Image and Video Processing

Digital Image

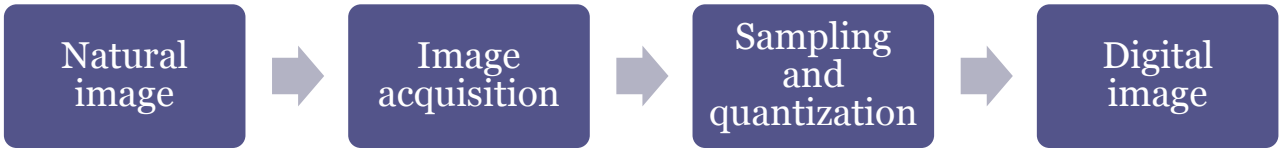
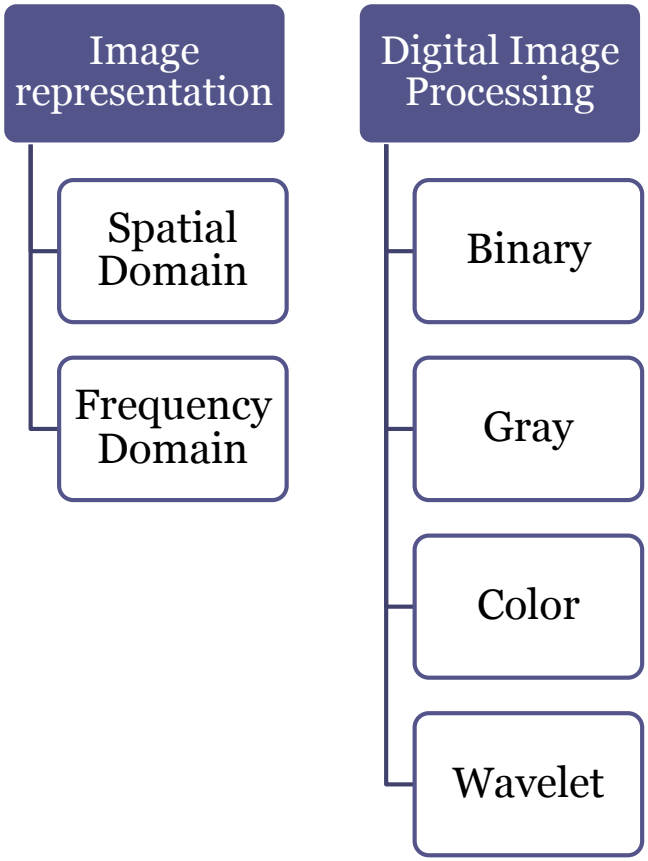


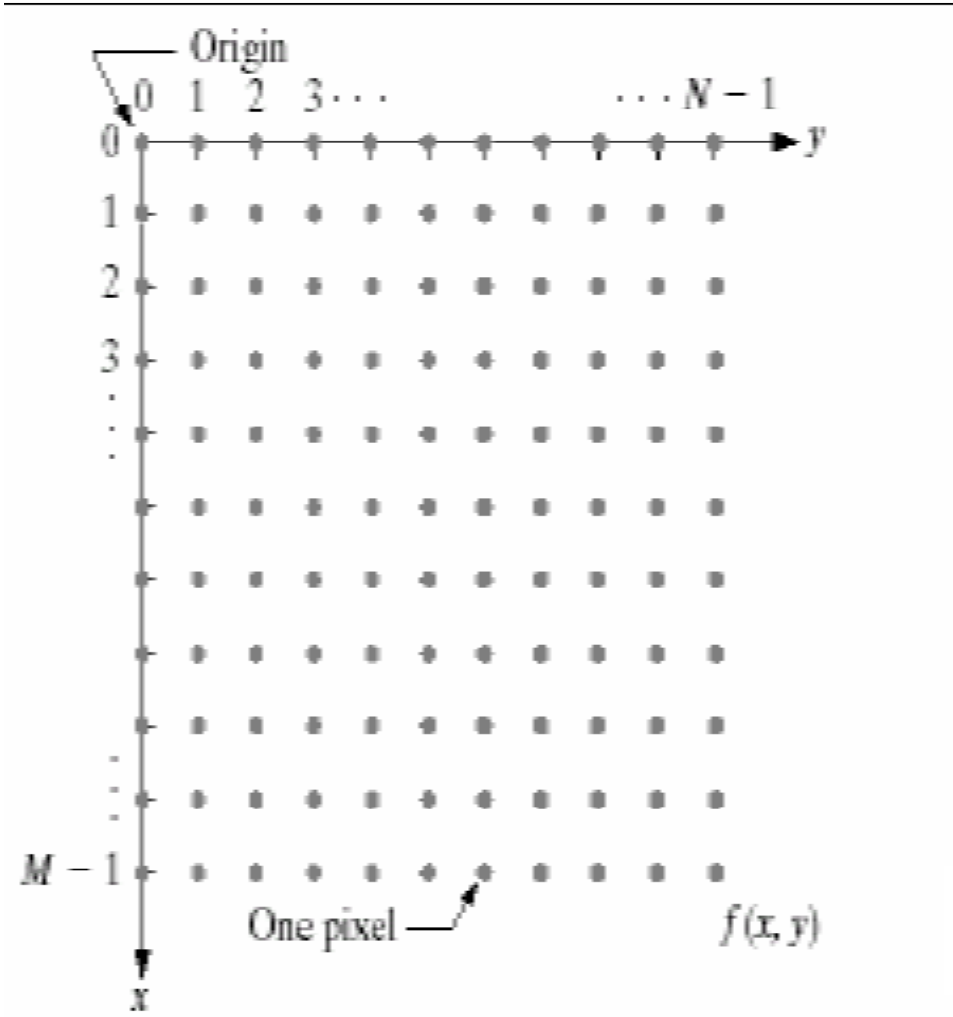
Image Representation and Processing



Digital image

- An image with countable number of rows and columns
- Fixed range of brightness for pixels

Matrix representation of Digital Image (spatial)



