

IMAGE PROCESSING (ELECTIVE-I)

Course Code:13CS1101

L	T	P	C
4	0	0	3

Course Educational Objectives:

- ❖ The primary objective of this course is to introduce students to basic principles of digital images, image data structures, and image processing algorithms.
- ❖ Thorough understanding of the theoretical underpinnings of digital image processing and compression.
- ❖ Extensive experience with the design, implementation and testing of various image processing and compression algorithm.

Course Outcomes:

A student who successfully completes this course should, at a minimum, be able to:

- ❖ Understanding of digital image fundamentals
- ❖ Understanding of image digitization
- ❖ Ability to understand and apply image enhancement and restoration techniques
- ❖ Understanding of image encoding techniques
- ❖ Understanding of image segmentation approaches
- ❖ Introduction to pattern recognition and feature detection approaches
- ❖ Ability to apply image processing techniques in both the spatial and frequency (Fourier) domains

UNIT-I

(12 Lectures)

Elements of digital image processing, Sampling and Quantization, Relationships between pixels, Enhancement by point

processing, Spatial filtering: Smoothing, Median, & Sharpening, FFT, Discrete cosine Transform, Wavelet Transform.

UNIT-II

(12 Lectures)

Image Segmentation: Discontinuity detection, Edge linking and boundary detection, Threshing, Region oriented segmentation, Hough Transform, Canny edge detection, Color Models, Pseudo Color processing, Color Image segmentation.

UNIT-III

(12 Lectures)

Morphological Image Processing: Dilation and Erosion, Opening and Closing, Morphological algorithm, like, Hit Miss transform, Convex Hull, Thinning, Thickening, Skeltonization. Boundary descriptor, Regional descriptor.

UNIT-IV

(12 Lectures)

Image Restoration and Compression: Degradation and observation models, Inverse filtering, Weiner filter, Noise models. Image compression models, Huffman coding, LZW Coding, Arithmetic Coding, JPEG compression, Wavelet compression

UNIT-V

(12 Lectures)

Object reorganization: Statistical pattern recognition, Neural networks, Fuzzy systems, Boosting in pattern recognition (Ada boost algorithm).

TEXT BOOKS:

1. R.C. Gonzalez & R.E. Woods, "*Digital Image processing*", Addison Wesley/ Pearson education, 2ndEdition,2010.
2. Milan Sonaka, Vaclav Hivac and Roger Boyle, "*Digital Image processing and Computer Vision*",2008 by Cengage Learning.

REFERENCES:

1. A.K.Jain, "*Fundamentals of Digital Image Processing*", PHI.
2. William K. Pratt, John Wilely, "*Digital Image processing*", 3rd Edition,2004.
3. Rafael C. Gonzalez, Richard E Woods and Steve, "*Digital Image processing using MAT LAB*", Edition, PEA, 2004

4. Weeks Jr., “*Fundamentals of Electronic Image Processing*”, SPIC/IEEE Series, PHI

Reference [Http://www.jntu.ac.in/](http://www.jntu.ac.in/).

WEB REFERNCES:

<http://www.nptel.iitm.ac.in/video.php?subjectId=117105079>

