RAJIV GANDHI PROUDYOGIKI VISHWAVIDYALAYA, BHOPAL

New Scheme Based On AICTE Flexible Curricula

CSE-Artificial Intelligence and Machine Learning/ Artificial Intelligence and Machine Learning, VI-Semester

Departmental Elective AL603 (A) Image and Video Processing

Course Objective:

The students will be able to work with images and videos in several ways. These methods can be used as pre-processing steps for complex models.

Detailed Contents:

Module 1: Image representation and analysis, Introduction to computer Vision, Numerical representation of images, Image augmentation, enhancement, processing, color transforms, geometric transforms, feature recognition and

extraction

Module 2: Image Segmentation Object detection, breaking image into parts, finding contours and edges of various objects in image, Background subtraction for video.

Module 3: Object Motion and tracking Tracking a single point over time, motion models to define object movement over time, analyze

videos as sequences of individual image frames, methods to track a set of features over time,

matching features from image frame to other, tracking a moving car using optical flow

Module 4: Robotic localization

Bayesian statistics to locate a robot in space, sensor measurements to safely navigate an

environment, Gaussian uncertainty, histogram filter for robot localization in python.

Module 5: Image Restoration

Degradation model, noise models, estimation of degradation function by modeling, restoration

using Weiner filters and Inverse filters

Laboratory/ Practicals (if any): Mention list of Practicals

1. Various forms of image representation
2. Apply various image segmentation algorithms
3. Apply object motion and tracking
4. Apply object localization
5. Apply image restoration

Text Books/Suggested References:

1. Audio Video Systems, Bali & Bali, Khanna Book Publishing 2020.
2. Handbook of Image and Video Processing by Alan C. Bovik, Academic Press, 2000.
3. Python 3 Image Processing, Ashwin Pajankar, BPB Publication, 2019.
4. https://www.coursera.org/learn/image-processing

Course Outcomes: After completion of course, students would be able to:

1. Understand images and videos representation in a detailed manner.
2. Apply ML techniques for image processing in different scenarios.
3. Apply various object detection and image segmentation algorithms
4. Apply various image restoration techniques and algorithm