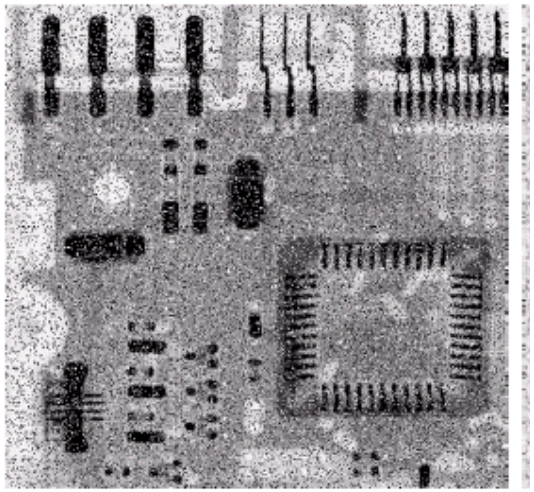
Digital image

- Has countable number of rows and columns
- Intensity value of pixel has fixed number of values
- Thus discretized both in spatial coordinate (row and column number) and brightness value of each pixel
- Can be represented by an image matrix
- Size of image matrix is same as size of image

Color and Binary Image Processing

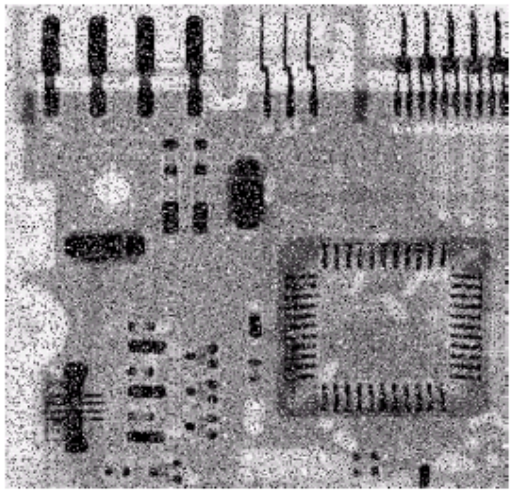
- Restoration
- Enhancement
- Segmentation
- Compression
- Object Recognition

Image Filters for Enhancement



Original Image
With Noise

Image Filters for Enhancement



Original Image With Noise

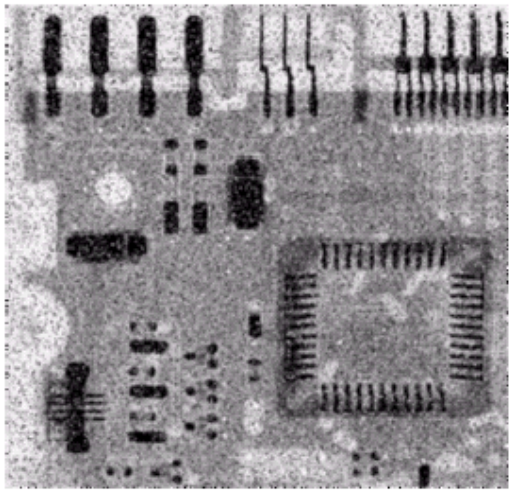
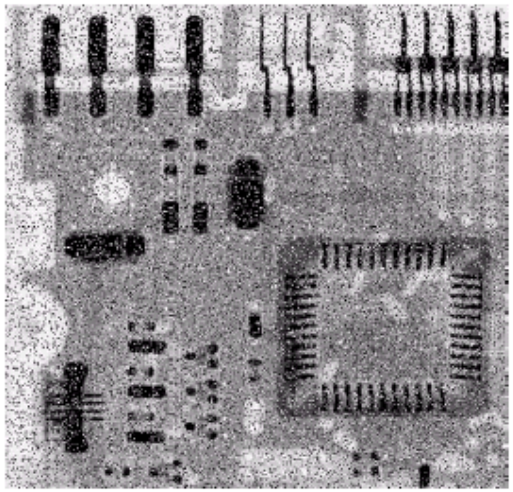


