

UEI721: DIGITAL IMAGE PROCESSING

L T P Cr.

3 1 2 4.5

Course Objectives: To introduce the concepts of image processing and basic analytical methods to be used in image processing. To familiarize students with image enhancement and restoration techniques, To explain different image compression techniques. To introduce segmentation and morphological processing techniques.

Introduction: Fundamentals of Image formation, components of image processing system, image sampling and quantization.

Image enhancement in the spatial domain: Basic gray-level transformation, histogram processing, arithmetic and logic operators, basic spatial filtering, smoothing and sharpening spatial filters.

Image restoration: A model of the image degradation/restoration process, noise models, restoration in the presence of noise—only spatial filtering, Weiner filtering, constrained least squares filtering, geometric transforms; Introduction to the image enhance in frequency domain.

Image Compression: Need of image compression, image compression models, error-free compression, lossy predictive coding, image compression standards.

Morphological Image Processing: Preliminaries, dilation, erosion, open and closing, basic morphologic algorithms, The Hit-or-Miss Transformation

Image Segmentation: Detection of discontinuous, edge linking and boundary detection, thresholding, Hough Transform Line Detection and Linking, region-based segmentation.

Object Recognition: Patterns and patterns classes, matching, classifiers.

Course Learning Outcomes (CLO):

After the successful completion of the course the students will be able to:

1. Explain the fundamentals of digital image and its processing
2. Perform image enhancement techniques in spatial and frequency domain.
3. Elucidate the mathematical modelling of image restoration and compression
4. Apply the concept of image segmentation.
5. Describe object detection and recognition techniques.

Text Books:

1. *Digital Image Processing, RafealC.Gonzalez, Richard E.Woods, Second Edition, Pearson Education/PHI.*

Reference Books

1. *Image Processing, Analysis, and Machine Vision, Milan Sonka, Vaclav Hlavac and Roger Boyle, Second Edition, Thomson Learning.*
2. *Introduction to Digital Image Processing with Matlab, Alasdair McAndrew, Thomson Course Technology*
3. *Computer Vision and Image Processing, Adrian Low, Second Edition, B.S.Publications*
4. *Digital Image Processing using Matlab, RafealC.Gonzalez, Richard E.Woods, Steven L. Eddins, Pearson Education.*

Evaluation Scheme:

S.NO.	Evaluation Elements	Weightage
1	MST	20
2	EST	40
3	Sessional (May include Assignments//Quizzes/Lab Evaluations)	40