. Define DCT and its inverse.
5. Define coding redundancy.
6. What is compression ratio and relative data redundancy?
7. What is variable length coding?
8. What is need for compression?
9. Define source encoder.
10. What is data redundancy?
11. What is uniquely decodable code?
12. Differentiate between subjective and objective fidelity criteria.

7 to 8 Marks Questions

1. What is Huffman coding? Why it is calls as variable length coding? Justify with example.
2. With the help of a block diagram explain image compression model.
3. What do you mean by loss-less compression? Explain LZW coding techniques with suitable example.
4. What is redundancy? Explain different types of redundancies.
5. With help of a neat block diagram explain how compression is achieved in transform coding system. What is role of DFT in transform coding?
6. Explain different types of image compression standards.
7. Discuss run length encoding with suitable example. How does it removes inter pixel redundancy?
8. Explain the LZW coding technique with suitable example.
9. Write Short note on
   1. Interpixel Redundancy
   2. Binary image compression standards
   3. Tiff image file format
   4. Fidelity Criteria
   5. Image compression model
   6. Run length encoding

Prepared By

Prof. L. B. Randive

Marathwada Institute of Technology
Computer Science & Engineering
Year 2015-16

Class: TE CSE Sem-I
Subject: Digital Image Processing
Subject Incharge: Prof. L. B. Randive

Unit 4
Image Segmentation

2 Marks Questions

1. Define image segmentation.
2. Define divide line in watershed segmentation.
3. Give expression for first order derivative gradient operator
4. What is boundary?
5. What is region growing?
6. What is multilevel thresholding?
7. What is an edge?
8. Define quad tree.
9. What is meant by object point and background point?
10. What is role of seed point in region growing process?
11. Differentiate between global and local threshold.
12. Differentiate between region and boundary.
13. What is threshold?
14. Write a mask of sobel operator and laplacian operator.
15. Explain line detection.

7 to 8 Marks Questions

1. Apply split and merge technique to segment the image below, also represent quad tree representation of the segment.
2. Explain region growing technique of segmentation.
3. Describe seeded region growing segmentation techniques in detail.
4. Discuss edge detection process in image segmentation.
5. Explain region spilt and merge segmentation technique. How does it overcome the problem of region splitting?
6. Elaborate image segmentation using morphological watersheds.
7. Explain detection of discontinuities with reference edge detection.

Prepared By

Prof. L. B. Randive

8. Elaborate region growing method for image segmentation. How it differ from thresholding?
9. Design compass gradient operator of size 3x3 to measure gradient of edge oriented in eight direction E, NE, N, NW, W, SW, S and SE. Give the form of these eight operators using coefficient value 0, 1 or -1. Specify the gradient direction of each mask.
10. Write short note on
    1. Edge detection
    2. Point and line detection
    3. Multivariable Thresholding
    4. Application of image segmentation
    5. Local and global thresholding

Prepared By

Prof. L. B. Randive

Marathwada Institute of Technology
Computer Science & Engineering
Year 2015-16

Class: TE CSE Sem-I
Subject: Digital Image Processing
Subject Incharge: Prof. L. B. Randive

Unit 5
Morphological and Color Image Processing

2 Marks Questions

1. What is difference between full color and pseudo color image processing?
2. What is need of structuring element?
3. What is pruning?
4. What is image closing?
5. How does dilation produce thickening effect? Give example
6. How erosion produces thinning effect? Give example.
7. Define image opening and closing.
8. What is color complement?
9. Define brightness.
10. What is hue and saturation?
11. What is morphological image processing?
12. What is a structuring element? How it is used for dilation operation?

7 to 8 Marks Questions

1. Explain different color transformations.
2. How different color models can be used for different purposes? Elaborate with their diagram.
3. Explain the different color transformations
4. What do you understand by dilation and erosion in morphological image processing? Explain with example. Also give one suitable application for each.
5. How can hit-or-miss transformation be used for extracting specific pixel configuration in an image? Give suitable example
6. Discuss basic morphoanalytical algorithms for region filling with suitable example
7. Elaborate the morphological algorithm for thinning in detail along with boundary

Prepared By

Prof. L. B. Randive

extraction algorithm

8. Explain the RGB and HSI color model in brief.
9. Explain CMY color model used in Digital Image Processing.
10. Explain morphological reconstruction.
11. Perform dilation operation A + B

A=001000
000010
010010
001110
000111
000101

B=

1
1
1

12. Write short note on
    1. Erosion
    2. Color Transformation
    3. Morphological dilation and erosion
    4. The RGB color model
    5. Color models
    6. Hit-or-miss transformation
    7. Full color image processing

Prepared By

Prof. L. B. Randive

Marathwada Institute of Technology
Computer Science & Engineering
Year 2015-16

Class: TE CSE Sem-I
Subject: Digital Image Processing
Subject Incharge: Prof. L. B. Randive

Unit 6
Image Representation and Description

2 Marks Questions

1. What is chain code?
2. Define Skeleton
3. What is image representation?
4. Define signatures.
5. Define image description

7 to 8 Marks Questions

1. What is role of representation in DIP? Discuss different approaches for representation process.
2. What are the descriptor? How simple descriptors can be used for boundary des cription purpose?
3. Differentiate between boundary and regional descriptors.
4. How topological descriptors can be used for region description?
5. How does image representation deal with image boundary and region? What is role of chain codes in representation process?
6. What is the use of descriptors in DIP? How can shape numbers and Fourier descriptors be used for boundary description?
7. Explain simple boundary and region descriptor
8. What is image texture? What are different approaches to describe texture.
9. Write short note on

1. Boundary Descriptor
2. Skeletonization
3. Chain Code
4. Boundary representation techniques
5. Signatures

Prepared By

Prof. L. B. Randive

Prepared By

Prof. L. B. Randive