

MCA508 IMAGE PROCESSING AND VIDEO PROCESSING

L	T	P	Cr
3	0	2	4.0

Course Objective: To learn the advanced concepts Image Processing and Video Processing and its implementation for assessment of understanding the course by the students.

Introduction and Digital Image Fundamentals: Digital Image Representation, Fundamental steps in Image Processing, Elements of Digital image processing systems, Sampling and quantization, neighbors of a pixel, adjacency, connectivity, Regions and Boundaries, Distance measures, Image operations on a pixels basis, Linear and Nonlinear operations

Image Enhancement and Restoration: Image Enhancement in the Spatial domain: Gray level transforms, Histogram Processing, Enhancement using Arithmetic/Logic Operations, smoothing and sharpening filters, Image Enhancement in the Frequency domain: 1-D and 2-D Fourier Transform and their Inverse, Filtering, Smoothing and sharpening domain filters, Homomorphic Filtering, Degradation Model, Noise models, Restoration in the presence of Noise only spatial filtering, Periodic Noise reduction by frequency domain filtering, estimating the degradation function

Color Image Processing: Color models, Pseudocolor Image Processing, Color Transforms, Smoothing and sharpening, Color Segmentation, Noise in color images, Color Image compression

Image Compression: Fundamentals, Compression Models, Error free Comparison, Lossy Compression, wavelets in Image compression, Image compression standards. Morphological Image Processing: Dilation and Erosion, Basic Morphological algorithms, Extension to gray scale images.

Image Segmentation, Representation and Description: Detection of discontinuities, Edge linking and boundary detection, Thresholding, Region oriented Segmentation, Motion based Segmentation; Representation schemes, Boundary description, Regional descriptors, Morphology.

Object Recognition: Patterns and Pattern classes, Decision Theoretic Methods, Structural methods.

Video Processing: Video formation, Video sampling, Video modeling, 2-D & 3-D Motion estimation, Motion-compensated (MC) filtering, Deinterlacing, Frame-rate conversion, Video Watermarking, Video Coding, Video Compression, Frame-based compression (MPEG-1/2), Scalable or layered frame-based compression, Object-based compression (MPEG-4), Error control in video communications.

Laboratory Work: The lab work will be based on image enhancement, image zooming,

image cropping, image restoration, image compression and image segmentation etc.

Recommended Books:

1. Gonzalez R. C. and Woods R. E., "Digital Image Processing", Edition 2nd, Pearson Education, 2007.
2. Jain A. K., "Fundamentals of Digital Image Processing", Edition 4th, PHI, 2002.
3. Umbaugh S E, "Computer Imaging, Digital Image Analysis and Processing", Edition 3rd, CRC Press Book, 2005.
4. Gonzalez R C, Woods R.E. and Eddins S.L., "Digital Image Processing using MATLAB", Pearson Education, 2004.
5. Wang Y, Ostermann J, Zhang Y Q, "Video Processing and Communications", Edition 1st, Prentice Hall, 2001.