Anekant Education Society's

Tuljaram Chaturchand College of Arts, Science & Commerce College Baramati

Department of Computer Science

Class: M.sc.(Computer science) (Semester-II)

Subject:-Digital Image Processing **Paper Code:(CS-201)**

Question Bank

2Marks question

1 Define Image

2. What is Dynamic Range?

3. Define Brightness

5. What do you meant by Gray level?

6. What do you meant by Color model?

7. List the hardware oriented color models

8. What is Hue and saturation?

9. List the applications of color models

10. What is Chromatic Adoption?

12. What is meant by pixel?

13. Define Digital image

14. What are the steps involved in DIP?

17. List the categories of digital storage

18. Differentiate photopic and scotopic vision

19. How cones and rods are distributed in retina?

20. Define weber ratio

26. Define sampling and quantization

27. Find the number of bits required to store a 256 X 256 image with 32 gray levels

28. Write the expression to find the number of bits to store a digital image?

29. Write short notes on neighbors of a pixel.

30. What is meant by path?

31. Give the formula for calculating D_4 and D_8 distance.

32. What is geometric transformation?

33. Define the term Luminance

34. What is meant by masking?

35. What is the purpose of image averaging?

36. **List the 2 categories of image enhancement.**

37. What is meant by laplacian filter?

38Write the steps involved in frequency domain filtering.

39. Differentiate linear spatial filter and non-linear spatial filter.

40.Specify the concept of Spatial domain methods.

41. What do you mean by Point processing?

42. Define Derivative filter?

43. Define spatial filtering

44. What is a Median filter?

45. What is maximum filter and minimum filter?

46.Write the equation for 1-D DFT.

47. Define Fast Fourier Transform

48.Write the equations for 1-D Discrete Cosine Transform (DCT)

49 Write the equations for 2-D Discrete Cosine Transform (DCT)

50.What is Image Transform?

52. Define Fourier spectrum and spectral density

53. Specify the properties of 2D Fourier transform.

54. Specify the steps involved in splitting and merging?

55. Write the Basic Formulation of region based segmentation.

56. What is image compression?

57. What are two main types of Data compression?

58. What is the need for Compression?

59.What are different Compression Methods?

60. Define encoder

61Define channel encoder

62Define source encoder

63What is bit plane Decomposition?

64Draw the block diagram of transform coding system

MCQ

Digital Image Processing Questions and Answers – GaussainLowpass and Sharpening Frequency Domain Filters

This set of Digital Image Processing Multiple Choice Questions & Answers (MCQs) focuses on "GaussainLowpass and Sharpening Frequency Domain Filters".

1. If the Gaussian filter is expressed as H(u, v) = e(-D2 (u,v)/2D 02),where D(u, v) is the distance from point(u, v), D0 is the distance defining cutoff frequency, then for what value of D(u, v) the filter is down to 0.607 of its maximum value?

a) D(u, v) = D0

b) D(u, v) = D02

c) D(u, v) = D03

d) D(u, v) = 0

Answer: a

2 Explanation: For the given Gaussian filter of 2-D image, the value D(u, v) = D0 gives the filter a down to 0.607 of its maximum value.

2. State the statement as true or false. "The GLPF did produce as much smoothing as the BLPF of order 2 for the same value of cutoff frequency".

a) True

b) False

Answer: b

3 Explanation: For the same value of cutoff frequency, the GLPF did not produce as much smoothing as the BLPF of order 2, because the profile of GLPF is not as tight as BLPF of order 2.

3. In general, which of the following assures of no ringing in the output?

a) Gaussian Lowpass Filter

b) Ideal Lowpass Filter

c) Butterworth Lowpass Filter

d) All of the mentioned

Answer: a

4Explanation: Using Gaussian Lowpass Filter no ringing is assured, but Ideal Lowpass Filter and Butterworth Lowpass Filter of order 2and more produces significant ringing.

4. The lowpass filtering process can be applied in which of the following area(s)?

a) The field of machine perception, with application of character recognition

b) In field of printing and publishing industry

c) In field of processing satellite and aerial images

d) All of the mentioned

Answer: d

5 Explanation: In case of broken characters recognition system, LPF is used. LPF is used as preprocessing system in printing and publishing industry, and in case of remote sensed images LPF is used to blur out as much detail as possible leaving the large feature recognizable.

