

## Chapter 3

# MATRICES – APPLICATION AND IMPLEMENTATION

### What is Digital Image Processing?

- '**DIGITAL IMAGE PROCESSING**' is a subcategory of '**DIGITAL SIGNAL PROCESSING**' where we use computer algorithms to perform on digital images. It has many advantages when compared to '**ANALOG IMAGE PROCESSING**' (can process 2D images like waves, graphs..).
- In DIP, we give a digital image as an input, implement different computer algorithms for processing and finally get an image (processed image as the output). Blurring, zooming, sharpening, edge detection, colour reproduction are few of the very basic functionalities of DIP.
- Tools like '**ADOBE PHOTOSHOP**' developed by adobe, '**MATLAB**' developed by mathworks, '**OPENCV**' originally developed by Intel are used to perform digital image processing on images.

### How can we use MATLAB for Digital Image Processing?

- DIP requires a lot of mathematical computations to be performed and 'MATLAB' is a platform which helps us to accomplish it.  
'MATLAB' is developed in a way so as to apply and process digital images and execute various computations on it to get the desired output.
- It helps us to represent data in the form of **MATRICES** which will further help us to use different mathematical functions on it to perform necessary calculations.
- Plotting of graphs from existing vector values is very easy and further processing can also be done on it.
- MATLAB is not only a programming language, but also a programming environment. You can perform operations on the command line or execute functions repetitively.
- For example, we can collect images of a person's face taken in different profiles, in the same lighting and at different angles, subject it to 'MATLAB', process all the 2D images and make a 3D image eventually.
- Image reconstruction using MATLAB is a sophisticated task. It requires interfacing MATLAB with other tools which helps us to **VOXELIZE** (closed 3D mesh of a polygon) images.

### Different Applications of MATLAB

1. Digital Image Processing
2. Numeric Computation
3. Data Analysis and Visualization
4. Programming and Algorithm Development
5. Application Development and Deployment

To know more about basic functions of MATLAB, refer the pdf attached to this link:  
<https://drive.google.com/file/d/0B4LuCgp-Rj0tdVk5QzZRVXVCNU0/view?usp=sharing>