	Computer Vision
Lab 01: Introduction to Digital Image Processing and Computer Vision	

Lab Objectives:

In this lab, you will:

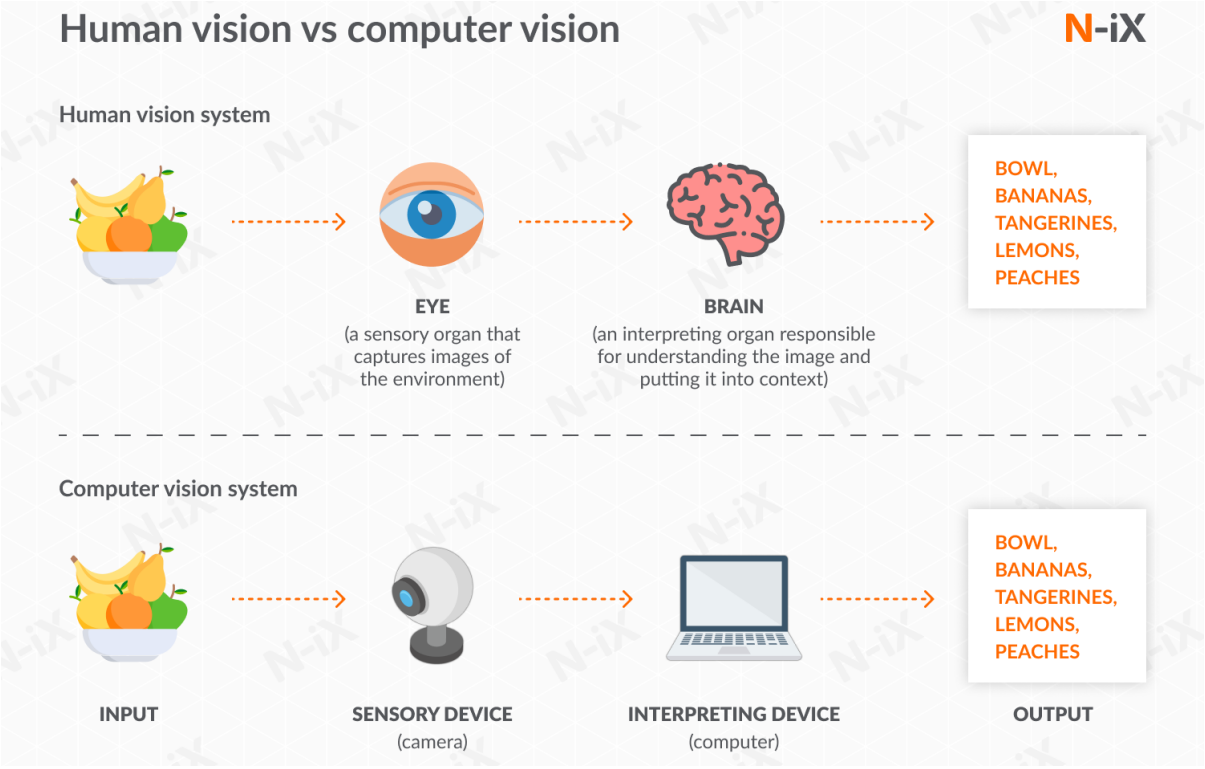
- Installation of environment.
- What is Digital Image Processing and Computer Vision?
- Running Basic functions in Digital Image Processing and Computer Vision.

1.1 Digital Image Processing:

DIP focuses on **developing a computer system that is able to perform processing on an image**. The input of that system is a digital image and the system process that image using efficient algorithms, and gives an image as an output. The most common example is Adobe Photoshop.

1.2 Computer Vision:

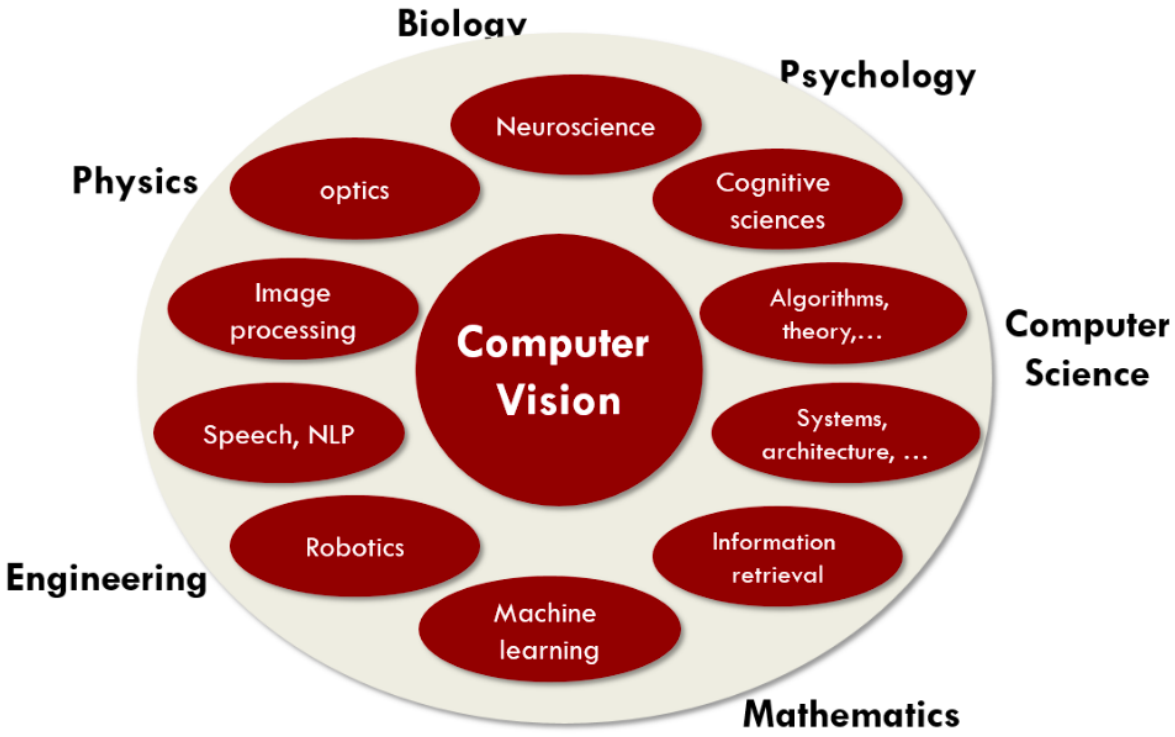
Computer vision is **a field of artificial intelligence that trains computers to interpret and understand the visual world**. Using digital images from cameras and videos and deep learning models, machines can accurately identify and classify objects — and then react to what they "see".



