

Semester-II, Paper-4
IMAGE PROCESSING

Teaching Scheme

Lecturers: 4 Hrs / week
Practical: 2 Hrs / week

Examination Scheme

Theory: 100 marks
Term work: 25 marks

Unit 1.

(10 Hrs, 20 Marks)

Digital Image representation, steps in Image processing, Elements of IP system, Frame Grabber, Digital camera, Elements of visual perception, Image model, Sample and Quantization, Basic relationship between pixels, Image Geometry.

Unit 2.

(10 Hrs, 20 Marks)

Image Transforms, Introduction to Fourier Transform, DFT, Properties of 2-D fourier transform, FET, Walsh transform, Hazard Transform, Discrete Cosine transform, Harr transform, Wavelet transform.

Unit 3.

(10 Hrs, 20 Marks)

Image Enhancement methods by Spatial and Frequency domain methods, point processing, Spatial filtering, Color Image processing, Image Restoration, Degradation model, Digitalization of circulant and block circulant matrices, Algebraic approach, inverse filtering, Least Mean Square filter, constrained Least square restoration, Restoration in spatial domain, geometric Transformation.

Unit 4.

(10 Hrs, 20 Marks)

Image Compression by Redundancies, Image compression models, Elements of Information theory, Error-Free compression, Lossy compression, compression standards: JPEG & MPEG. Image Segmentation Detection of Discontinuities, Edge linking and Boundary detection, Thresholding, Region oriented segmentation, use of motion in segmentation.

Unit 5.

(10 Hrs, 20 Marks)

Representation and Description Representation schemes, Boundary descriptors, Regional descriptors, Morphology, Applications of Image Processing in Instrumentation and Control

References:

1. Digital Image Processing, "R.C.Gonzalez and R.E.Woods", Addison-Wesley Longman, Inc, 1999
2. Digital Image Processing, , "A.K.Jain", PHI
3. Image processing, Analysis and Machine vision, "M.Sonka, V.Hlavac, and R.Boyle", Thomson Asia pvt. Ltd, 1999.

List of Experiments:

1. Study of IP Toolbox in Matlab
2. Perform Arithmetic & Logical operations on Image
3. To study application of Histogram Equalization for image contrast improvement
4. To study application of Edge detection in IP for image identification
5. Application of FFT to perform operations on image like Convolution, Translation.
6. Application of FFT to perform operations on image like Rotation.
7. To Study application of Transform, Filtering by applying LPF & Mask for smooth imaging.
8. To Study application of Transform, Filtering by applying HPF & Mask for Image shaping.