# E2MATRIX

## Training and Research Institute

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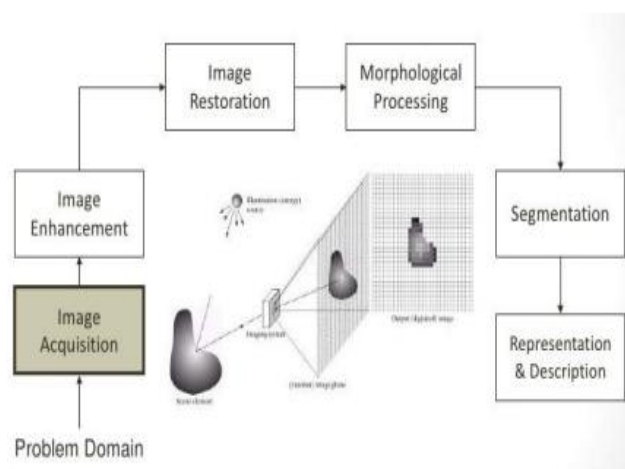
# IMAGE PROCESSING USING MATLAB COURSE STRUCTURE

Digital image processing is the use of computer algorithms to perform image processing on digital images. As a subcategory or field of digital signal processing, digital image processing has many advantages over analog image processing. It allows a much wider range of algorithms to be applied to the input data and can avoid problems such as the build-up of noise and signal distortion during processing. Since images are defined over two dimensions (perhaps more) digital image processing may be modeled in the form of multidimensional systems. Digital Processing techniques help in manipulation of the digital images by using computers. As raw data from imaging sensors from satellite platform contains deficiencies. To get over such flaws and to get originality of information, it has to undergo various phases of processing. The three general phases that all types of data have to

undergo while using digital technique are Preprocessing, enhancement and display, information extraction.

## Module 1: Working with Images

<u>Objective</u>: Understand different image types available in IMAGE PROCESSING, and how they can be read into IMAGE PROCESSING.

1. Image types
2. Supported IMAGE PROCESSING data types for representing images
3. Binary Images
4. Grayscale images
5. Index Images
6. RGB images
7. Importing and exporting images in IMAGE PROCESSING
8. Finding image pixel values
9. Calculating image statistics
10. Converting image formats

## Module 2: Image Enhancement Techniques:

<u>Objective</u>: Enhance image characteristics by adjusting the Image intensity and isolating a region of interest,

1. Adjusting image intensity
2. Histogram stretching
3. Histogram equalization
4. Using arithmetic functions to enhance images
5. Correcting lens distortion

## Module 3: Filtering Images

Objective: Understand how block processing works: implement spatial-domain and frequency-domain filters and use filtering techniques to reduce the effects of unwanted distortions.

1. Defining filtering
2. Filtering process
3. Performing filtering
4. Filtering applications: smoothing, edge detection, and sharpening
5. Region-of-interest processing
6. Specific applications of filtering

## Module 4: Feature Extraction and Segmentation

Objective: Extract image features and measurements using different segmentation methodologies.

1. Isolating image features using thresholding
2. Performing morphological segmentation
3. Creation of structuring elements
4. Erosion and dilation
5. Measurement of region properties
6. Reconstructing images and object
7. Segmenting images based on texture