1.3 What is computer vision?

Two definitions of computer vision Computer vision can be defined as a scientific field that extracts information out of digital images. The type of information gained from an image can vary from identification, space measurements for navigation, or augmented reality applications. Another way to define computer vision is through its applications. Computer vision is building algorithms that can understand the content of images and use it for other applications. We will see in more details in the last section from the different domains where computer vision is applied.

Application in Many domains



1.4 Color

1.4.1 Physics of Color

What is color?

Color is the result of interaction between physical light in the environment and our visual system. A psychological property of our visual experiences when we look at objects and lights, not a physical property of those objects or lights [1].

Color and light

White light is composed of almost equal energy in all wavelengths of the visible spectrum

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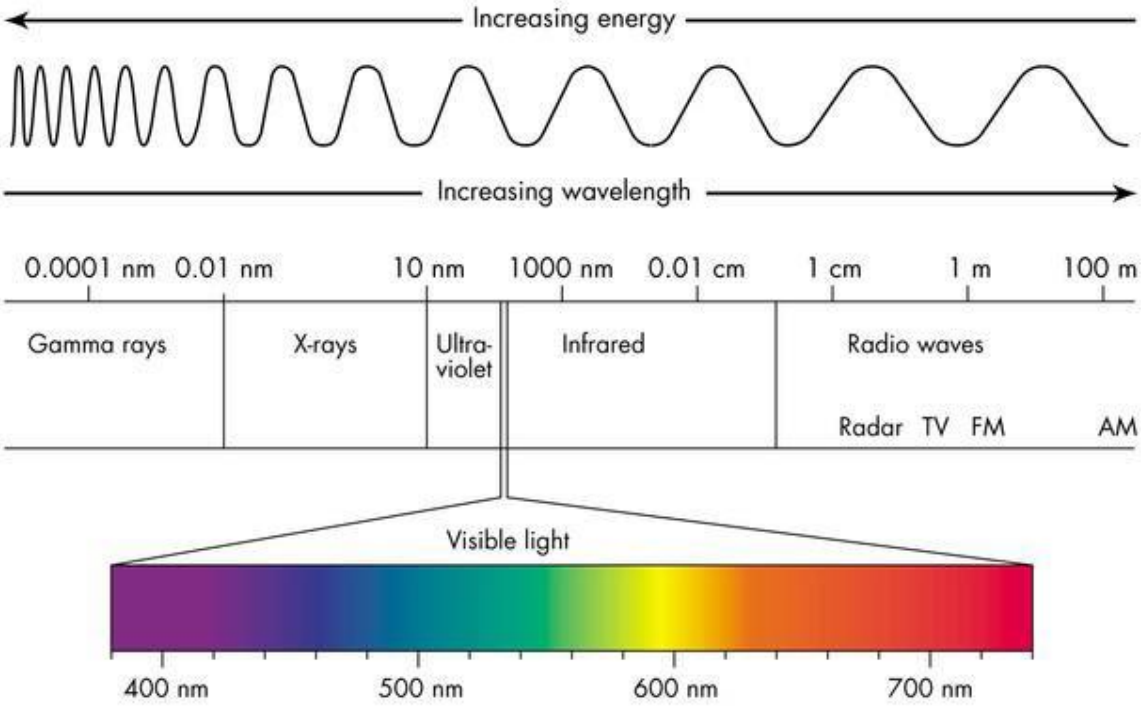

Lab Task:

a. Read Image and Display its matrix.
b. Show red, green and blue channels matrix separately. In Image and Matrix form.
c. Write a program in Python to read image and convert it into binary image.
d. Write a program in Python to read image and convert it into Grayscale image.
e. Convert image from BGR to RGB.
f. Convert RGB to following forms:
    i. Hex code.
    ii. CMYK.
    iii. HSI/HSV.

References:

[1] Stephen E Palmer. Vision science: Photons to phenomenology. MIT press,1999.