Electives in Computer Vision

19CSE431	DIGITAL IMAGE PROCESSING	L-T-P-C: 2-0-3-3

Course Objectives

- This course introduces the basics of image processing and explores the algorithms in spatial and frequency domain relevant to image enhancement, restoration and segmentation applications.
- This course introduces binary, gray scale and color image processing.

Course Outcomes

CO1: Understand fundamental principles of image processing and perform basic operations on pixels.
CO2: Apply the image processing algorithms and filters in spatial domain for image enhancement and restoration.
CO3: Analyze images in the frequency domain and explore the frequency domain filters for image enhancement and restoration.
CO4: Apply segmentation algorithms on Images and analyze their performance.
CO5: Apply morphological processing on images for simple image processing applications.

CO-PO Mapping

PO/PSO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3												3	2
CO2							2	2					3	2
CO3		3		2									3	2
CO4			3			2							3	2
CO5					3				2	2			3	2

Syllabus

Unit 1
Digital Image Fundamentals: Elements of Visual Perception- Image Sensing and Acquisition-Image Sampling and Quantization – Basic Relationships between Pixels - Image interpolation. Intensity Transformations and Spatial Filtering: Basic Intensity transformation Functions – Histogram Processing – Fundamentals of Spatial Filtering – Smoothing and Sharpening Spatial Filters.

Unit 2
Filtering in Frequency Domain: 2D Discrete Fourier Transforms - Basics of filtering - Image Smoothing and Image Sharpening Using Frequency Domain Filters - Selective Filtering, Image Restoration: Noise Models – Restoration using Spatial Filters – Periodic Noise Reduction by Frequency Domain Filters.

Unit 3
Morphological Image Processing: Erosion – Dilation – Opening – Closing – Hit-or-Miss Transform - Extraction of Connected Components. Image Segmentation: Fundamentals – Point, Line and Edge Detection – Thresholding-Region Based Segmentation – Region Growing – Region Splitting and Merging. Color image processing.

Text Book(s)
Gonzalez RC, Woods RE. Digital Image Processing. Third edition;2008.

Reference(s)

Pratt W K.Digital Image Processing, Fourth Edition, John Wiley & Sons;2007.
Castleman K R. Digital Image Processing, Prentice Hall;1996.
Rafael C. Gonzalez, Richard E. Woods, Steven L. Eddins. Digital Image Processing Using MATLAB®. Prentice Hall; 2004.
Russ JC, Russ JC. Introduction to Image Processing and Analysis. CRC press; 2007.

Evaluation Pattern

Assessment	Internal	External
Periodical 1	10	
Periodical 2	10	
*Continuous Assessment (Theory) (CAT)	10	
Continuous Assessment (Lab) (CAL)	40	
End Semester		30

*CA – Can be Quizzes, Assignment, Projects, and Reports.