IV Year B.Tech. ECE II - Semester

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EC418 DIGITAL IMAGE PROCESSING
(Dept. Elective - VI)

Course Description & objectives:

To introduce to students the analytical tools and methods, which are currently used in digital image processing as applied to image information for human viewing. Students will learn to apply these tools in the Laboratory in image restoration, enhancement, compression and segmentation.

Course outcomes:

Upon successful completion of this course, students should be:

  a. *Able to Understand the basic principles of digital image processing.*

  b. *Able to formulate solutions and algorithms to general image processing problems.*

  c. *Able to comprehensive background in image filtering and analysis.*

  d. *Able to understand process of image compression techniques.*

  e. *Able to understand process of image segmentation techniques.*

UNIT I- Digital Image Fundamentals :

Elements of visual perception, Image sensing and acquisition, Image sampling and quantization Basic relationship between pixels, Basic geometric transformations, Introduction to Fourier Transform and DFT, Properties of 2D Fourier Transform, FFT Separable Image Transforms, Walsh, Hadamard , Discrete Cosine Transform, Haar Transform, Slant Transform and Hotelling Transform.

UNIT II- Enhancement :

Spatial Domain methods, Basic grey level transformation, Histogram equalization, Image subtraction, Image averaging, Spatial filtering: Smoothing,

sharpening filters, Laplacian filters, Frequency domain filters: Smoothing, Sharpening filters, Homomorphic filtering.

UNIT III - Restoration :

Model of Image Degradation/Restoration process, Noise models, Inverse filtering, Least Mean Square filtering, Constrained Least Square filtering, Blind Image Restoration, Pseudo inverse, Singular Value Decomposition.

UNIT IV - Compression :

Fundamentals of image compression, image compression models, lossless compression, Variable length coding, LZW coding, Bit plane coding, predictive coding, DPCM. Lossy Compression: Transform coding, Wavelet coding, Basics of Image compression standards: JPEG, MPEG, Basics of Vector quantization.

UNIT V - Segmentation :

Detection of discontinuities, Thresholding, Region Based segmentation.

TEXT BOOKS:

1. Rafael C Gonzalez, Richard E Woods , "Digital Image Processing", 2nd ed., Pearson Education, 2003

2. A.K. Jain, "Fundamentals of Digital Image Processing", PHI.

REFERENCE BOOKS :

1. Millman Sonka, Vaclav hlavac, Roger Boyle, "Image Processing Analysis and Machine Vision", Thompson Learning (1999).

2. Chanda Dutta Majumdar, "Digital Image Processing and Applications", Prentice Hall of India, 2000.

3. Rafael C Gonzalez, "Digital Image Processing using MATLAB".