

COMPUTER VISION

II Semester: CSE																							
Course Code	Category	Hours / Week			Credits	Maximum Marks																	
BCSC17	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																
<p>I. COURSE OVERVIEW: This course provides insights into Image formation and filtering, including camera and optics -Light and color -Image filtering Image processing Feature detection and matching Image compression. The topics include Multiple views and stereo Recognition Segmentation Color Imaging, Introduction to spectral imaging and Introduction to machine learning Applications.</p> <p>II. COURSE OBJECTIVES: The students will try to learn: I. 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.</p> <p>III. COURSE OUTCOMES: After successful completion of the course, students should be able to</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tbody> <tr> <td style="width: 10%;">CO 1</td> <td style="width: 70%;">Identify basic concepts, terminology, theories, models and methods in the field of computer vision.</td> <td style="width: 20%;">Understand</td> </tr> <tr> <td>CO 2</td> <td>Make use of basic methods of computer vision related to multi-scale representation, edge detection and detection of other primitives, stereo, motion and object recognition,</td> <td>Apply</td> </tr> <tr> <td>CO 3</td> <td>Experiment a design of a computer vision system for a specific problem</td> <td>Apply</td> </tr> <tr> <td>CO 4</td> <td>Make use of clustering algorithms for finding the nearer objects</td> <td>Apply</td> </tr> <tr> <td>CO 5</td> <td>Illustrate the classification algorithms for construction of a data model.</td> <td>Apply</td> </tr> </tbody> </table> <p>IV. SYLLABUS</p> <p>MODULE –I: INTRODUCTION (08) Overview, computer imaging systems, lenses, Image formation and sensing, Image analysis, pre-processing and Binary image analysis.</p> <p>MODULE –II: EDGE DETECTION TECHNIQUES (09) Edge detection, Edge detection performance, Hough transform, corner detection.</p> <p>MODULE –III: SEGMENTATION (08) Segmentation, Morphological filtering, Fourier transform.</p> <p>MODULE –IV: FEATURE EXTRACTION (10) Feature extraction, shape, histogram, color, spectral, texture, using CVIP tools, Feature analysis, feature vectors, distance /similarity measures, data pre-processing.</p> <p>MODULE –V: ANALYSIS (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</p>									CO 1	Identify basic concepts, terminology, theories, models and methods in the field of computer vision.	Understand	CO 2	Make use of basic methods of computer vision related to multi-scale representation, edge detection and detection of other primitives, stereo, motion and object recognition,	Apply	CO 3	Experiment a design of a computer vision system for a specific problem	Apply	CO 4	Make use of clustering algorithms for finding the nearer objects	Apply	CO 5	Illustrate the classification algorithms for construction of a data model.	Apply
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methods.

V TEXT BOOKS:

1. Richard Szeliski, “Computer Vision: Algorithms and Applications”, Springer, 2010.
2. Good fellow, Bengio, and Courville, “Deep Learning”, MIT Press book, 2014.
3. Fisher et al, “Dictionary of Computer Vision and Image Processing”, 2016.

VI. Reference Books:

1. Emanuele Trucco and Alessandro Verri “Introductory Techniques for 3-D Computer Vision”, Prentice Hall, 1998.
2. Olivier Faugeras, “Three-Dimensional Computer Vision”, The MIT Press, 1993.

VII. WEB REFERENCES:

1. <http://www.sctie.iitkgp.ernet.in/>
2. <http://www.rkala.in/softcomputingvideos.php>
3. <http://www.sharbani.org/home2/soft-computing>
4. http://www.myreaders.info/html/soft_computing.html

VIII. 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.Mi+zutani,+Neuro,+Fuzzy+and+Soft+Computing,+PHI,+2004,Pearson+Education.>