MCAS305: IMAGE PROCESSING

Hours/Week: 4	I.A. Marks: 30
Credits: 4	Exam. Marks: 70

Course Learning Objectives: Students will able to try,
1. Fundamental concepts of a digital image processing system.
2. Analyze the basic algorithms used for image processing &image compression with morphological image processing.
3. To study the image fundamentals and mathematical transforms necessary for image processing.
4. Design algorithms to solve image processing problems and meet design specifications.

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

CO1: Understand the need for image transforms different types of image transforms and their properties.

CO2: Develop any image processing application and understand the rapid advances in Machine vision.

CO3: Learn different techniques employed for the enhancement of images.

CO4: Identify different causes for image degradation and overview of image restoration techniques.

CO5: Explain different Image enhancement techniques

CO6: Design & Synthesize Color image processing and its real world applications.

CO7: Come across the image representation with their model approaches.

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UNIT- I   12 Hrs.

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   12 Hrs.

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.

UNIT-III   12 Hrs.

Segmentation: Thresholding, Edge-based segmentation, Region based segmentation, Matching. Image Compression: Image compression: Fundamentals, Image compression models, Elements of information theory, Error-Free Compression, Lossy compression.

UNIT-IV   12 Hrs.

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. Rafel 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.