IMAGE AND VIDEO PROCESSING

Course Code:15EC2110

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Pre requisites:
Signals and Systems, Digital Signal Processing.

Course Outcomes: Upon completion of the course, the student will be able to

CO1: Comprehend the image processing fundamentals and enhancement techniques in spatial and frequency domain.
CO2: Describe the color image fundamentals, models and various restoration techniques.
CO3: Design and Analyze the image compression systems.
CO4: Outline the various image segmentation and morphology operations.
CO5: Comprehend the basics of video processing and video coding.

UNIT-I (10-Lectures)

INTRODUCTION AND IMAGE ENHANCEMENT:
Digital image fundamentals, Concept of pixels and gray levels, Applications of image processing, Introduction to image enhancement, spatial domain methods: point processing - intensity transformations, histogram processing, image averaging, image subtraction, Spatial filtering- smoothing filters, sharpening filters, Frequency domain methods: low pass filtering, high pass filtering, Homomorphic filtering.

UNIT-II (10-Lectures)

IMAGE RESTORATION:
Introduction to Image restoration, Degradation model, Restoration in the presence of Noise only-Spatial Filtering, Periodic Noise reduction by Frequency domain Filtering, Algebraic approaches- Inverse filtering, Wiener filtering, Constrained Least squares restoration.

COLOR IMAGE PROCESSING:

Introduction, Fundamentals of Color image processing: Color models - RGB, CMY, YIQ, HSI, Pseudo color image processing - intensity slicing, gray level to color transformation, Basics of Full Color image processing.

UNIT-III (10-Lectures)

IMAGE COMPRESSION:

Introduction, Need for image compression, Redundancy in images, Classification of redundancy in images, image compression scheme, Classification of image compression schemes, Huffman coding, Arithmetic coding, Predictive coding, Transformed based compression, Image compression standards, Wavelet-based image compression.

UNIT-IV (10-Lectures)

IMAGE SEGMENTATION:

Introduction to image segmentation, Detection of discontinuities - point, line and edge and combined detection; Edge linking and boundary description - local and global processing using Hough transform, Thresholding, Region oriented segmentation - basic formulation, region growing by pixel aggregation, region splitting and merging.

IMAGE MORPHOLOGY:

Introduction to Morphology, Dilation and Erosion, Opening and Closing, Hit-or-Miss Transformation, Some Basic Morphological Algorithms.

UNIT-V (10-Lectures)

DIGITAL VIDEO & CODING:

Basics of Video, Time-varying Image formation Models, Spatio-Temporal Sampling, Optical flow, General methodologies, Overview of coding systems, Video Compression Standards.

TEXT BOOKS:

1. R.Gonzalez, R.E.Woods, "*Digital Image Processing*", 3rd Edition, Pearson Education, India, 2009.

2. M. Tekalp, "*Digital Video Processing*", Prentice-Hall, 1995.

REFERENCES:

1. Rafael C. Gonzalez, Richard E Woods and Steven L. Eddins, "*Digital Image Processing using MAT LAB*" , Pearson Edu., 2004.
2. Bovik, "*Handbook of Image & Video Processing*", Academic Press, 2000
3. Yao Wang, Jorn Ostermann and Ya Qin Zhang, "*Video Processing and Communications*", Prentice Hall Publishers, 2002.