DSPE3007 IMAGE PROCESSING (3-0-0)

Course Objectives:

- To study the image fundamentals and mathematical transforms necessary for image processing.
- To study the image enhancement techniques
- To study image restoration procedures.
- To study the image compression procedures

MODULE - I: (08 Hours)

INTRODUCTION AND DIGITAL IMAGE FUNDAMENTALS: Introduction: Origin, Steps in Digital Image Processing, Components. Digital Image Fundamentals: Elements of Visual Perception, Image Sampling and Quantization, Some Basic Relationships between pixels, Color Models.

MODULE - II: (08 Hours)

IMAGE TRANSFORMATION: Introduction to the Fourier Transform, The Discrete Fourier Transform, Discrete Cosine Transform, Singular Value Decomposition and Principal Component Analysis.

MODULE - III: (10 Hours)

IMAGE ENHANCEMENT: Spatial Domain: Some Simple Intensity Transformations, Histogram processing, Basics of Spatial Filtering, Smoothing and Sharpening Spatial Filtering. Frequency Domain: Smoothing and Sharpening frequency domain filters – Ideal, Butterworth and Gaussian filters.

MODULE - IV: (08 Hours)

IMAGE RESTORATION AND SEGMENTATION: Image Restoration: Noise models, Mean Filters, Order Statistics, Adaptive filters, Band reject Filters, Band pass Filters, Notch Filters, Optimum Notch Filtering, Inverse Filtering, Wiener filtering. Segmentation: Thresholding.

MODULE - V: (08 Hours)

WAVELETS AND IMAGE COMPRESSION: Wavelets: Background, Sub-band Coding, Multi-resolution Expansions. Compression: Fundamentals, Image Compression Models, Error Free compression-Variable Length Coding, Bit-Plane Coding, Lossless Predictive Coding, Lossy Compression, Lossy Predictive Coding, Transform Coding and Wavelet Coding.

Course Outcomes:

After completing this course, students will be able to:

CO1: To grasp the basics and image transforms necessary for image processing
CO2: To apply the image enhancement techniques.
CO3: To analyze and apply the image restoration procedures and segmentation tools.
CO4: To study the wavelet tools and the image compression procedures

Text Book:

1. Rafael C. Gonzales, Richard E. Woods, “Digital Image Processing”, Third Edition, Pearson Education, 2010.

References:

1. S. Jayaraman, S Essakirajan, “Digital Image Processing”, Second Edition, Tata McGraw Hill, 2009
2. Khalid Sayood, “Introduction to Data Compression”, Third Edition, Elsevier, 2006.
3. Rafael C. Gonzalez, Richard E. Woods, Steven L. Eddins, “Digital Image Processing Using MATLAB”, Third Edition Tata Mc Graw Hill Pvt. Ltd., 2011.
4. https://cse19-iiith.vlabs.ac.in/index.html