Syllabus

Image and Video Processing

Course Code	**23EC6701**	**Year**	IV	**Semester**	I
Course Category	Honors	**Branch**	ECE	**Course Type**	Theory
Credits	3	**L-T-P**	3-0-0	**Pre requisites**	-
Continuous Internal Evaluation	30	**Semester End Evaluation**	70	**Total Marks**	100

Course Outcomes		
Upon successful completion of the course, the student will be able to		BL
CO1	Apply the mathematical knowledge for image analysis	L3
CO2	Analyze various image processing algorithms.	L4
CO3	Illustrate the fundamentals of digital video, sampling and filtering of video signals.	L3
CO4	Explain various methods for two dimensional motion estimation and their applications in video processing	L4

Contribution of Course Outcomes towards achievement of Program Outcomes & Strength of Correlations (3:High, 2:Medium, 1:Low)

COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PSO1**	**PSO2**
CO1	3					1			1		1	2	
CO2	3	3				1			1		1	2	
CO3	2					1			1		1	2	
CO4	3	2				1			1		1	2	
Avg.	3	3				1			1		1	2	

Syllabus		
Unit No.	**Contents**	**Mapped CO**
1	**Introduction:** Introduction to Image Processing, Fundamental steps in digital image processing, components of an image processing system, Image sensing and acquisition, image sampling and quantization, Some basic relationships between pixels. **Image Transforms:** Need for image transforms, Image transforms, 2D Discrete Fourier Transform, Walsh Transform, Hadamard transform, Haar Transform, Slant transform, Discrete Cosine transform	**CO1**
2	**Image Enhancement:** Spatial domain methods: Histogram processing, Fundamentals of Spatial filtering, Smoothing spatial filters, Sharpening spatial filters. **Filtering in frequency domain:** Basics of filtering in frequency domain, image smoothing, image sharpening **Image Restoration:** A model of the image degradation / Restoration process, Noise models, Linear, Position –Invariant Degradations, Estimating the degradation function, Inverse filtering, Minimum mean square error (Wiener) filtering.	**CO1, CO2**

3	**Image segmentation:** Fundamentals, point, line, edge detection, thresholding, and Region –based segmentation. **Image compression**: Fundamentals, Basic compression methods: Huffman coding, Arithmetic coding, LZW coding, Block Transform coding, Predictive coding	**CO1, CO2**
4	**Basic Steps of Video Processing:** Analog Video, Digital Video. Time-Varying Image Formation models: Three-Dimensional Motion Models, Geometric Image Formation, Photometric Image Formation, Sampling of Video signals, Filtering operations	**CO3**
5	**2-D Motion Estimation:** Optical flow, General Methodologies, Pixel Based Motion Estimation, Block- Matching Algorithm, Mesh based Motion Estimation, Global Motion Estimation, Region based Motion Estimation, Multi resolution motion estimation	**CO3,CO4**

Learning Resources
Text Books
1. Gonzalez and Woods, Digital Image Processing, 3rd Ed., Pearson, 2008. 2. M. Tekalp, Digital Video Processing –Prentice Hall International-1995. 3. Yao Wang, Joem Ostermann and Ya–quin Zhang, Video Processing and Communication, 1st Ed., PH Int.,2001
Reference Books
1. Anil K. Jain, Fundamentals of Digital Image Processing, Prentice Hall of India, 9th Ed., Indian Reprint, 2002. 2. S. Jayaraman, S. Esakkirajan, and T. Veerakumar, Digital Image Processing –McGraw-Hill Education, 2018.
E-Resources
1. http://nptel.iitm.ac.in/video.php?subjectId=117105079

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