5. The edges and other abrupt changes in gray-level of an image are associated with_____

a) High frequency components

b) Low frequency components

c) Edges with high frequency and other abrupt changes in gray-level with low frequency components

d) Edges with low frequency and other abrupt changes in gray-level with high frequency components

Answer: a

6 Explanation: High frequency components are related with the edges and other abrupt changes in gray-level of an image.

6. A type of Image is called as VHRR image. What is the definition of VHRR image?

a) Very High Range Resolution image

b) Very High Resolution Range image

c) Very High Resolution Radiometer image

d) Very High Range Radiometer Image

Answer: c

Explanation: A VHRR image is a Very High Resolution Radiometer Image.

7. The Image sharpening in frequency domain can be achieved by which of the following method(s)?

a) Attenuating the high frequency components

b) Attenuating the low-frequency components

c) All of the mentioned

d) None of the mentioned

Answer: b

Explanation: The Image sharpening in frequency domain is achieved by attenuating the low-frequency components without disturbing the high-frequency components.

8. The function of filters in Image sharpening in frequency domain is to perform reverse operation of which of the following Lowpass filter?

a) Gaussian Lowpass filter

b) Butterworth Lowpass filter

c) Ideal Lowpass filter

d) None of the Mentioned

Answer: c

Explanation: The function of filters in Image sharpening in frequency domain is to perform precisely reverse operation of Ideal Lowpass filter.

The transfer function of Highpass filter is obtained by relation: Hhp(u, v) = 1 – Hlp(u, v), where Hlp(u, v) is transfer function of corresponding lowpass filter.

9. If D0 is the cutoff distance measured from origin of frequency rectangle and D(u, v) is the distance from point(u, v). Then what value does an Ideal Highpass filter will give if D(u, v) ≤ D0 andifD(u, v) >D0?

a) 0 and 1 respectively

b) 1 and 0 respectively

c) 1 in both case

d) 0 in both case

Answer: a

Explanation: Unlike Ideal lowpass filter, an Ideal highpass filter attenuates the low-frequency components and so gives 0 for D(u, v) ≤ D0 and 1 for D(u, v) >D0.

10. What is the relation of the frequencies to a circle of radius D0, where D0 is the cutoff distance measured from origin of frequency rectangle, for an Ideal Highpass filter?

a) IHPF sets all frequencies inside circle to zero

b) IHPF allows all frequencies, without attenuating, outside the circle

c) All of the mentioned

d) None of the mentioned

Answer: c

Explanation: An Ideal high pass filter gives 0 for D(u, v) ≤ D0 and 1 for D(u, v) >D0.

11. Which of the following is the transfer function of the Butterworth Highpass Filter, of order n, D0 is the cutoff distance measured from origin of frequency rectangle and D(u, v) is the distance from point(u, v)?

a)digital-image-processing-questions-answers-gaussain-lowpass-frequency-domain-filters-sharpening-q11

b)digital-image-processing-questions-answers-gaussain-lowpass-frequency-domain-filters-sharpening-q11a

c)digital-image-processing-questions-answers-gaussain-lowpass-frequency-domain-filters-sharpening-q11b

d) none of the mentioned

Answer: a

Explanation: The transfer function of Butterworth highpass filter of order n, D0 is the cutoff distance measured from origin of frequency rectangle and D(u, v) is the distance from point(u, v) is given by:digital-image-processing-questions-answers-gaussain-lowpass-frequency-domain-filters-sharpening-q11.

12. Which of the following is the transfer function of the Ideal Highpass Filter? Given D0 is the cutoff distance measured from origin of frequency rectangle and D(u, v) is the distance from point(u, v).

a)digital-image-processing-questions-answers-gaussain-lowpass-frequency-domain-filters-sharpening-q11

b)digital-image-processing-questions-answers-gaussain-lowpass-frequency-domain-filters-sharpening-q11a

c)digital-image-processing-questions-answers-gaussain-lowpass-frequency-domain-filters-sharpening-q11b

d) none of the mentioned

Answer: b

Explanation: The transfer function of Ideal highpass filter, whereD0 is the cutoff distance measured from origin of frequency rectangle and D(u, v) is the distance from point(u, v) is given by:digital-image-processing-questions-answers-gaussain-lowpass-frequency-domain-filters-sharpening-q11a.

