Multiple Choice Questions & Answers

1. What is the Fourier transform of a continuous-time sinusoidal signal?

   A) Impulse function

   B) Another sinusoidal signal

   C) Zero signal

   D) Step function

   Answer: B) Another sinusoidal signal

2. Which of the following is a property of the Fourier transform?

   A) Linearity

   B) Time-invariance

   C) Causality

   D) Stability

   Answer: A) Linearity

3. Sampling theorem is used for:

   A) Converting continuous-time signals to discrete-time signals

   B) Converting discrete-time signals to continuous-time signals

   C) Filtering continuous-time signals

   D) Filtering discrete-time signals

   Answer: A) Converting continuous-time signals to discrete-time signals

4. The Nyquist rate is defined as:

   A) Twice the maximum frequency present in the signal

   B) Equal to the maximum frequency present in the signal

   C) Half the maximum frequency present in the signal

   D) A quarter of the maximum frequency present in the signal

Answer: A) Twice the maximum frequency present in the signal

5. Which of the following is a characteristic of an LTI (Linear Time-Invariant) system?

A) Nonlinearity

B) Time-variant

C) Causality

D) Stability

Answer: D) Stability

6. What does the Laplace transform convert a time-domain signal into?

A) Frequency domain

B) Time domain

C) Phase domain

D) Amplitude domain

Answer: A) Frequency domain

7. Which transform is commonly used to analyze signals in the frequency domain?

A) Fourier transform

B) Laplace transform

C) Z-transform

D) Wavelet transform

Answer: A) Fourier transform

8. In digital image processing, which color model is commonly used for display purposes on computer screens?

A) RGB

B) CMYK

C) HSI

D) YUV

Answer: A) RGB

9. The human visual system is most sensitive to which color?

A) Red

B) Green

C) Blue

D) Yellow

Answer: B) Green

10. Which of the following is not a component of digital video compression?

A) Spatial redundancy

B) Temporal redundancy

C) Quantization

D) Frequency modulation

Answer: D) Frequency modulation

11. What is the frame rate of standard digital video?

A) 24 frames per second

B) 30 frames per second

C) 60 frames per second

D) 120 frames per second

Answer: B) 30 frames per second

12. In 3D video, what does the term "parallax" refer to?

A) The perceived depth in the video

B) The motion of objects in the scene

C) The difference in viewpoint between the left and right eyes

D) The color distribution in the video

Answer: C) The difference in viewpoint between the left and right eyes

13. What is the function of the YUV color model in digital video?

A) Represents luminance and two chrominance components

B) Represents three primary colors

C) Represents hue, saturation, and intensity

D) Represents red, green, and blue components

Answer: A) Represents luminance and two chrominance components

14. Which of the following is a common application of digital video?

A) Video conferencing

B) Medical imaging

C) Financial analysis

D) Genetic engineering

Answer: A) Video conferencing

15. What is the purpose of image and video quality assessment techniques?

A) To enhance image and video resolution

B) To reduce file size

C) To evaluate the fidelity of images and videos

D) To add visual effects

Answer: C) To evaluate the fidelity of images and videos

16. In digital image processing, what is histogram equalization used for?

A) Enhancing contrast

B) Reducing noise

C) Sharpening edges

D) Changing color balance

Answer: A) Enhancing contrast

17. Which of the following is not a type of image filtering?

A) Median filtering

B) Gaussian filtering

C) Edge filtering

D) Frequency filtering

Answer: D) Frequency filtering

18. Which color model is based on human perception of colors?

A) RGB

B) CMYK

C) HSI

D) YUV

Answer: C) HSI

19. What is the primary objective of video compression techniques?

A) To increase video resolution

B) To reduce video quality

C) To decrease video file size

D) To add visual artifacts

Answer: C) To decrease video file size

20. Which of the following is a characteristic of a good video codec?

A) High compression ratio with minimal loss of quality

B) Low compression ratio with minimal loss of quality

C) High compression ratio with significant loss of quality

D) Low compression ratio with significant loss of quality

Answer: A) High compression ratio with minimal loss of quality

21. Which transform is commonly used for image compression?

A) Fourier transform

B) Discrete cosine transform (DCT)

C) Wavelet transform

D) Laplace transform

Answer: B) Discrete cosine transform (DCT)

