

Lectures for the course: Image Processing

Week 1

Lecture 1: 21/07/2004

- Introduction to the Course
- Expectations
- Evaluation Norms
- Applications of Digital Image Processing

Lecture 2: 22/07/2004

- Introduction to Digital Image Processing
- Low-level, Mid-level and High-level Image Processing
- Image processing at various regions of the EM spectrum
- Fundamental Steps in Digital Image Processing
- Components of an image processing system

Lecture 3: 23/07/2004

- Image formation in the human eye
- Rod and Cone cells
- Brightness adaptation and discrimination
- Weber's law
- Mach Band effects

Week 2

Lecture 4: 29/07/2004

- Image Sensing and Acquisition
- Sensor
- Acquisition using single sensor
- Acquisition using sensor strips
- Acquisition using sensor arrays

Lecture 5 (a+b) : 30/07/2004

- Simple Image Formation Model

- Sampling and Quantization
- Digital Image Representation
- Spatial and Gray Level Resolution
- Zooming and Shrinking of Digital Images
- Nearest neighbor interpolation and Bilinear interpolation
- Pixel Neighborhood
- Adjacency, Connectivity, Regions and Boundaries
- Distance Measures
- Short assignment on the above topics given

Week 3

Lecture 6: 05/08/2004

- Assignments checked and demonstrated

Lecture 7 (a+b) : 06/08/2004

- Image Enhancement in the Spatial Domain
- Gray Level Transformations
- Contrast Stretching
- Image Negatives
- Log Transformations
- Power Law Transformations
- Gamma Correction
- Gray Level Slicing
- Bit Plane Slicing
- Short assignment on the above topics given

Week 4

Lecture 8: 12/08/2004

- Histogram equalization

Lecture 9 (a+b) : 13/08/2004

- Assignments checked
- Masks/Filters
- Bitwise operations – AND, OR masks
- Addition and Subtraction - applications
- Smoothing filters – Mean filter, Median filter

- Sharpening filters – Laplacian mask

Week 5

Lecture 10: 19/08/2004

- Color Image Processing
- Human Perception of Color – Red, Green and Blue Color absorption in Cone Cells
- Primary Colors of Light
- Primary Color of Pigment
- RGB

Lecture 11 (a+b) : 20/08/2004

- Chromaticity Diagram
- HSV Color Space
- Color Histogram
- Color Based Image Retrieval
- Smoothing of Color Images
- Sharpening of Color Images
- Short assignment on the above topics given

Week 6

Lecture 12: 26/08/2004

- By Prof. J. Mukhopadhyay

Lecture 13 (a+b) : 27/08/2004

- By Prof. J. Mukhopadhyay

Week 7

Lecture 14: 02/09/2004

- By Prof. J. Mukhopadhyay

Lecture 15 (a+b) : 03/09/2004

- By Prof. J. Mukhopadhyay

Week 8

Lecture 16: 09/09/2004

- By Prof. J. Mukhopadhyay

Lecture 17 (a+b) : 10/09/2004

- By Prof. J. Mukhopadhyay

Mid Sem Exam was held here

Week 9

Lecture 18: 30/09/2004

- By Prof. J. Mukhopadhyay

Lecture 19 (a+b) : 01/10/2004

- By Prof. J. Mukhopadhyay

Week 10

Lecture 20: 07/10/2004

- Introduction to Wavelet Transform
- Stationary and Non-Stationary Signals
- Short Term Fourier Transform
- Continuous Wavelet Transform

Lecture 21 (a+b) : 08/10/2004

- DWT and MRA
- Haar Wavelets
- Daubechies' Wavelets
- QMF
- Two-dimensional DWT
- Compression using Wavelets
- Assignments given. To be checked after two weeks

Week 11

Lecture 22: 14/10/2004

- Morphological Image Processing
- Reflection and Translation
- Dilation and Erosion
- Dilation and Erosion Duality

Lecture 23 (a+b) : 15/10/2004

- Boundary Detection
- Region Filling
- Mid-sem papers were shown

Week 12

Lecture 24: 14/10/2004

- Connected Component Analysis
- Texture Analysis

Lecture 25 (a+b) : 29/10/2004

- Segmentation
- Point detection
- Line Detection
- Edge Detection
- Hough Transform
- Edge Linking

Week 13

Lecture 26: 04/11/2004

- Representation and Description
- Chain Code representation
- Rotation Invariance
- Descriptors
 - Major axis and Minor Axis
 - Basic Rectangle
 - Fourier Descriptor

Lecture 27 (a+b) : 05/11/2004

- Classes not held as all the students planned to appear for campus interview (Trilogy)

Week 14

Lecture 28: 10/11/2004

- Assignments checked

Lecture 29: 11/11/2004

- Summary and feedback