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13. Which of the following is the transfer function of the Gaussian Highpass Filter? Given D0 is the cutoff distance measured from origin of frequency rectangle and D(u, v) is the distance from point(u, v).

a)digital-image-processing-questions-answers-gaussain-lowpass-frequency-domain-filters-sharpening-q11

b)digital-image-processing-questions-answers-gaussain-lowpass-frequency-domain-filters-sharpening-q11a

c)digital-image-processing-questions-answers-gaussain-lowpass-frequency-domain-filters-sharpening-q11b

d) none of the mentioned

Answer: c

Explanation: The transfer function of Gaussian highpass filter, where D0 is the cutoff distance measured from origin of frequency rectangle and D(u, v) is the distance from point(u, v) is given by:digital-image-processing-questions-answers-gaussain-lowpass-frequency-domain-filters-sharpening-q11b.

14. For a given image having smaller objects, which of the following filter(s), having D0 as the cutoff distance measured from origin of frequency rectangle, would you prefer for a comparably smoother result?

a) IHLF with D0 15

b) BHPF with D0 15 and order 2

c) GHPF with D0 15 and order 2

d) All of the mentioned

Answer: c

Explanation: For the same format as for BHPF, GHPF gives a result comparably smoother than BHPF. However, BHPF performance for filtering smaller object is comparable with IHPF.

15. Which of the following statement(s) is true for the given fact that “Applying Highpass filters has an effect on the background of the output image”?

a) The average background intensity increases to near white

b) The average background intensity reduces to near black

c) The average background intensity changes to a value average of black and white

d) All of the mentioned

Answer: b

Explanation: The Highpass filter eliminates the zero frequency components of the Fourier transformed image HPFs are applied on. So, the average background intensity reduces to near black.

4 Marks question

1.What is data redundancy? Explain three basic data redundancy?

2. What is image compression? Explain any four variable length coding compression schemes.
3.Definition of image compression

4. Explain about Image compression model?

5. The source Encoder and Decoder

6.The channel Encoder and Decoder

7. Explain about Error free Compression?

8. Explain about Lossy compression?

9. Explain the schematics of image compression standard JPEG.

10. Diffeentiate between lossless and lossy compression and explain transform coding system with a neat diagram.

11.What is the use of wiener filter in image restoration. Explain.

12.What is meant by Inverse filtering? Explain.

13.Explain singular value decomposition and specify its properties.

14.Explain image degradation model /restoration process in detail.

15. What are the two approaches for blind image restoration? Explain in detail.

16. Discuss about Constrained Least square restoration for a digital image in detail.

17. What is image restoration?Explain the degaradation model for continuous function in detail.

18. What is meant by Image Restoration?
19. What are the two properties in Linear Operator?
20. Explain additivity property in Linear Operator?
21. How a degradation process is modeled?

22. Explain homogenity property in Linear Operator?
23. Give the relation for degradation model for continuous function?
24. What is fredholm integral of first kind?
24. Define circulant matrix?
25. what is concept algebraic approach?
26. What are the two methods of algebraic approach?
27. Define Gray-level interpolation?
28. What is meant by Noise probability density function?
29 Why the restoration is called as unconstrained restoration?

30. Which is the most frequent method to overcome the difficulty to formulate the spatial relocation of pixels?

31. What are the three methods of estimating the degradation function?

32. What are the types of noise models?

33. Give the relation for rayleigh noise?

34. Give the relation for Gamma noise?

35. Give the relation for Exponential noise?

36. Give the relation for Uniform noise?

37. Write the properties of Singular value Decomposition (SVD)?

38. What is inverse filtering?

39. What is pseudo inverse filter?

40. What is meant by least mean square filter?

6 Marks or 8 Marks Questions

1**.** What is image segmentation. Explain in detail.
2. Explain Edge Detection and edge linking in detail?
3. Define Thresholding and explain the various methods of thresholding in detail?
4. Discuss about region based image segmentation techniques. Compare threshold region based techniques
5. Explain the two techniques of region segmentation.

6. Explain the segmentation techniques that are based on finding the regions directly.
7. How is line detected? Ex plain through the operators
8. Explain global processing using Hough transform
9. Discuss in detail about threshold selection based on boundary characteristics
8. Elaborate the process of dam construction along with the watershed segmentation algorithm
11. What is meant by optimal thresholding? How do you obtain the threshold for image processing tasks? Write morphological concepts applicable for image processing