

## Computer Vision

Course Code: UCST00023T

Course Title: Computer Vision

Semester: II

Credits: 04

### Rationale

Computer vision is a field of artificial intelligence that trains computers to interpret and understand the visual world. Using digital images from cameras and videos and deep learning models, machines can accurately identify and classify objects and then react to what they “see.” The focus of the course is to develop the intuitions and mathematics of the lecture methods, and then to learn about the difference between theory and practice in the problem sets.

### Course Outlines

Contents	No of Lectures
<u>Unit-I</u> Overview, computer imaging systems, lenses, Image formation and sensing, Image analysis, pre-processing and Binary image analysis.	10
<u>Unit-II</u> Edge detection, Edge detection performance, Hough transform, corner detection.	10
<u>Unit-III</u> Segmentation, Morphological filtering, Fourier transform Recent trends in Activity Recognition, computational photography, Biometrics.	10
<u>Unit-IV</u> Feature extraction, shape, histogram, colour, spectral, texture, using CVIPtools, Feature analysis, feature vectors, distance /similarity measures, data pre-processing.	10
<u>Unit-V</u> 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.	10

### Course Outcomes

Upon successful completion of this course, candidates will be able to:

- Develop the practical skills necessary to build computer vision applications using image sensing and analysis.