

COMPUTER VISION

II Semester: CSE

Course Code	Category	Hours / Week			Credits	Maximum Marks		
BCSB15	Elective	L	T	P	C	CIA	SEE	Total
		3	0	0	3	30	70	100
Contact Classes: 45	Total Tutorials: Nil		Total Practical Classes: Nil			Total Classes: 45		

I. COURSE OVERVIEW:

In this course on computer vision, students gain comprehensive knowledge and practical skills in various aspects of image analysis and pattern recognition. The course focuses on applying computer vision techniques to medical imaging, specifically in CT-Scan and MRI analysis. Students learn how to process and analyze medical images to extract meaningful information and assist in diagnosis.

II. OBJECTIVES:

The students will try to learn:

- I. Both the theoretical and practical aspects of computing with images.
- II. The foundation of image formation, measurement, and analysis.
- III. The geometric relationships between 2D images and the 3D world.
- IV. The principles of state-of-the-art deep neural networks.

III. COURSE OUTCOMES:

After successful completion of the course, students should be able to:

CO 1	Demonstrate an application of computer vision in CT-Scan and MRI analysis.	Understand
CO 2	Develop an edge detection technique used for image segmentation.	Create
CO 3	Develop a segmentation technique used for morphological filtering application.	Create
CO 4	Apply feature extraction and analysis in data preprocessing.	Apply
CO 5	Make use of different types of pattern analysis techniques in dimensionality reduction.	Create

IV. SYLLABUS

UNIT-I	INTRODUCTION	Classes: 08
Overview, computer imaging systems, lenses, Image formation and sensing, Image analysis, pre-processing and Binary image analysis.		
UNIT-II	EDGE DETECTION TECHNIQUES	Classes: 09
Edge detection, Edge detection performance, Hough transform, corner detection.		
UNIT-III	SEGMENTATION	Classes: 08
Segmentation, Morphological filtering, Fourier transform.		
UNIT-IV	FEATURE EXTRACTION	Classes: 10

Feature extraction, shape, histogram, color, spectral, texture, using CVIP tools, Feature analysis, feature vectors, distance /similarity measures, data pre processing.		
UNIT-V	ANALYSIS	Classes: 10
Pattern Analysis: Clustering: K-Means, K-Medoids, Mixture of Gaussians. Classification: Discriminant Function, Supervised, Un-supervised, Semi supervised. Classifiers: Bayes, KNN, ANN models; Dimensionality Reduction: PCA, LDA, ICA, and Non-parametric methods.		
Text Books:		
1. Computer Vision: Algorithms and Applications by Richard Szeliski. 2. Deep Learning, by Good fellow, Bengio, and Courville. 3. Dictionary of Computer Vision and Image Processing, by Fisher et al.		
Web References:		
1. http://www.sctie.iitkgp.ernet.in/ 2. http://www.rkala.in/softcomputingvideos.php 3. http://www.sharbani.org/home2/soft-computing-1 4. http://www.myreaders.info/html/soft_computing.html		
E-Text Books:		
1. https://www.books.google.co.in/books?id=bVbj9nhvHd4C 2. https://www.books.google.co.in/books?id=GrZHPgAACAAJ&dq=1.+J.S.R.Jang,+C.T.Sun+and+E.Mizutani,+Neuro,+Fuzzy+and+Soft+Computing,+PHI,+2004,Pearson+Education.		