# IMAGE PROCESSING

## (Professional Elective-III) )/(Common to CSE & IT)

**Course Code : 15CT1127**

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**Pre-requisites:**

Computer Graphics

**Course Outcomes:**

At the end of the Course, the Student will be able to:

**CO 1** Understand the image fundamentals and mathematical transforms necessary for image processing.

**CO 2** Explain the image enhancement techniques

**CO 3** Describe image restoration procedures.

**CO 4** Explain the image compression procedures

**CO 5** Understand the image segmentation and representation techniques

**UNIT-I** **(10 Lectures)**

**INTRODUCTION :**

Examples of fields that use digital image processing,fundamental steps in digital image processing, components of image processing system. Digital Image Fundamentals: A simple image formation model, image sampling and quantization, basic relationships between pixels

**IMAGE ENHANCEMENT IN THE SPATIAL DOMAIN :**

Basic gray-level transformation, histogram processing, enhancement using arithmetic and logic operators, basic spatial filtering, smoothing and sharpening spatial filters.

## UNIT-II (10 Lectures)

### IMAGE RESTORATION :

A model of the image degradation/ restoration process, noise models, restoration in the presence of noise– only spatial filtering, geometric transforms; Introduction to the Fourier transform and the frequency domain, estimating the degradation function.

### COLOR IMAGE PROCESSING :

Color fundamentals, color models, basics of full–color image processing, color transforms, smoothing and sharpening, color segmentation.

## UNIT-III (10 Lectures)

### IMAGE COMPRESSION :

Fundamentals, image compression models, error-free compression, lossy predictive coding, image compression standards: JPEG compression standard, Fractal compression scheme, Wavelet compression scheme.

### MORPHOLOGICAL IMAGE PROCESSING :

Preliminaries, dilation, erosion, open and closing, hit or miss transformation, basic morphological algorithms.

## UNIT-IV (10 Lectures)

### IMAGE SEGMENTATION :

Detection of discontinuous-First order and second order edge operators, Edge linking and boundary detection, Canny's edge detection algorithm, Hough transform for detecting lines and curves, Edge linking, thresholding, region–based segmentation.

## UNIT-V (10 Lectures)

### OBJECT RECOGNITION :

Patterns and patterns classes, recognition based on decision–theoretic methods, matching, optimum statistical classifiers, neural networks, structural methods – matching shape numbers, string matching.

## TEXT BOOK:

RafealC.Gonzalez, Richard E.Woods, "Digital Image Processing", 3rd Edition, Pearson Education/PHI,2010.

## REFERENCE BOOKS:

1. Milan Sonka, Vaclav Hlavac and Roger Boyle, "Image Processing, Analysis, and Machine Vision", 2nd Edition, Thomson Learning, 2010.
2. Alasdair McAndrew, "Introduction to Digital Image Processing with Matlab",1st Edition, Thomson Course Technology,2010.
3. Adrian Low, "Computer Vision and Image Processing", 2nd Edition, B.S. Publications, 2010.
4. RafealC.Gonzalez, Richard E.Woods, Steven L. Eddins, "Digital Image Processing Using Matlab", 1st Edition Pearson Education, 2010.
5. William K. Prat, Wily, "Digital Image Processing", 3rd Edition
6. B. Chanda, D. DattaMajumder, "Digital Image Processing and Analysis", 2nd Edition Prentice Hall of India, 2011.