Question Paper Code:97B03

B.E./B.Tech. DEGREE EXAMINATION, NOV 2023

Seventh Semester

Biomedical Engineering

19UBM703- IMAGE PROCESSING TECHNIQUES

(Regulations 2019)

Duration: Three hours   Maximum: 100 Marks

Answer All Questions

PART A - (10x 2 = 20 Marks)

1. State the primary application of the DCT (Discrete Cosine Transform) in image compression — CO1-U

2. Define image sampling and explain its role in digital image processing — CO1- U

3. Define intensity level slicing and explain its purpose in image processing. — CO1-U

4. Discuss the concept of histogram equalization and its role in enhancing image details and improving visualization — CO1-U

5. Provide a definition of inverse filtering in the context of image restoration. — CO1- U

6   State the significance of the signal-to-noise ratio (SNR) in the Wiener filter — CO1- U

7   Classify the types of discontinuity in digital image — CO1- U

8   Demonstrate the steps involved in splitting and merging — CO1 -U

9   Sketch the two equivalent representations of the perception model for two pattern classes. — CO1 -U

10 Illustrate the need for Compression — CO1 -U

PART – B (5 x 16= 80Marks)

11. (a) Explain the concept of spatial domain sampling in digital images CO1- U (16) and how it relates to pixel resolution and image size. Describe the process of quantization in image processing, highlighting its role in reducing continuous intensity values to discrete levels.

Or

(b) Define digital image processing. Explain various functional block CO1 -U (16)

of digital image processing with diagram

12. (a) Illustrate the mathematical principles behind homomorphic CO3- Ana (16)
filtering and how itenables the separation of illumination and
reflectance components in an image.How is the Fourier transform
utilized in this process?

Or

(b) Evaluate the impact of different histogram equalization CO3 -Ana (16)
algorithms on images with varying statistical distributions and
assess their ability to improve contrast.

13. (a) Evaluate the impact of inverse filtering advancements on fields CO3 -Ana (16)
such as medical diagnostics, forensics, and remote sensing,
highlighting both the benefits and potential risks

Or

(b) Analyze how frequency domain filtering techniques can be used CO3 -Ana (16)
to reduce periodic noise in images? Provide a brief overview of
the approach

14. (a) Assess how an image is segmented using region splitting and CO1 -U (16)
merging algorithm in detail and how the segmented object is
represented by chain codes.

Or

(b) Examine image segmentation based on various thresholding CO1-U (16)
techniques

15. (a) Explain the fundamental principles of image compression. CO1- U (16)
Differentiate between lossless and lossy compression techniques,
focusing on their applications and trade-offs.

Or

(b) Explain the fundamental concepts of image recognition, CO1 -U (16)
emphasizing the role of patterns and pattern classes. Provide
examples to illustrate your explanation

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