

24CSS201: IMAGE PROCESSING

Hours/Week: 4
Credits: 4

I.A. Marks: 30
Exam. Marks: 70

Course Learning Objectives:

- Fundamental concepts of a digital image processing system.
- Analyze the basic algorithms used for image processing
- To study the image fundamentals and mathematical transforms necessary for image processing.
- Design algorithms to solve image processing problems and meet design specifications.

Course Outcomes: After completing the course, the students will be able to,

- Understand image transforms and their properties.
- Develop any image processing application and understand the rapid advances in Machine vision.
- Learn different techniques employed for the enhancement of images.
- Identify different causes for image degradation and overview of image restoration techniques.
- Explain different Image enhancement techniques.
- Design & Synthesize Color image processing and its real world applications.
- Come across the image representation with their model approaches.

UNIT-I

12Hrs.

Digitized image and its properties: Basic concepts, Image digitization, Digital image properties. Image Preprocessing: Image pre-processing; Histogram processing, Enhancement using arithmetic / logic operations, Basics of spatial filtering, Smoothing spatial filters, Sharpening spatial filters. Brightness and geometric transformations, local preprocessing.

UNIT-II

12Hrs.

Edge Detection Techniques: Canny and LoG approaches, Line Detection algorithms; Segmentation methods: Thresholding, Edge-based segmentation, Region based segmentation, Matching.

UNIT-III

12Hrs.

Image Enhancement: Image enhancement in the frequency domain: Background, Introduction to the Fourier transform and the frequency domain, Smoothing Frequency-Domain filters, Sharpening Frequency Domain filters, Homomorphic filtering. Image Compression: Image compression: Fundamentals, Image compression models, Elements of information theory, Error-Free Compression, Lossy compression.

UNIT-IV

12Hrs.

Image Representation and Description: Region identification, Contour-based shape representation and description, Region based shape representation and description, Shape classes. Morphology: Basic morphological concepts, Morphology principles, Binary dilation and erosion, Gray-scale dilation and erosion, Morphological segmentation and watersheds.

REFERENCE BOOKS:

1. Milan Sonka, Vaclav Hlavac and Roger Boyle, Image Processing, Analysis and Machine Vision 2nd Edition, Thomson Learning, 2001.
2. Rafael C Gonzalez and Richard E Woods, Digital Image Processing, 2nd Edition, Pearson Education, 2003.
3. Anil K Jain, Fundamentals of Digital Image Processing Pearson Education/Prentice- Hall of India Pvt. Ltd., 1997.
4. B. Chanda, D Dutta Majumder, Digital Image Processing and Analysis Prentice-Hall India, 2002.

