

MEE1003 DIGITAL IMAGE PROCESSING TECHNIQUES

Module 1

Digital Image Fundamentals:

Fundamental steps in Digital Image Processing, Components of an Image processing system, Digital Image Representation , Basic relationship between pixels, Color Modules, RGB and HSI color modules, Application of Fuzzy logic in Digital Image Processing.

Module 2

Image Enhancement:

Image negatives, Histogram Equalization, Local Enhancement, Image Subtraction, Image Averaging, Smoothing Spatial Filters, Sharpening Spatial Filters, Combining Spatial Enhancement methods.

Module 3

Image Transform:

Fourier Transform ,Discrete Fourier Transform, Fast Fourier Transform, Smoothing Frequency Domain filters, Sharpening Frequency Domain filters, Homomorphic filtering, Convolution and Correlation Theorems, Wavelet Transforms, The Fast Wavelet Transforms.

Module 4

Image Restoration:

Noise Models, Restoration in the presence of Noise-Only Spatial filtering , Mean filters , Adaptive filters Periodic Noise Reduction by Frequency Domain filtering , Inverse Filtering , Minimum Mean Square Error (Wiener) Filtering, Geometric Mean Filter.

Module 5

Image Segmentation:

Detection of Discontinuities, Point Detection, Line detection, Edge Detection, Thresholding , Optimal Global and Adaptive thresholding, Region-based Segmentation, Textural Images, Textural Feature extraction from Co-occurrence matrices .

Module 6

Representation and Description:

Chain codes, Signatures, Boundary Segments, Skeletons, Boundary Descriptors, Regional Descriptors, Use of the Principal Components for Description, Relational Descriptors.

Module 7

Image Compression:

Fundamentals, Redundancy , Image Compression Models, Coding Theorems, Error-free Compression techniques like Variable- length Coding and Lossless Predictive Coding , Lossy Compression techniques like Lossy Predictive Coding and Wavelet Coding, Image Compression standards.

Text Books:

1. Digital Image Processing. 2/E by Rafael C. Gonzalez and Richard E. Woods. Pearson Education
2. Digital Image Processing and Analysis. by B. Chanda and D. Dutta Majumder PHI