



FIRST SEMESTER 2021-22
Course Handout

16-01-2023

Course No. : *EEE F435*
Course Title : *Digital Image Processing*
Instructor-in-Charge : *Dr. Rajesh Kumar Tripathy*

1. Scope and Objective of the Course:

The course introduces the students to the fundamentals of digital images and various processing techniques that are applied to the digital images. It begins with an introduction to the fundamentals of digital images and discusses the various discrete transforms, which are extensively used in image processing. It then goes on to discuss the different image processing techniques such as image enhancement, image segmentation, automatic image classification and recognition. This course is very helpful for the students interested to pursue research on computer vision, image processing, pattern recognition and applied artificial intelligence. The OpenCV based python software framework will be used in this course for the demonstration of different image processing algorithms. The students need to solve the programming assignments and gain hands on experience on the industrial applications of digital image processing.

2. Textbooks:

T1. Gonzalez, R. C. & R. E. Woods, Digital Image Processing, Pearson Education, 4th ed., 2017

3. Reference books/Materials

R1: OpenCV tutorial, https://opencv24-python-tutorials.readthedocs.io/_/downloads/en/stable/pdf/

4. Course Plan:

Lecture No.	Learning Objectives	Topics to be covered	Reference to Text Book
1-2	To introduce fundamental concepts and terms associated with digital images.	Introduction and digital image fundamentals.	Chap 2
3-5	To study image enhancement by gray level transformations	Some basic gray level transformations	Sec. 3.1, 3.2
6-7	To study Histogram processing of an image	Histogram processing	Sec 3.3
8-9	To learn image enhancement by filtering in the spatial domain	Spatial filtering	Sec. 3.4-3.7



10-11	Review of Fourier domain techniques	Fourier Transforms, DFT, Convolution	4.1-4.6
12-14	Filtering in the Fourier domain	Image smoothing and sharpening using Frequency domain filters	4.7-4.10
15-17	Image Restoration and Reconstruction	Noise Models, Inverse filtering	5.1-5.7
18-21	Image Compression	Information Theory, Huffman coding, Basic Compression Methods	8.1-8.2
22-24	Morphological Image Processing	Erosion, dilation, Opening closing, Hit-or-miss transformation, some basic morphological algorithms	9.1-9.4, 9.5.1-9.5.7
25-30	Image Segmentation	Point, line and edge detection, thresholding	10.1-10.3
31-35	Representation and description	Boundary following, chain codes, signatures, boundary descriptors, regional descriptors, principal components analysis (PCA)	11.1.1-11.1.2, 11.1.5, 11.2, 11.3.3, 11.3.4, 11.4
36 –38	Introduction to Medical Imaging and Advances in Medical Image Processing	Image Registration	Class Notes
39 –44	Object Recognition	Patterns and pattern classes, decision-theoretic methods	12.1-12.2

5. Evaluation Scheme:

Component	Durati on	Weightage (%)	Marks	Date & Time	Nature of Component
Mid-Sem Exam	90 min	30%	90	13/03 9.30 - 11.00AM	Closed Book
Programming Assignments using Python	-----	30%	90	To be announced	Open Book
Comprehensive Exam	180 min	40%	120	08/05 FN	Closed Book

6. Chamber Consultation Hour: To be announced

7. Notices: Notices concerning this course will be on CMS.

8. Make-up Examination: Make-up will be given on genuine grounds only. Prior application should be made for seeking the make- up examination.



9. Academic Honesty and Integrity Policy: Academic honesty and integrity are to be maintained by all the students throughout the semester and no type of academic dishonesty is acceptable.

Rajesh Kumar Tripathy
INSTRUCTOR-IN-CHARGE

