



E2MATRIX

Training and Research Institute

www.e2matrix.com

COMPUTER VISION AND ROBOTICS COURSE STRUCTURE

Computer vision is an interdisciplinary field that deals with how computers can be made to gain high-level understanding from digital images or videos. From the perspective of engineering, it seeks to automate tasks that the human visual system can do. Computer vision tasks include methods for acquiring, processing, analyzing and understanding digital images, and in general, deal with the extraction of high-dimensional data from the real world in order to produce numerical or symbolic information, e.g., in the forms of decisions. Understanding in this context means the transformation of visual images (the input of the retina) into descriptions of the world that can interface with other thought processes and elicit appropriate action. This image understanding can be seen as the disentangling of symbolic information from image data using models constructed with the aid of geometry, physics, statistics, and learning theory. As a scientific discipline, computer vision is concerned with the theory behind artificial systems that extract information from images.



The image data can take many forms, such as video sequences, views from multiple cameras, or multidimensional data from a medical scanner. As a technological discipline, computer vision seeks to apply its theories and models for the construction of computer vision systems. Sub-domains of computer vision include scene reconstruction, event detection, video tracking, object recognition, object pose estimation, learning, indexing, motion estimation, and image restoration. The main purpose of this “Hands-on Training on Computer Vision” is to create awareness and enrich knowledge for research scholars, faculty and students in the area of Computer vision.

Module 1: Introduction to Computer vision

The journey into vision robotics will start from basic discussion on vision sensors and different cameras available. We will explore the application of vision in robotics and Mechatronic systems.

Module 2: Digital Image Processing in MATLAB

Basics of MATLAB, Image Acquisition and Image Processing toolboxes.

Module 3: Image Acquisition and Processing

The understanding for Pixels, color spaces, vector indexing and matrix indexing will be developed in this module.

Module 4: Image Manipulation in MATLAB

Adjusting image intensity, Image histogram equalization, arithmetic functions to enhance images, Threshold, Edge Detection, Template matching, Distinguishing colors, Shape Detection, frequency domain filtering and convolution.

Module 5: Parallel Port Programming & Machine Control

Robots that will be covered in the workshop are:

1. Ball following Robot using Matlab.
2. Color Detection
3. Speech Control

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