Digital Image Processing

In today's digital life, digital images are everywhere around us. An image is a visual representation of an object, a person, orascene.A digital image is a two-dimensional function f(x, y) that is a projection of a 3-dimesional scene into a 2 dimensional projection plane, where x,y represents the location of the picture element or pixel and contains the intensity value. When values of x, y and intensity are discrete, then the image is said to be a digital image. Mathematically, a digital image is a matrix representation of a two-dimensional image using a infinite number of points cell elements ,usually referred to as pixels(picture, elements, orpels).Each pixel is represented by numerical values :for gray scale images, a single value representing the intensity of the pixel(usually in a[0,255]range)is enough;forcolor images, three values (representing the amount of red (R), green (G), and blue (B)) are stored. If an image has only two intensities, then the image is known as a binary image.

MATLAB®supports the following image types:

1. **Gray scale:** A grayscale image, having M×N pixels is represented as a matrix of double data type of M×N size in MATLAB. Element values denote the pixel grayscale intensities in the range [0,1] with 1 = white and 0 = black.

2. **True-color RGB:** A true-color red-green-blue (RGB) image is represented as three-dimensional $M \times N \times 3$ double matrixes in MATLAB. Each pixel has red, green and blue components. The color components of a pixel (m,n) are denoted as(m,n,1) = red, (m,n,2) = green, (m,n,3) = blue.

3. **Indexed:** In MATLAB, Indexed (palette) images are represented with an index matrix of size M×N and a color map matrix of size K×3.The color map matrix hold colors

used in the image and the index matrix represents the pixels by referring to colors in the color map.

4. **Binary:** In MATLAB, a binary image having two values, 1 (White) or 0 (black), is represented by an M×N

Logical matrix

Human Visual System

The human visual system consists of two parts: eye and brain. The human eye acts as a receptor of images by capturing light and converting it into signals. These signals are then transmitted to the brain for further analysis.

Classification of Digital Images

They are stored, digital images can be classified
Into two categories:
(1) Raster or Bitmap image
(2) Vector image.

A bitmap or raster image is a rectangular array of sampled values or pixels. These images have a fixed number of pixels. In the zooming of a raster image, mathematical interpolation is applied. The quality of a zoomed image degrades after a particular value of zooming factor.

The solution of a bitmap image is determined by the sensing device .BMP, GIF, PNG, TIFF and JPEG common image formats are bitmap or raster image formats.

On the other hand, vector images are stored in the form of mathematical lines.

It is many useful of basic daily life in image processing.