Image After Averaging Filter

Image Filters for Enhancement



Original Image With Noise

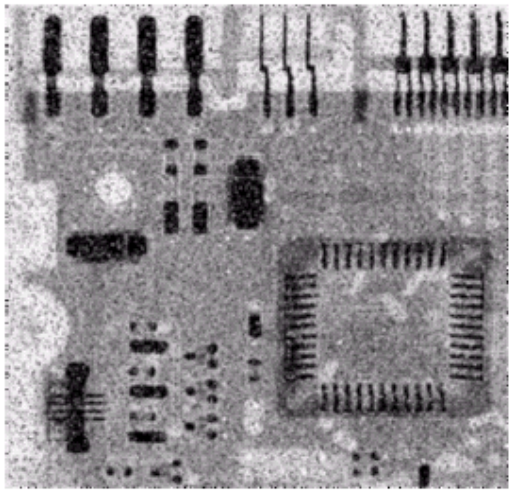


Image After Averaging Filter

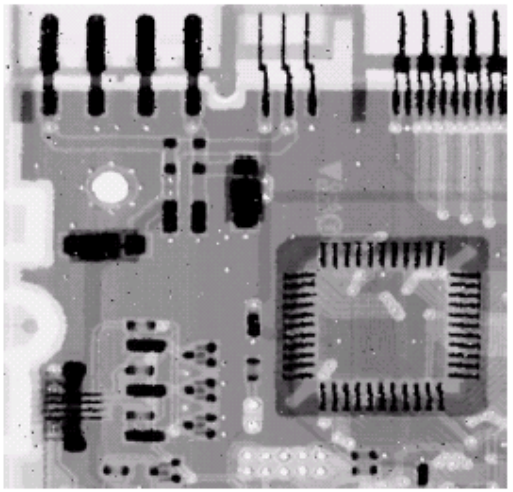


Image After Median Filter

Image Filters for Enhancement

Before averaging filter

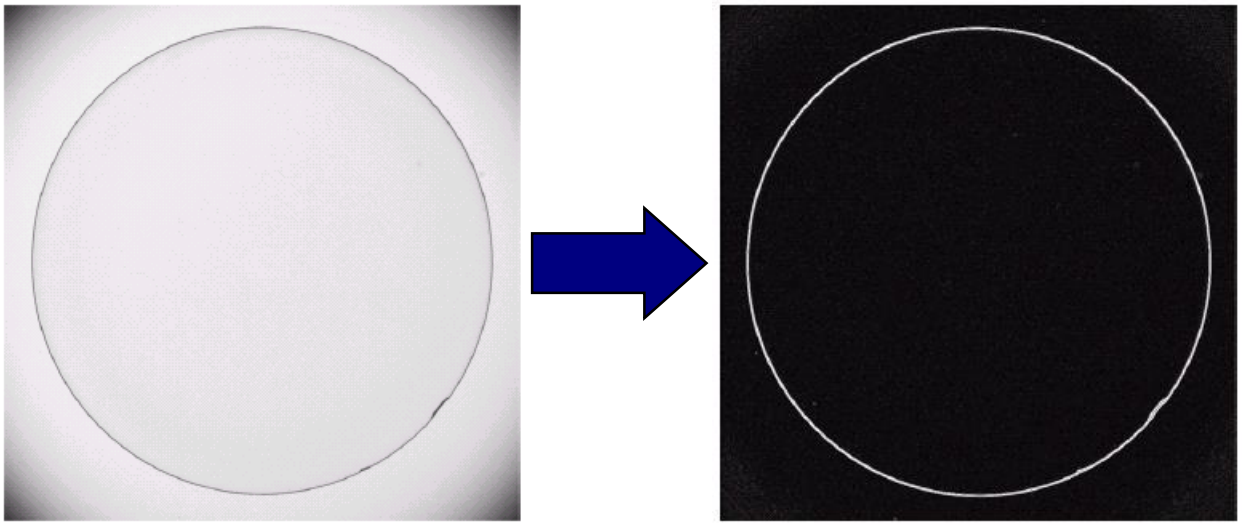
Image Filters for Enhancement

Before averaging filter

After averaging filter

Frequency selective Low pass filter

Filter for Edge Detection



- An image of a contact lens which is enhanced in order to make defects more obvious

