UNIT-I

Introduction To Computer Vision Image Formation -Geometric Primitives - 2D,3D Transformations - 3D To 2D Projection - Lighting, Reflectance and Shading - Sampling And Aliasing - Image Processing- Point Operators- Pixel Transforms - Color Transform Histogram Equalization - Linear Filtering, non Linear filtering- Fourier transforms Two-dimensional Fourier transforms -Wiener filtering

Multiple Choice Questions

1. Digitization of spatial co-ordinates (x,y)is called

(a)gray level quantization

(b)finite sampling

(c)image sampling

(d)image quantization

2. Image transforms are needed for

(a)conversion information form spatial to frequency

(b)spatial domain

(c)time domain

(d)both b&c

3. An alternate approach to median filtering is _____

a) Use a mask b) Gaussian filter c) Sharpening d) Laplacian filter

4. The amount of white light present in a spectrum is called as _____

a.intensity **b.saturation** c.hue d.colour

5. well transform is used for _____

a. highlighting the bright peaks **b. highlighting the dark peaks**

c. highlighting the bright and dark peaks d. highlighting the dark and bright peaks

6. A translation is applied to an object by

a) Repositioning it along with straight line path

b) Repositioning it along with circular path

c) Only b

d) All of the mentioned

7. The translation distances (dx, dy) is called as

a) Translation vector

b) Shift vector

c) Both a and b

d) Neither a nor b

8. A straight line segment is translated by applying the transformation equation

a) P'=P+T

b) Dx and Dy

c) P'=P+P

d) Only c

9. A Grid of square which contains a single color is called

a. Image b. Pixel value c. Pixel d. Color

Ans:c

10. A Fourier transform of a product is equal to

a. Correlation of Fourier transform b. Convolution of Fourier transform

c. Both of the above d. None of the above

Ans:a

11. Intensity can be converted to colour transformation by Assigning colors to

a.Pixels b.Coordinates c.Pixel depth d.Intensity Levels

Ans.d

12. Which of the following filter(s) has the response in which the central pixel value is replaced by value defined by ranking the pixel in the image encompassed by filter?

a.Order-Statistic filters **b.** Non-linear spatial filters

c.Median filter **d.**All of the above

Ans:d

13. Which of the following is/are used as basic function in nonlinear filter for noise reduction?

a) Computation of variance b) Computation of median

c) All of the above d) None of the above

Ans: b

14. In Weiner filtering it is assumed that noise and image are

a. Different b.Homogeneous c.Correlated d. Uncorrelated

Ans:d

15. Find the Fourier transform of F(x) = 1, |x|<a0, otherwise.

a) 2sin(ap)p b) 2asin(ap)p c) 4sin(ap)p d) 4asin(ap)p

Ans: a

16. Which of the following processes would help avoid aliasing while downsampling an image?

(a) Image sharpening (b) Image blurring.

(c) Median filtering where you replace every pixel by the median of pixels in a window around the pixel.

(d) Histogram equalization.

Ans: b

17. Down sampling can lead to aliasing because

(a) Sampling leads to additions of low frequency noise.

(b) Sampled high frequency components result in apparent low frequency components.

(c) Sampling increases the frequency components in an image.

(d) Sampling leads to spurious high frequency noise

Ans: b

18. Which of the following is true for Eigenfaces (PCA)?

(a) Can be used to effectively detect deformable objects.

(b) Invariant to affine transforms.

(c) Can be used for lossy image compression

(d) Is invariant to shadows.

Ans: c

19. Select one of the most appropriate applications of Computer vision

a) Medical computer imaging
b) remote sensing
c) geographical map
d) medical diagnosis
Ans:a

20. If the pixels of an image are shuffled then the parameter that may change is

a) Histogram b) Mean c) Entropy d) Covariance
Ans:d

21. Computer vision defined as a discipline in which ----------

a) Both the input and output of a process are images.

b) The input of a process is an image description and the output is image

c) Both the input and output of a process are descriptions.

d) The input of a process is an image and the output is an image description.

Ans:d

22. ----------Filter cannot be implemented using a convolution mechanism.

a) Average b) Gaussian c) Median d) Disk

Ans:c

23. Which of the following techniques is based on the Fourier transform?

a) Structural b) Spectral c) Statistical d) Topological

Answer: b

24. The color model which is more relevant to a display system is the

a) RGB Model b) CMY Model c) HIS Model d) YIQ Model

Ans: a

25.The forward models that we use in computer vision are usually developed in _____and _____

a) Physics and chemistry
b) Physics and computer graphics
c) Only a
d) None of the above

Answer: b

26.Choose the applications of computer vision from the below.

a) Machine inspection and 3D modeling
b) Retail and Optical character recognition
c) All of the above
d) Only b

Answer: c

27.Face detection involves _____ and _____

a)Improved camera focusing and more relevant image searching
b) Reduced camera focusing and inefficient image searching
c)only b
d)None of the above
Answer: a

28.2D points can also be represented using *homogeneous coordinates*, in which (x,y,1) is _____

a)Identical vector
b)Isolated vector
c)Augmented vector
d)None of the above

29. How does the diffuse reflection scatter light?

a)Uniformly in all directions
b)Bidirectional reflectance
c)None of the above
d)only b
Answer: a

30..What happens when a field of light impinging on the image sensor falls onto the active sense areas in the imaging chip?

a)The photons arriving at each active cell are integrated and then digitized
b)The neutrons arriving at each active cell are integrated
c)only b
d)None of the above
Answer: a

SHORT ANSWERS

1.Explain adaptive histogram equalization technique.
2.Define Photometric image formation. Discuss about Light scatters when it hits a surface.
3.Define BRDF.What is Helmholtz reciprocity?
4.Differentiate between Discrete Fourier Transform and Fast Fourier Transform
5.Explain in detail about discrete cosine transform in Fourier transform
6.Explain briefly about impulse response function with equation
7.Explain in detail about Orthography and para-perspective
8.Define similarity transform with matrix form
9.Discuss the Hierarchy of 2D coordinate transformations

- listing the transformation name,
- its matrix form,
- the number of degrees of freedom,
- what geometric properties it preserves,
- a mnemonic icon

10.Explain the Bilinear interpolation.

ANSWER THE FOLLOWING

1. Explain briefly about Geometric primitives and transformations with a neat diagram.
2. Discuss about the following point operators in image processing transforms.

❖ Pixel transforms
❖ Color transforms
❖ Compositing and matting

3. Illustrate briefly about Orthography and Para-perspective in 2D and 3D geometric primitives.
4. Explain the following Linear Filtering techniques,

- Separable filtering
- Band-pass and steerable filters

5. Discuss about affine transformation with neat diagram