22. Which of the following statements about 3D video is true?

A) It requires special glasses for viewing

B) It cannot be displayed on standard screens

C) It does not support depth perception

D) It has lower resolution compared to 2D video

Answer: A) It requires special glasses for viewing

23. Which technique is used for reducing the size of a digital image or video file?

A) Quantization

B) Interpolation

C) Morphological operations

D) Histogram equalization

Answer: A) Quantization

24. What is the term for the phenomenon where adjacent pixels in an image have similar colors or intensities?

A) Spatial redundancy

B) Temporal redundancy

C) Quantization error

D) Edge artifact

Answer: A) Spatial redundancy

25. Which of the following is not a factor affecting image and video quality?

A) Resolution

B) Compression ratio

C) Color depth

D) File format

Answer: D) File format

26. Which of the following is a characteristic of JPEG compression?

A) Lossless compression

B) Wavelet-based compression

C) Lossy compression

D) Run-length encoding

Answer: C) Lossy compression

27. What does the term "bit depth" refer to in digital images?

A) Number of pixels in an image

B) Number of colors or shades of gray that can be represented per pixel

C) File size of the image

D) Resolution of the image

Answer: B) Number of colors or shades of gray that can be represented per pixel

28. Which of the following is a common artifact in compressed video?

A) Gaussian noise

B) Blocking artifacts

C) Salt and pepper noise

D) Moiré pattern

Answer: B) Blocking artifacts

29. What is the purpose of motion estimation in video compression?

A) To enhance color fidelity

B) To reduce temporal redundancy

C) To increase frame rate

D) To improve spatial resolution

Answer: B) To reduce temporal redundancy

30. Which of the following statements about MPEG compression is true?

A) It is a lossless compression standard

B) It is primarily used for audio compression

C) It stands for Motion Picture Experts Group

D) It does not support inter-frame compression

Answer: C) It stands for Motion Picture Experts Group

31. Which of the following is not a characteristic of the human visual system?

A) Sensitivity to color

B) Sensitivity to motion

C) Sensitivity to spatial frequency

D) Sensitivity to audio frequency

Answer: D) Sensitivity to audio frequency

32. Which color model is commonly used in printing?

A) RGB

B) CMYK

C) HSI

D) YUV

Answer: B) CMYK

33. Which transform is commonly used for image enhancement and denoising?

A) Fourier transform

B) Discrete cosine transform

C) Wavelet transform

D) Laplace transform

Answer: C) Wavelet transform

34. What is the primary difference between analog and digital video?

A) Analog video has higher resolution

B) Digital video has better color accuracy

C) Analog video is continuous, while digital video is discrete

D) Digital video requires less storage space

Answer: C) Analog video is continuous, while digital video is discrete

35. What does the term "chroma subsampling" refer to in digital video?

A) Compression of color information

B) Compression of luminance information

C) Compression of spatial resolution

D) Compression of temporal resolution

Answer: A) Compression of color information

36. Which of the following is not a component of the YUV color model?

A) Luminance

B) Chrominance

C) Hue

D) Saturation

Answer: C) Hue

37. Which video compression standard is commonly used for high-definition television (HDTV)?

A) MPEG-1

B) MPEG-2

C) MPEG-4

D) H.264

Answer: D) H.264

38. What is the primary advantage of using wavelet transforms for image compression?

A) Better compression efficiency compared to other transforms

B) Faster computation

C) Lossless compression

D) Higher spatial resolution

Answer: A) Better compression efficiency compared to other transforms

39. Which of the following is a measure of video quality?

A) Signal-to-noise ratio (SNR)

B) Compression ratio

C) Bit rate

D) Frame rate

Answer: A) Signal-to-noise ratio (SNR)

40. What does the term "interlacing" refer to in video processing?

A) Combining multiple video streams into a single stream

B) Encoding audio and video together

C) Displaying alternate lines of an image in successive frames

D) Adjusting the brightness and contrast of a video

Answer: C) Displaying alternate lines of an image in successive frames

41. Which of the following is not a color space commonly used in digital imaging?

A) RGB

B) CMYK

C) YUV

D) HSL

Answer: D) HSL

42. Which of the following statements about image compression is true?

A) Lossless compression always achieves higher compression ratios than lossy compression

B) Lossy compression retains all original image information

C) Compression artifacts are more noticeable in lossless compression

D) Lossy compression is suitable for all types of images

Answer: C) Compression artifacts are more noticeable in lossless compression

43. What is the main goal of video transcoding?

A) Increasing video resolution

B) Converting video between different formats or codecs

C) Adding visual effects to videos

D) Improving audio quality

Answer: B) Converting video between different formats or codecs

44. Which of the following is a common video file format?

A) GIF

B) JPEG

C) PNG

D) MP4

Answer: D) MP4

45. Which transform is used in JPEG image compression?

A) Fourier transform

B) Discrete cosine transform

C) Wavelet transform

D) Laplace transform

Answer: B) Discrete cosine transform

46. What is the term for the phenomenon where high-frequency components in an image or video are lost during compression?

