AP5292 DIGITAL IMAGE PROCESSING

DETAILED SYLLBUS

OBJECTIVES:

The students should be made to:

- Understand fundamentals of digital images
- Learn different image transforms
- Study concept of segmentation

UNIT I DIGITAL IMAGE FUNDAMENTALS

A simple image model, Sampling and Quantization, Imaging Geometry, Digital Geometry, Image Acquisition Systems, Different types of digital images. Basic concepts of digital distances, distance transform, medial axis transform, component labeling, thinning, morphological processing, extension to gray scale morphology.

UNIT II IMAGE TRANSFORMS

1D DFT, 2D transforms - DFT, DCT, Discrete Sine, Walsh, Hadamard, Slant, Haar, KLT, SVD, Wavelet transform.

UNIT III SEGMENTATION OF GRAY LEVEL IMAGES

Histogram of gray level images, multilevel thresholding, Optimal thresholding using Bayesian classification, Watershed and Dam Construction algorithms for segmenting gray level image. Detection of edges and lines: First order and second order edge operators, multi-scale edge detection, Canny's edge detection algorithm, Hough transform for detecting lines and curves, edge linking.

UNIT IV IMAGE ENHANCEMENT AND COLOR IMAGE PROCESSING

Point processing, Spatial Filtering, Frequency domain filtering, multi-spectral image enhancement, image restoration. Color Representation, Laws of color matching, chromaticity diagram, color enhancement, color image segmentation, color edge detection, color demosaicing.

UNIT V IMAGE COMPRESSION

Lossy and lossless compression schemes, prediction-based compression schemes, vector quantization, sub-band encoding schemes, JPEG compression standard, Fractal compression scheme, Wavelet compression scheme.

REFERENCES:

1. A.K. Jain, "Fundamentals of Digital Image Processing", Prentice-Hall, Addison-Wesley, 1989.

2. Bovik (ed.), "Handbook of Image and Video Processing", Academic Press, 2000.

3. B. Jähne, "Practical Handbook on Image Processing for Scientific Applications", CRC Press,1997.

4. Bernd Jähne, Digital Image Processing, Springer-Verlag Berlin Heidelberg 2005.

5. Gonzalez and Woods, Digital Image Processing, Prentice-Hall.

6. J. C. Russ. The Image Processing Handbook. CRC, Boca Raton, FL, 4th edn., 2002.

7. J. S. Lim, “Two-dimensional Signal and Image Processing” Prentice-Hall, 1990.

8. M. Petrou, P. Bosdogianni, “Image Processing, The Fundamentals”, Wiley, 1999.

9. Rudra Pratap, Getting Started with MATLAB 7. Oxford University Press, 2006

10. Stephane Marchand-Maillet, Yazid M. Sharaiha, Binary Digital Image Processing, A Discrete Approach, Academic Press, 2000

11. W. K. Pratt. Digital image processing, PIKS Inside. Wiley, New York, 3rd, edn., 2001.