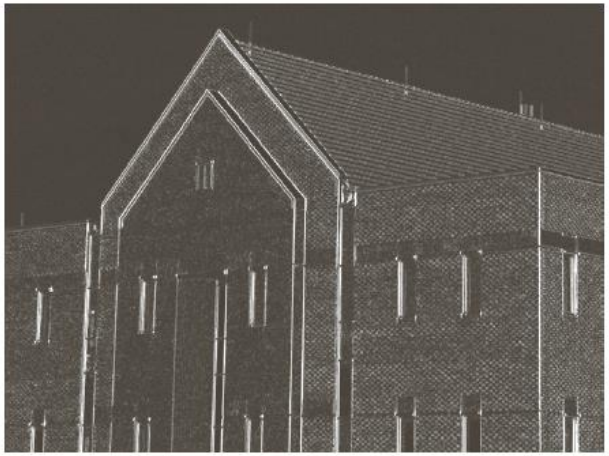
Edge detection

Edge detection

Horizontal Edges

Edge detection

Horizontal Edges



Vertical Edges

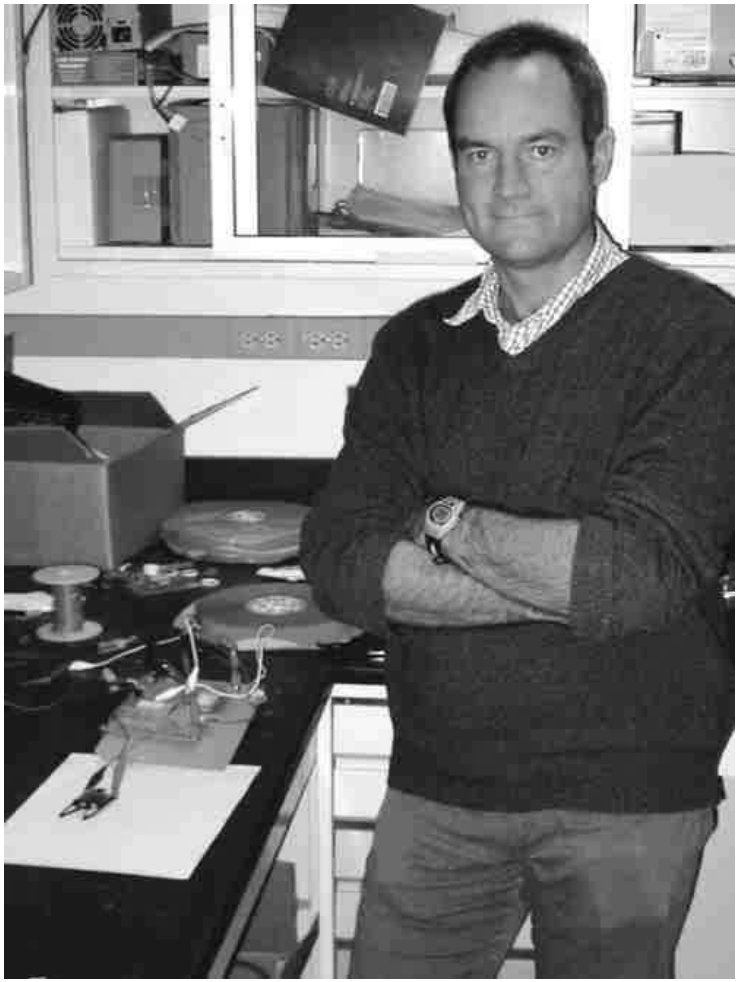
Edge detection

Horizontal Edges

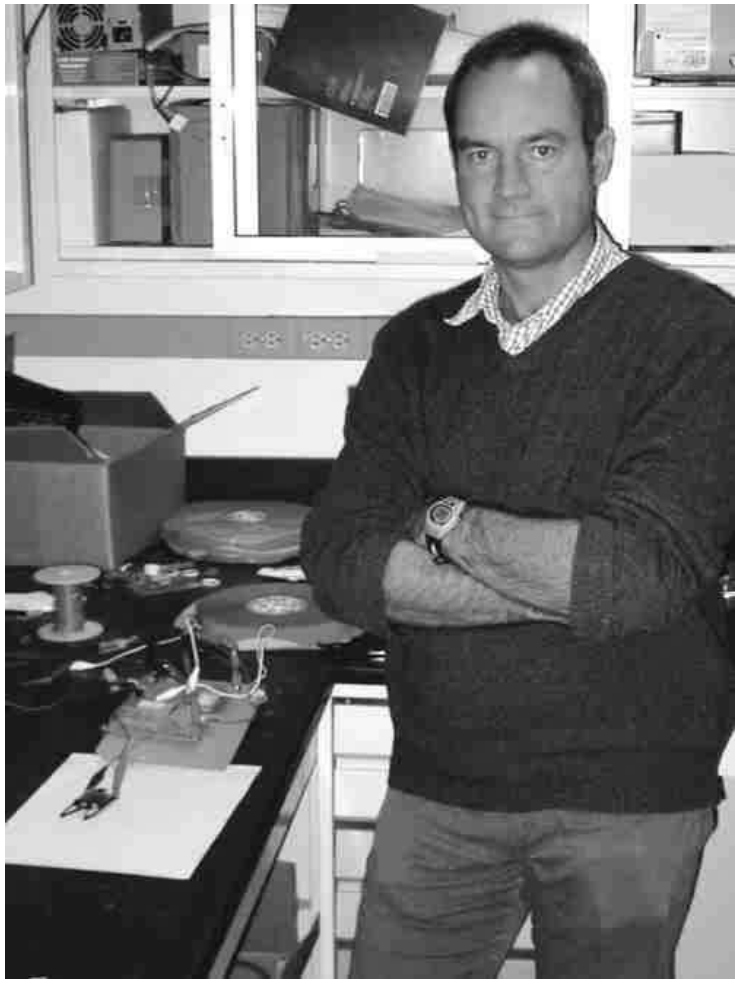
Vertical Edges