A) Blocking artifacts

B) Aliasing

C) Quantization error

D) Edge enhancement

Answer: C) Quantization error

47. Which of the following is not a type of video compression artifact?

A) Blocking artifacts

B) Moiré pattern

C) Color bleeding

D) Edge artifact

Answer: C) Color bleeding

48. Which of the following statements about the H.264 video compression standard is true?

A) It is a lossless compression standard

B) It is primarily used for audio compression

C) It achieves high compression ratios with minimal loss of quality

D) It does not support inter-frame compression

Answer: C) It achieves high compression ratios with minimal loss of quality

49. What is the main disadvantage of using lossless compression for image and video?

A) Loss of image quality

B) Large file sizes

C) Limited compression ratios

D) Slow compression and decompression

Answer: B) Large file sizes

50. Which of the following statements about digital video formats is true?

A) MPEG-4 is primarily used for audio compression

B) AVI is a lossy compression format

C) MOV is a container format developed by Microsoft

D) MKV is a proprietary format developed by Apple

Answer: B) AVI is a lossy compression format

51. Motion estimation is a crucial task in:

A) Image segmentation

B) Image formation

C) Image compression

D) Image enhancement

Answer: C) Image compression

52. Which of the following describes apparent motion in a 2D image?

A) Motion in depth

B) Motion across the image plane

C) Motion along the vertical axis

D) Motion along the horizontal axis

Answer: B) Motion across the image plane

53. Differential methods for motion estimation involve:

A) Comparing pixel values between consecutive frames

B) Applying a filter to each pixel individually

C) Performing Fourier transform on image frames

D) Using a pre-defined motion model

Answer: A) Comparing pixel values between consecutive frames

54. Matching methods in motion estimation involve:

A) Finding corresponding features between frames

B) Applying random transformations to images

C) Estimating motion based on global image statistics

D) Using gradient descent optimization

Answer: A) Finding corresponding features between frames

55. Non-linear optimization methods in motion estimation are used for:

A) Solving linear systems of equations

B) Minimizing a cost function involving non-linear terms

C) Finding global motion parameters

D) Estimating motion based on local pixel displacements

Answer: B) Minimizing a cost function involving non-linear terms

56. Transform domain methods for motion estimation involve:

A) Applying spatial filters to image frames

B) Converting images into frequency domain

C) Segmenting images based on color histograms

D) Estimating motion based on image gradients

Answer: B) Converting images into frequency domain

57. Which of the following is a common transform used in motion estimation?

A) Discrete cosine transform (DCT)

B) Fourier transform

C) Wavelet transform

D) Laplace transform

Answer: C) Wavelet transform

58. 3D motion and structure estimation involves:

