Kadi Sarva Vishwavidyalaya

Faculty of Engineering & Technology

Fourth Year Bachelor of EC Engineering

(VIIIthsem Academic Year 2020)

Subject Code: EC801-N	Subject Title: Digital Image Processing

Course Objective:

- To present a problem oriented introductory knowledge of digital image processing.
- To address the underlying concepts and methods behind human vision, digital image processing and its applications.

Teaching scheme				Total Credit	EvaluationScheme					
L	T	P	Total		Theory		IE Marks	CIA Marks	Pract. Marks	Total Marks
Hrs	Hrs	Hrs	Hrs		Hrs	Marks				
04	00	02	06	05	03	70	30	20	30	150

Outline Of the Course:

Sr. No.	TitleoftheUnit	Minimum Hours
1.	Introduction	06
2.	Fundamental of Digital Imaging	09
3.	Image Transformation in Spatial domain	09
4.	Filtering in the Frequency Domain	09
5.	Color Image Processing	09
6.	Image Compression	09
7.	Morphological Image Processing	09
	Total	60

Total hours (Theory): 60
Total hours (Lab):
Total hours:

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Detailed Syllabus

Sr. No.	Topic	Lecture Hours	Weightage(%)
1	**Introduction:** Overview of digital image processing, Image representation, Types of images based on color, digital image processing operations, applications.	06	**10**
2	**Fundamental of Digital Imaging:** Human visual system & its properties, Sampling & quantization, Image storage & file formats, Some basic relationships between pixels.	09	**16**
3	**Image Transformation in Spatial domain:** Basic Intensity Transformations functions, Histogram Processing, Fundamentals of Spatial Filtering.	09	**15**
4	**Filtering in the Frequency Domain:** Preliminary Concepts, Extension to functions of two variables, 2D- Discrete Fourier Transform, Image Smoothing, Image Sharpening.	09	**15**
5	**Color Image Processing:** Color Fundamentals, Color Models.	09	**12**
6	**Image Compression:** Fundamentals of redundancies, Basic Compression Methods: Huffman coding, Arithmetic coding, JPEG Compression standard.	09	**16**
7	**Morphological Image Processing:** Erosion and dilation, Opening and closing, Basic Morphological Algorithms: Boundary Extraction, Hole filling, Thinning, Thickening.	09	**16**
	Total	**60**	**100**

Instructional Method and Pedagogy:

- At the start of course, the course delivery pattern, prerequisite of the subject will be discussed.
- Lectures will be conducted with the aid of multi-media projector, black board, OHP etc.
- Attendance is compulsory in lecture and laboratory which carries 10 marks in overall evaluation.
- One internal exam will be conducted as a part of internal theory evaluation.
- Assignments based on the course content will be given to the students for each unit and will be evaluated at regular interval evaluation.
- Surprise tests/Quizzes/Seminar/tutorial will be conducted having a share of five marks in the overall internal evaluation.
- The course includes a laboratory, where students have an opportunity to build an appreciation for the concepts being taught in lectures.
- Experiments shall be performed in the laboratory related to course contents.

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Learning Outcome:

At the end of this course, the student would be able

- The student can identify different areas of image processing. One can find the applications of all the areas in day to day life from industry, medical science, PCB verification etc.

TEXT BOOKS:

1. Digital Image Processing, Rafael C. Gonzalez and Richard E. Woods, Third Edition, Pearson Education

REFERENCE BOOKS:

1. Digital Image Processing Using MATLAB, Rafael C. Gonzalez, Richard E. Woods, and Steven L. Eddins, Second Edition, Tata McGraw Hill Publication
2. Digital Image Processing, S Sridhar, Oxford University Press.

List of experiments(Not limited to following. Subject teacher may modify the same)**:**

No.	List of Experimentation
1.	To read , write and display the image
2.	Compression of image files form '.tif' to '.jpg.'
3.	To find connectivity between given pixel
4.	To generate negative, bright and dark image from given image
5.	To see the effect of reducing the number of gray levels in an image
6.	To see the effect of zooming the original image.
7.	Program to show the bit plane slicing, it also illustrate the usage ofcommand 'bit get'
8.	To retrieve image from magnitude and phase information from its Fourier transform.
9.	To find and display the FFT of a 2D image and see the effect of rotation of image on its FFT
10.	Program to find out histogram of the image and to illustrate the usage of command 'imhist'. Program for image enhancement using Histogram equalization.
11.	To pass the image through a low pass filter and see its effect
12.	To pass the image through a high pass filter and see its effect
13.	To illustrate the effect of high pass filter using various operators.
14.	Program to show the high pass filtering in spatial domain, the mask used is 'Sobel' mask. It also illustrates the usage of command 'conv2'.