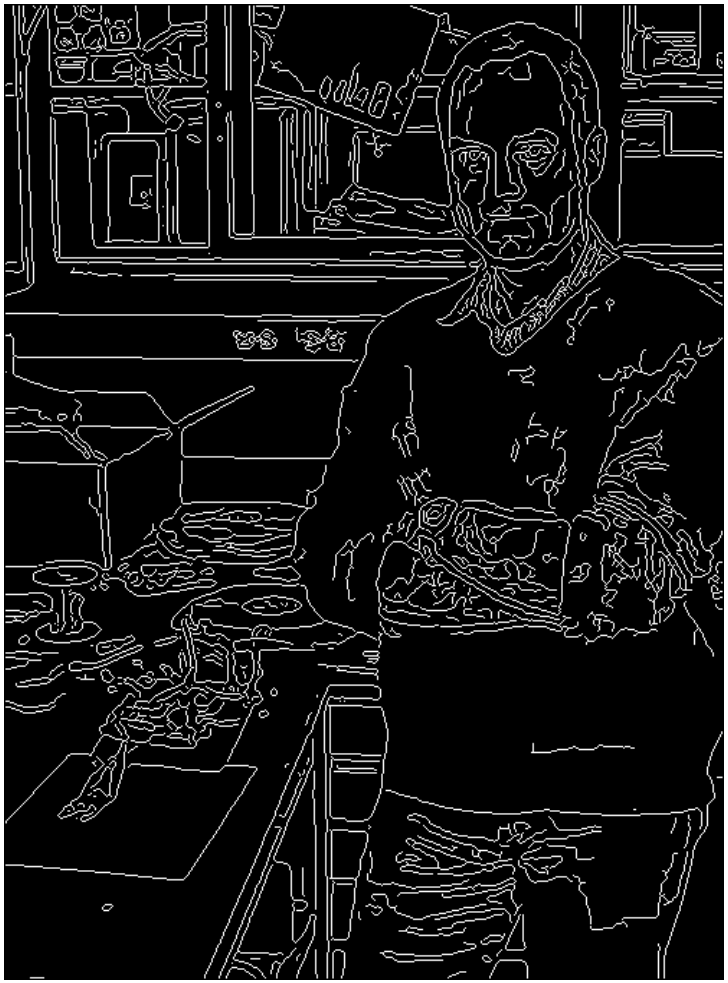
Horizontal and Vertical Edges

Canny edge detection



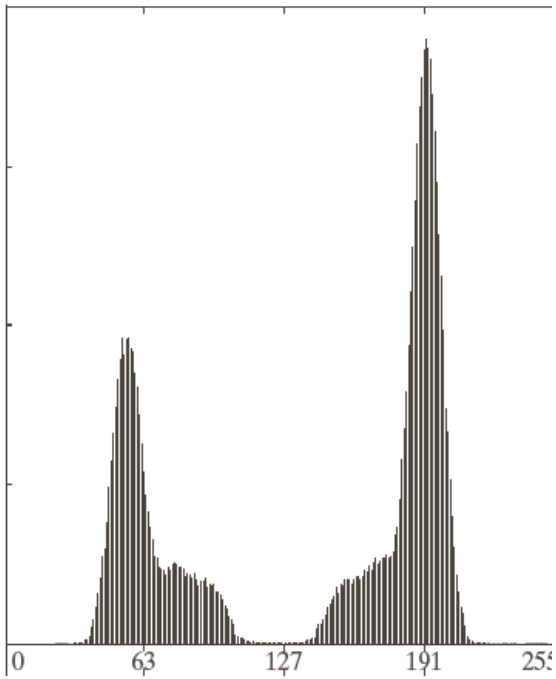
Canny edge detection





Segmentation based on thresholding

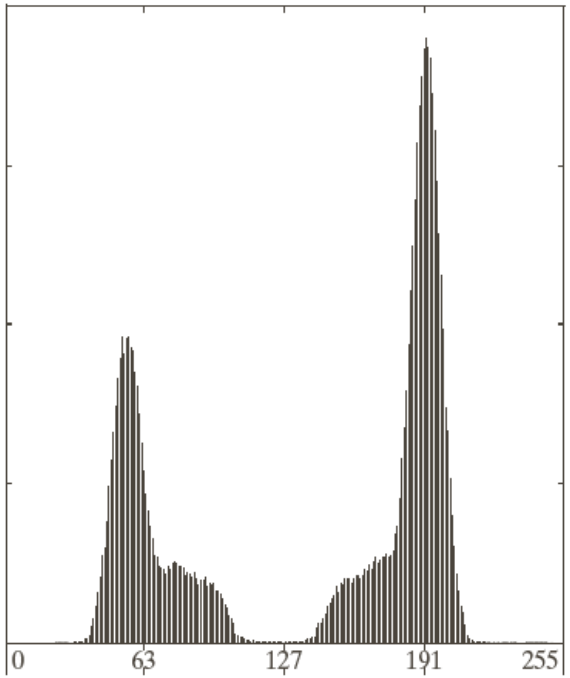
Original Image



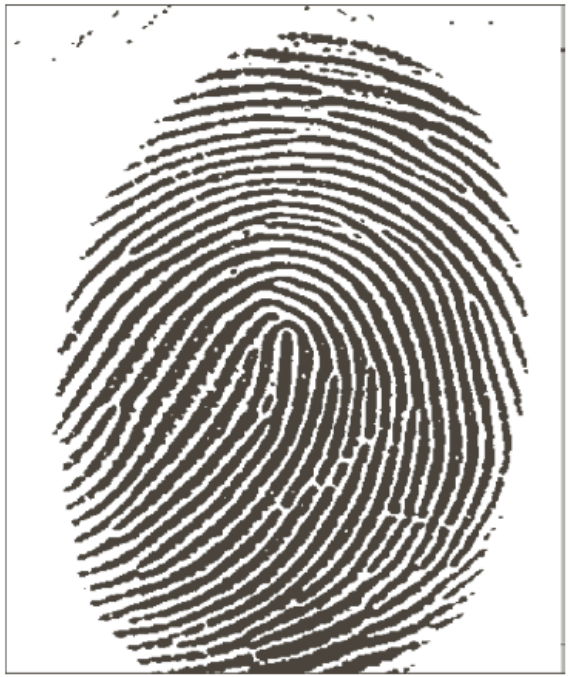
