III Year MCA I Semester

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MC315   IMAGE PROCESSING
ELECTIVE– IV

Objective of the Course:
The course will introduces the student to 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 for image restoration, enhancement, compression and segmentation.

UNIT - I   (14 Hrs)
Elements of visual perception: 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.

UNIT - II   (10 Hrs)
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   (12 Hrs)
Model of Image Degradation/restoration process: Noise models – Inverse filtering -Least mean square filtering – Constrained least mean square filtering – Blind image restoration – Pseudo inverse – Singular value decomposition.

UNIT - IV   (14 Hrs)
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   (10 Hrs)
Edge detection: Thresholding - Region Based segmentation – Boundary representation: chair codes- Polygonal approximation – Boundary segments – boundary descriptors: Simple descriptors-Fourier descriptors - Regional descriptors –Simple descriptors- Texture.

Text Books:
1. Digital Image Processing, Rafael C Gonzalez, Richard E Woods 2nd Edition,. Pearson Education 2003
2. Image Processing Analysis and Machine Vision – Millman Sonka, Vaclav hlavac, Roger Boyle, Thompson Learning (1999).

Reference Books:
1. Digital Image Processing, Castle Man, Pearson Education.
2. Fundamentals of Digital Image Processing, A.K. Jain, PHI
3. Digital Image Processing and Applications, Chanda Dutta Majumdar, Prentice Hall of India, 2000