A) Estimating motion in 3D space

B) Estimating motion in 2D space

C) Estimating motion and depth information

D) Estimating motion and texture information

Answer: C) Estimating motion and depth information

59. Image formation refers to:

A) The process of capturing images using a camera

B) The process of transforming 3D scenes into 2D images

C) The process of enhancing image quality

D) The process of segmenting objects in an image

Answer: B) The process of transforming 3D scenes into 2D images

60. Motion models in motion estimation:

A) Represent the actual motion of objects in a scene

B) Are always linear

C) Are used to predict future motion

D) Are not used in motion estimation

Answer: C) Are used to predict future motion

61. Which method involves estimating motion by analyzing local image gradients?

A) Differential methods

B) Matching methods

C) Non-linear optimization methods

D) Transform domain methods

Answer: A) Differential methods

62. In matching methods, corresponding features between frames are typically identified using:

A) Spatial filtering

B) Correlation techniques

C) Fourier transform

D) Histogram analysis

Answer: B) Correlation techniques

63. Non-linear optimization methods often involve:

A) Gradient descent

B) Fourier transform

C) Histogram equalization

D) Median filtering

Answer: A) Gradient descent

64. Transform domain methods for motion estimation exploit the:

A) Spatial redundancy in images

B) Temporal redundancy in images

C) Frequency content of images

D) Color information of images

Answer: C) Frequency content of images

65. Which transform is commonly used in transform domain motion estimation?

A) Fourier transform

B) Wavelet transform

C) Laplace transform

D) Z-transform

Answer: B) Wavelet transform

66. What does 3D motion and structure estimation involve?

A) Estimating motion in three dimensions

B) Estimating motion over time

C) Estimating motion and depth information

D) Estimating motion and texture information

Answer: C) Estimating motion and depth information

67. Motion estimation is important in which of the following applications?

A) Medical imaging

B) Video surveillance

C) Autonomous vehicles

D) All of the above

Answer: D) All of the above

68. Image formation involves:

A) Storing digital images on a computer

B) Capturing images using a camera

C) Enhancing image quality

D) Segmenting objects in images

Answer: B) Capturing images using a camera

69. Which of the following is a characteristic of apparent motion in a 2D image?

A) Motion in depth

B) Motion across the image plane

C) Rotation around an axis

D) Time-varying motion

Answer: B) Motion across the image plane

70. Which method involves estimating motion by minimizing a cost function involving non-linear terms?

A) Differential methods

B) Matching methods

C) Non-linear optimization methods

D) Transform domain methods

Answer: C) Non-linear optimization methods

71. Which of the following statements about motion models is true?

A) They represent actual motion with high accuracy

B) They are always linear

C) They can predict future motion based on past observations

D) They are not used in motion estimation

Answer: C) They can predict future motion based on past observations

72. Matching methods in motion estimation often involve:

A) Comparing pixel values between frames

B) Finding corresponding features between frames

C) Minimizing a cost function

D) Transforming images into frequency domain

Answer: B) Finding corresponding features between frames

73. Non-linear optimization methods in motion estimation are particularly useful for handling:

A) Linear motion models

B) Global motion estimation

C) Complex motion patterns

D) High-frequency image content

Answer: C) Complex motion patterns

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D) Laplace transform

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B) Estimating motion over time

C) Estimating motion and depth information

D) Estimating motion and texture information

Answer: C) Estimating motion and depth information

77. Motion estimation plays a key role in which of the following applications?

A) Video games

B) Virtual reality

C) Video compression

D) Social media

Answer: C) Video compression

78. Which of the following is a key step in image formation?

A) Enhancing image quality

B) Capturing images using a camera

C) Storing digital images on a computer

D) Segmentation of objects in images

Answer: B) Capturing images using a camera

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B) Matching methods

C) Non-linear optimization methods

D) Transform domain methods

Answer: A) Differential methods

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C) Non-linear optimization methods

D) Transform domain methods

Answer: A) Differential methods

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101. What is the primary goal of pedestrian detection in video analytics?

A) Tracking the movement of vehicles

B) Identifying anomalies in the scene

C) Detecting stationary objects

D) Identifying pedestrians in the scene

Answer: D) Identifying pedestrians in the scene

102. How does vehicle detection and tracking differ from pedestrian detection and tracking?

A) Vehicle detection focuses on stationary objects

B) Pedestrian detection is more challenging due to smaller size

C) Vehicle tracking is less accurate than pedestrian tracking

D) Vehicle detection deals with larger objects and complex environments

Answer: D) Vehicle detection deals with larger objects and complex environments

103. Which method is commonly used for vehicle detection and tracking?

A) Optical flow estimation

B) Deep learning techniques

C) Template matching

D) Histogram analysis

Answer: B) Deep learning techniques

104. What is the primary challenge in articulated human motion tracking?

A) Dealing with occlusions and complex poses

B) Estimating the speed of human motion accurately

C) Differentiating between human and non-human objects

D) Handling changes in lighting conditions

Answer: A) Dealing with occlusions and complex poses

105. What are scene artifacts in video analytics?

A) Patterns and behaviors in the video

B) Moving objects in the scene

C) Distortions or anomalies in the video footage

D) Lighting variations

Answer: C) Distortions or anomalies in the video footage

106. Which method is used to model the background in a video scene?

A) Median filtering

B) Gaussian filtering

C) Kalman filtering

D) Adaptive background modeling

Answer: D) Adaptive background modeling

107. How does adaptive background modeling help in object detection?

A) By isolating moving objects from the background

B) By enhancing the colors of objects in the scene

C) By removing noise from the video frames

D) By applying filters to each pixel individually

Answer: A) By isolating moving objects from the background

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B) Estimating the speed of human motion accurately

C) Differentiating between human and non-human objects

D) Handling changes in lighting conditions

Answer: A) Dealing with occlusions and complex poses

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