Histogram

Segmentation based on thresholding

Original Image



Histogram



Segmented Image

Image smoothing to improve segmentation

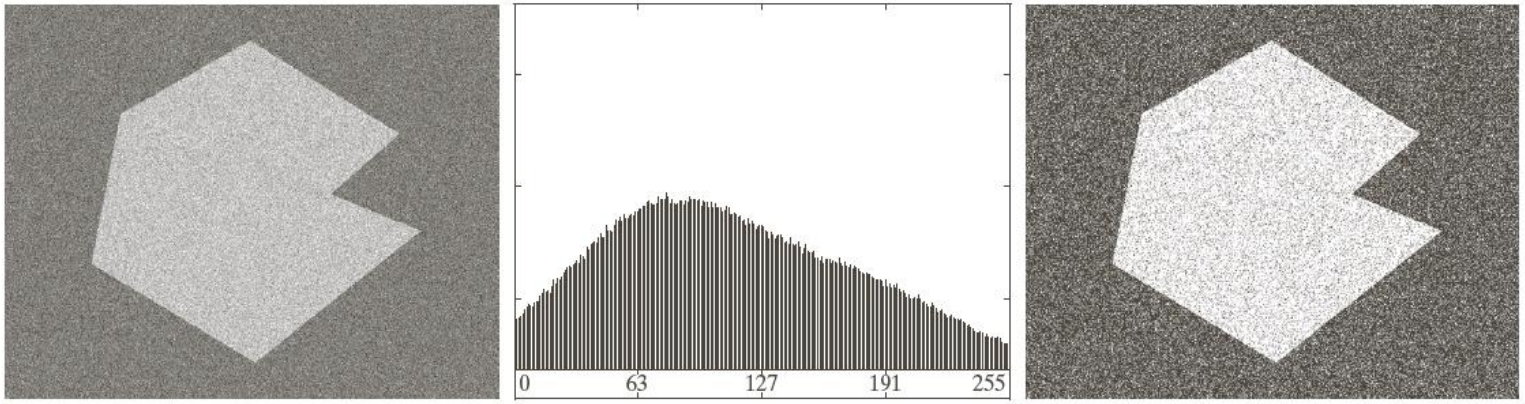
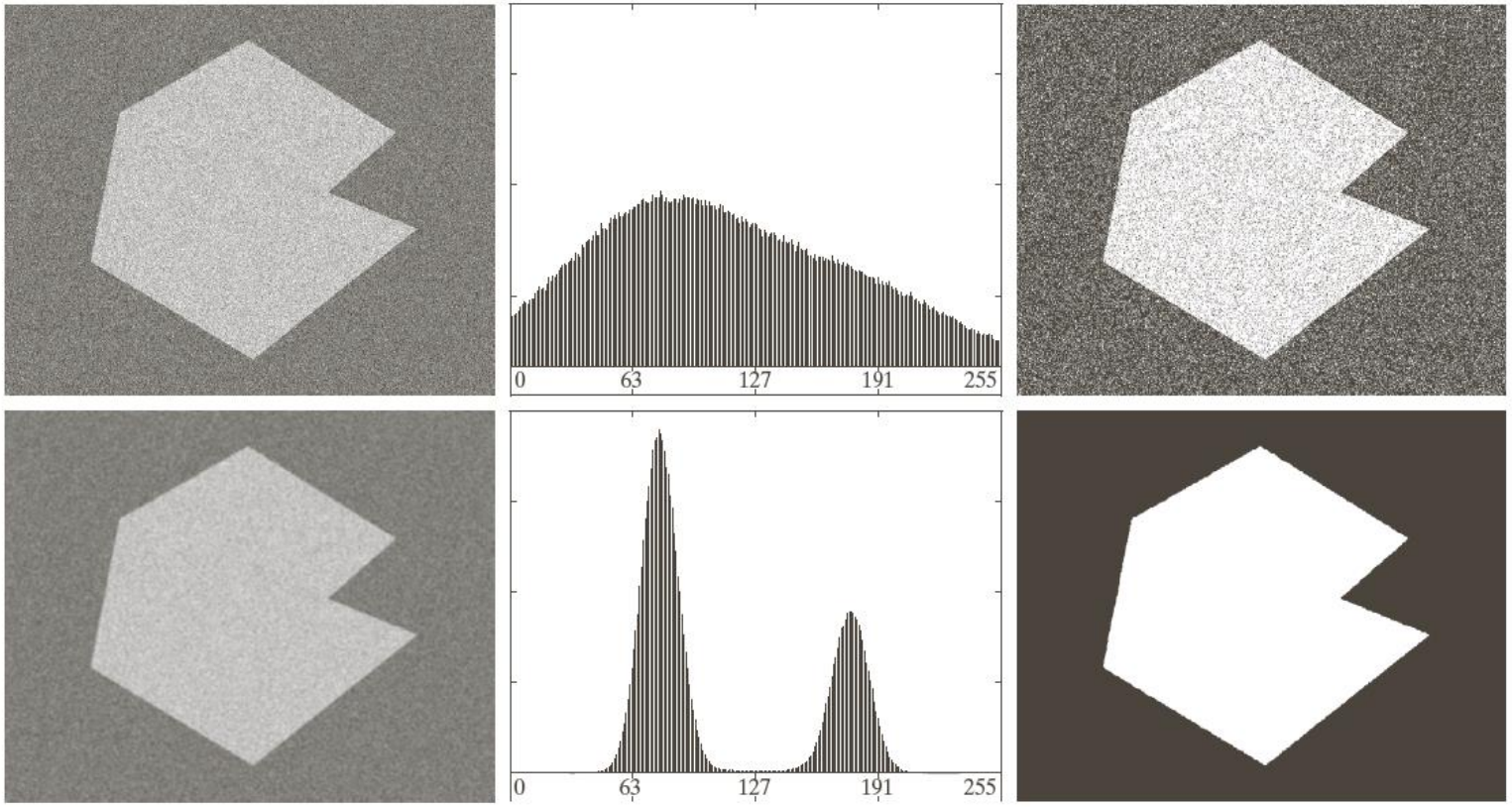
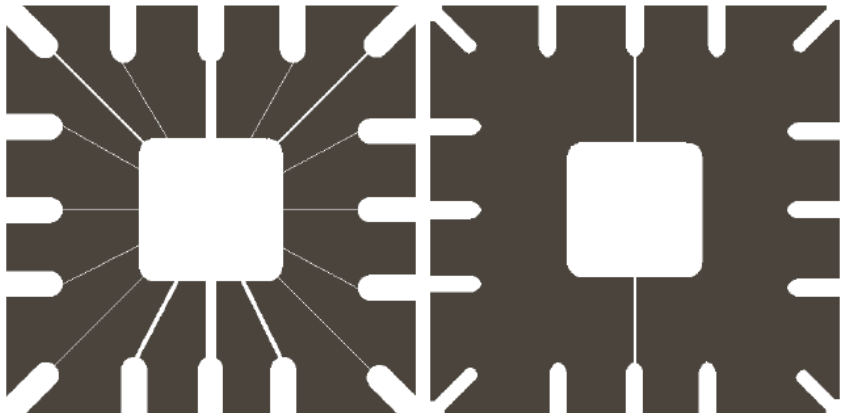


