MANIPAL UNIVERSITY JAIPUR

School of Computing and Information Technology

Department of Computer Science and Engineering
Course Hand-out

Digital Image Processing | CS 1650 | 4 Credits

Session: 2015-2016 | Faculty: Harish Sharma

Course Outcomes: At the end of the course, students will be able to

[CS 1650.1] Understand fundamental Image Processing Pre-Processing task

[CS 1650.2] implement the fundamental image enhancement algorithms such as histogram modification, contrast manipulation, and edge detection, spatial filtering techniques, including linear and nonlinear methods.

[CS 1650.3] solve 2D Fourier transform, including the 2D DFT and FFT, and enhance skill development with their use in frequency domain filtering.

[CS 1650.4] Design and implement image compression and image segmentation techniques

[CS 1650.5] Apply image processing algorithms for practical object recognition and analysis applications.

A.   SYLLABUS

Prerequisites: Basic knowledge of Coordinate Geometry, Linear algebra and matrix operations.
Fundamentals of Image Processing: Steps in image processing, Image file formats, Basic relationships between pixels. Image Histogram. Color fundamentals & models – RGB, HSI YIQ; **Image Enhancement and Restoration:** Spatial domain enhancement: Point Operations-Log transformation, Power-law transformation. **Frequency domain enhancement**: introduction to image transform, Fourier transform, 2D DFT. Restoration: Noise models, Restoration using Inverse filtering and Wiener filtering; **Image Coding and Compression** Lossless compression, Lossy compression, JPEG, MPEG; **Image Segmentation and Representation and descriptions :** Grey level features edges and lines: Similarity and correlation, Template matching, Edge detection using templates; Representation scheme, Boundary Descriptors, Regional Descriptors; **Overview of Applications:** Biometric Authentication.

B.   TEXT BOOKS

i.   R. C. Gonzalez and R. E. Woods, "Digital Image Processing", 3rd Edition, Pearson Education, 2009.
ii. A.K Jain, "Fundamentals of Digital Image Processing", Prentice Hall of India, 1994.