BRAINWARE UNIVERSITY

Term End Examination 2024-2025
Programme – MCA-2024
Course Name – Image Processing
Course Code - MCA20201B
(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 the resolution of 1024 x 1024 image
   a) 1048576   b) 1148576
   c) 1248576   d) 1348576

(ii) Identify the intensity levels in 8-bit image
   a) 16   b) 256
   c) 32   d) 48

(iii) Choose what does CT means in CT Scan
   a) Computing Tomography   b) Computer Topology
   c) Computed Tomography   d) Computerized Teaching methodology

(iv) Identify the necessary parameter for performing a rotation in image transformation.
   a) Rotation Angle   b) Rotation Distance
   c) Rotation Vector   d) Rotation Angle & Rotation Distance both

(v) Select the true fact(s) for the second order derivative of a digital function?
   a) Must be zero in the flat areas   b) Must be zero at the onset of a gray-level step or ramp discontinuities
   c) Must be nonzero along the gray-level ramps   d) None of the mentioned

(vi) In _____ image we notice that the components of histogram are concentrated on the high side on intensity scale.
   a) Bright   b) Dark
   c) Colourful   d) all of these

(vii) Determine the key objective of image restoration techniques.

a) Enhancing image features

b) Reducing image noise and recovering original quality

c) Changing color balance

d) Increasing image resolution

(viii) What is the main drawback of inverse filtering?

a) It amplifies noise

b) It blurs the image

c) It increases image resolution

d) It requires high computational power

(ix) Which element of information theory is crucial for image compression?

a) Entropy

b) Frequency domain transformation

c) Noise reduction

d) Edge enhancement

(x) Type of images benefited the most from the vector quantization

a) Noisy images

b) High-contrast images

c) Uniformly colored images

d) Low-resolution images

(xi) Examine how entropy coding work in image compression?

a) Encodes frequently occurring symbols with shorter codes

b) Removes redundant pixels

c) Applies frequency domain transformations

d) Enhances contrast in images

(xii) What is the primary benefit of adaptive thresholding?

a) Simpler computation

b) Handles uneven illumination

c) Always outperforms global thresholding

d) Works on all images

(xiii) Why is hit-or-miss transformation useful for shape analysis?

a) Fastest morphological operation

b) Detects specific shapes using complementary structuring elements

c) Outperforms region-based segmentation

d) Enhances edges without noise removal

(xiv) What is the geometric mean filter best suited for?

a) Removing Gaussian noise

b) Preserving edge details

c) Enhancing blurriness

d) Increasing contrast

(xv) What is the main benefit of using a hybrid image compression technique?

a) Combines advantages of multiple methods

b) Reduces execution time

c) Requires less processing power

d) Increases file size

Group-B
(Short Answer Type Questions)   3 x 5=15

2. Define pixel and resolution in digital images.   (3)
3. Describe how histogram equalization improves image contrast.   (3)
4. Perform an arithmetic operation (e.g., image subtraction) and explain its effect on image enhancement.   (3)
5. Compare the effectiveness of transform-based compression methods like DCT and Wavelet Transform.   (3)
6. Propose an advanced edge-linking technique that improves the accuracy of boundary detection.   (3)

OR

Create a novel algorithm that integrates boundary detection and region-based segmentation for object tracking.   (3)

Group-C
(Long Answer Type Questions)   5 x 6=30

7. Differentiate between image sampling and quantization with suitable examples. (5)
8. Differentiate between lossy and lossless image compression. (5)
9. Compare inverse filtering and Wiener filtering in terms of their effectiveness for image restoration. (5)
10. Compare the performance of Wavelet-based compression (JPEG2000) with traditional DCT-based compression. (5)
11. Develop a hybrid segmentation approach combining region-based and edge-based techniques for complex images. (5)
12. Analyze the limitations of thresholding in image segmentation. (5)

OR

How does morphological filtering enhance object boundaries in an image? (5)

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