Image smoothing to improve segmentation

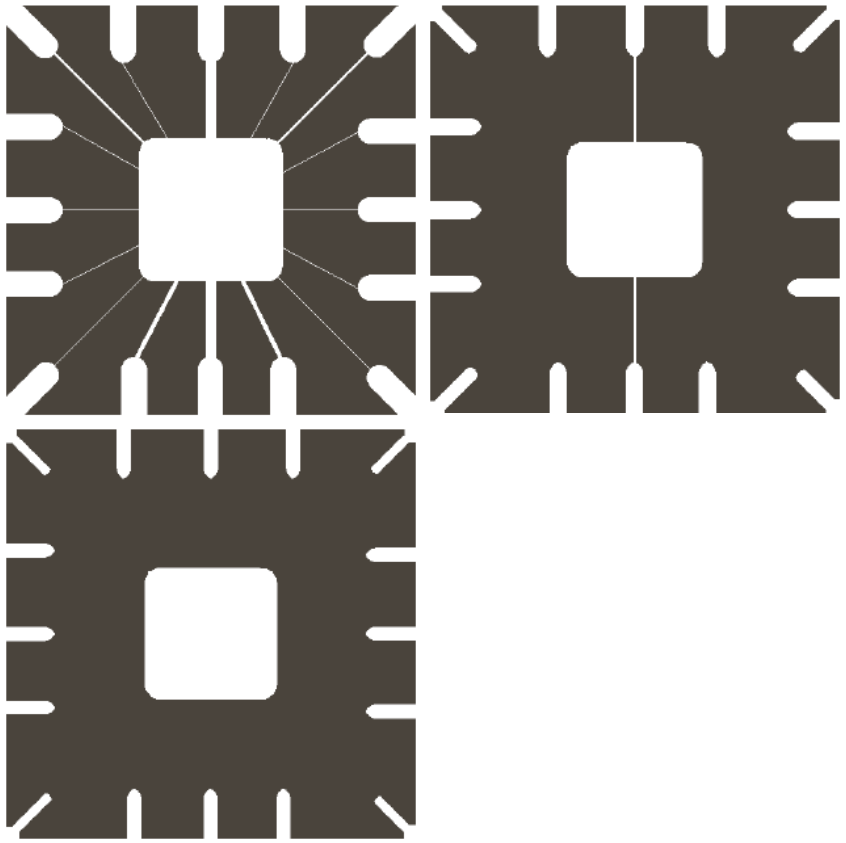


Morphological Operation: Erosion

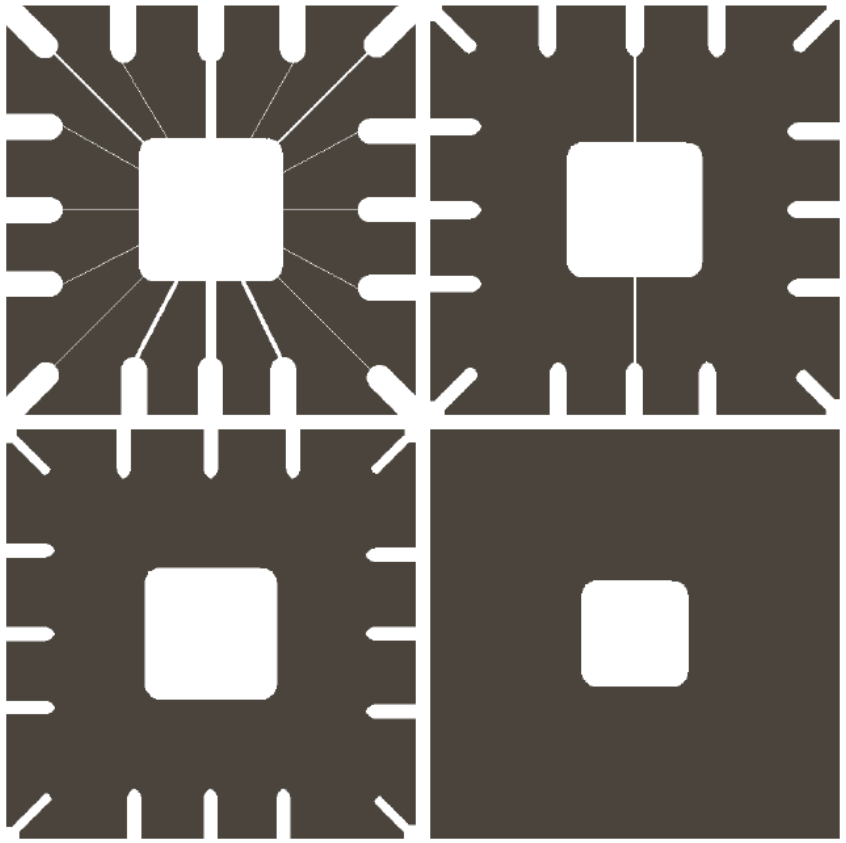
Morphological Operation: Erosion



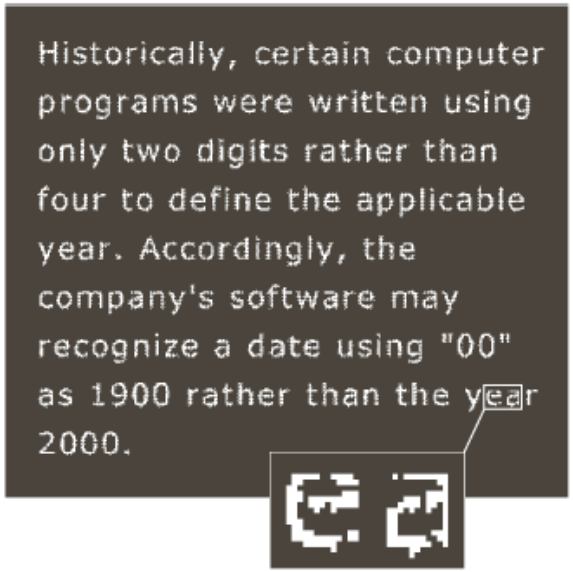
Morphological Operation: Erosion



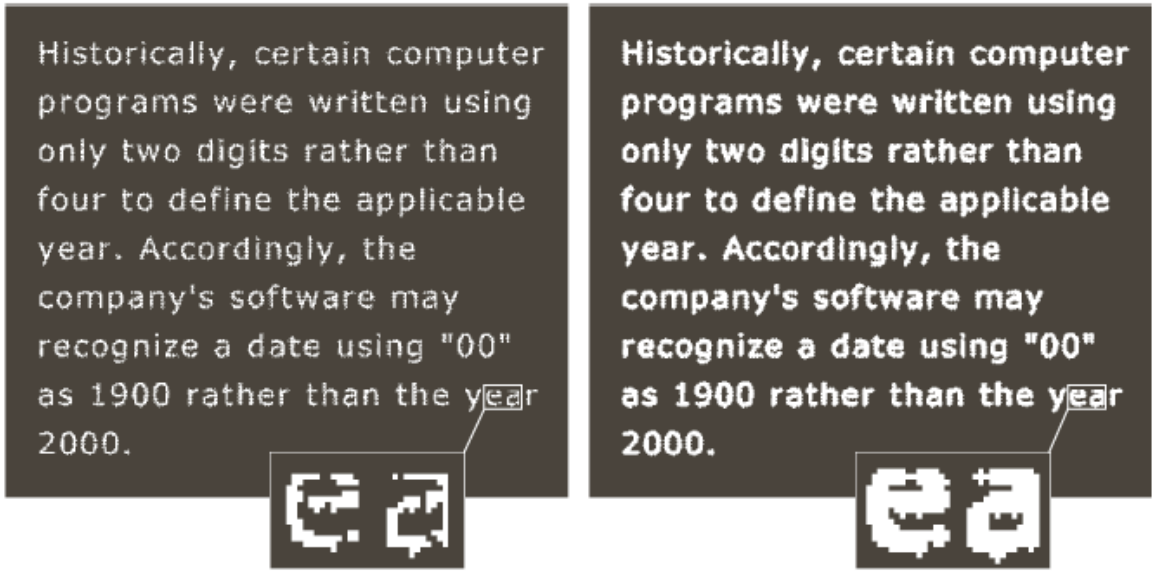
