BRAINWARE UNIVERSITY

Term End Examination 2023-2024
Programme – M.Tech.(CSE)-AIML-2023
Course Name – Image Processing
Course Code - PEC-MCSM201C
(Semester II)

Full Marks : 60 **Time : 2:30 Hours**

[The figure in the margin indicates full marks. Candidates are required to give their answers in their own words as far as practicable.]

Group-A
(Multiple Choice Type Question) 1 x 15=15

1. *Choose the correct alternative from the following :*

(i) Select Primary goal of image processing among the following options:

a) Developing new cameras and sensors.
b) Manipulating images to extract meaningful information.
c) Printing physical copies of images.
d) Ignoring computer science applications.

(ii) State the purpose of image enhancement techniques

a) To reduce image quality
b) To degrade image resolution
c) To improve the visibility of features
d) To blur the images

(iii) predict a technique suitable for noise reduction in images

a) Median filtering
b) Histogram equalization
c) Gradient-based filtering
d) Sharpening

(iv) Select the term for measuring the pixel connectivity in an image

a) Pixels
b) Neighbours
c) Intensity
d) Resolution

(v) Identify the distance measure is commonly used to calculate the similarity between two pixels

a) Euclidean Distance
b) Manhattan distance
c) Hamming distance
d) Chebyshev distance

(vi) Select correct option: In a 3x3 neighborhood of pixels, how many neighbors does a pixel have

a) 4
b) 8
c) 9
d) 12

(vii) Select the techniques is commonly used for image segmentation

a) Convolutional Neural Networks (CNNs) b) Histogram Equalization
c) Gaussian Blur d) K-means Clustering

(viii) Choose a method for enhancing images based on morphological operations

a) Erosion and Dilation b) Histogram equalization
c) Median filtering d) Laplace Transform

(ix) Identify the primary difference between grayscale and color images

a) Grayscale images have more colors than color images. b) Grayscale images contain only shades of gray, while color images contain multiple colors.
c) Grayscale images are larger in size than color images. d) Grayscale images have higher resolution than color images.

(x) Select part of the human eye is responsible for focusing light onto the retina

a) Iris b) Lens
c) Cornea d) Retina

(xi) Name the spatial filter commonly used for edge detection?

a) Laplacian Filter b) Sobel Filter
c) Gaussian Filter d) Prewitt Filter

(xii) Select the purpose of using power law transformation in image processing?

a) To enhance the edges b) To increase the image brightness
c) To stretch the histogram non-linearly d) To extract specific bit planes

(xiii) State the logical operation in image processing that combines two binary images to include regions present in either or both images?

a) AND b) OR
c) NOT d) XOR

(xiv) Predict the term that describes the spatial arrangement of pixels in an image and their relationship to each other.

a) Connectivity b) Neighbors
c) Distance Measures d) Linear Operations

(xv) Select from the following techniques is commonly used for image segmentation.

a) Histogram equalization b) Gaussian blur
c) K-means clustering d) Image sharpening

Group-B

(Short Answer Type Questions) 3 x 5=15

2. Develop a method to handle images with varying noise levels using the arithmetic mean filter. (3)
3. write about image sharpening, and how is it performed in the frequency domain? (3)
4. List the different types of images. (3)
5. Evaluate the impact of filter parameters, such as the window size and standard deviation, on local noise reduction using the Gaussian filter. (3)
6. Estimate the advantages of using region-based segmentation in image processing. (3)

OR

Summarize the advantages and disadvantages of thresholding in image processing. (3)

Group-C

(Long Answer Type Questions) 5 x 6=30

7. Illustrate Homomorphic Filtering (5)
8. Discuss salt-and-pepper noise and its impact on image quality. (5)

9. Illustrate line sensor and array sensor in image acquisition (5)
10. Design an algorithm that combines edge linking and thresholding techniques for segmenting medical images with complex structures and varying intensities. (5)
11. Compare and contrast the advantages and disadvantages of using morphological watersheds for image segmentation with other segmentation methods. (5)
12. Explain a model of the image Degradation/Restoration Process (5)

OR

Summarized Gaussian noise with its probability density function. (5)

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