Morphological Operation: Erosion



Morphological Operation: Dilation



Morphological Operation: Dilation



Key Stages in Digital Image Processing

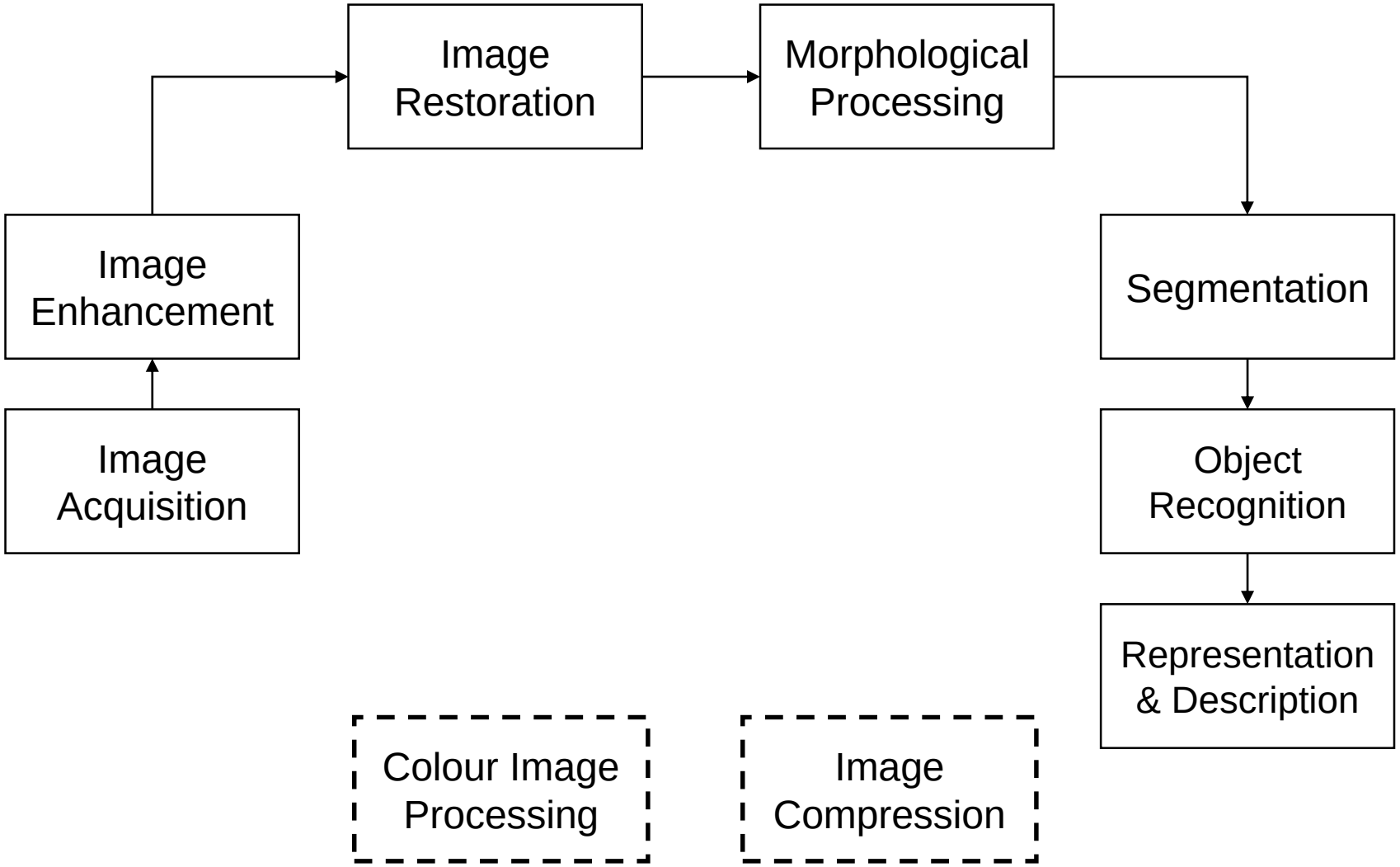


Image Acquisition

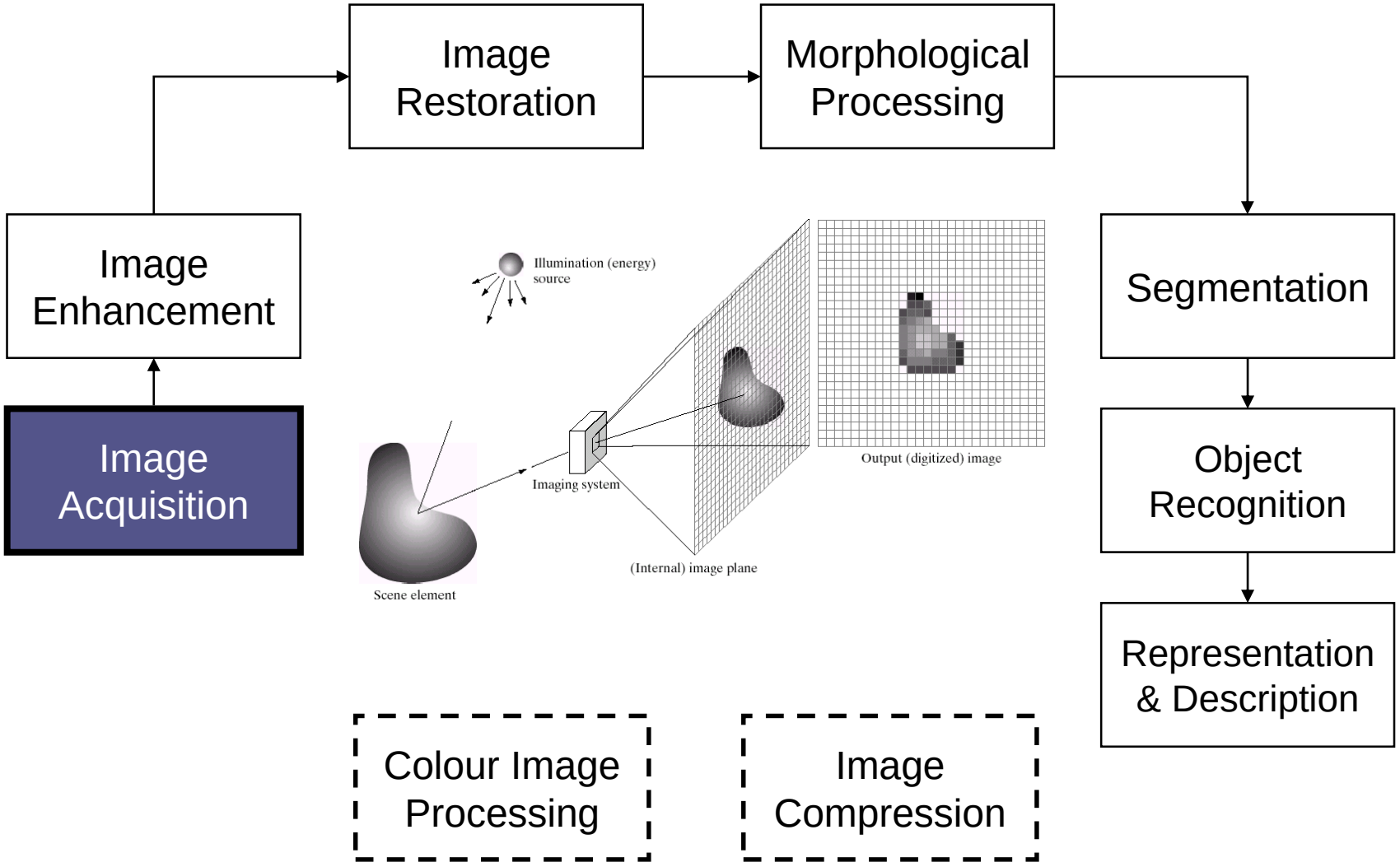


Image Enhancement

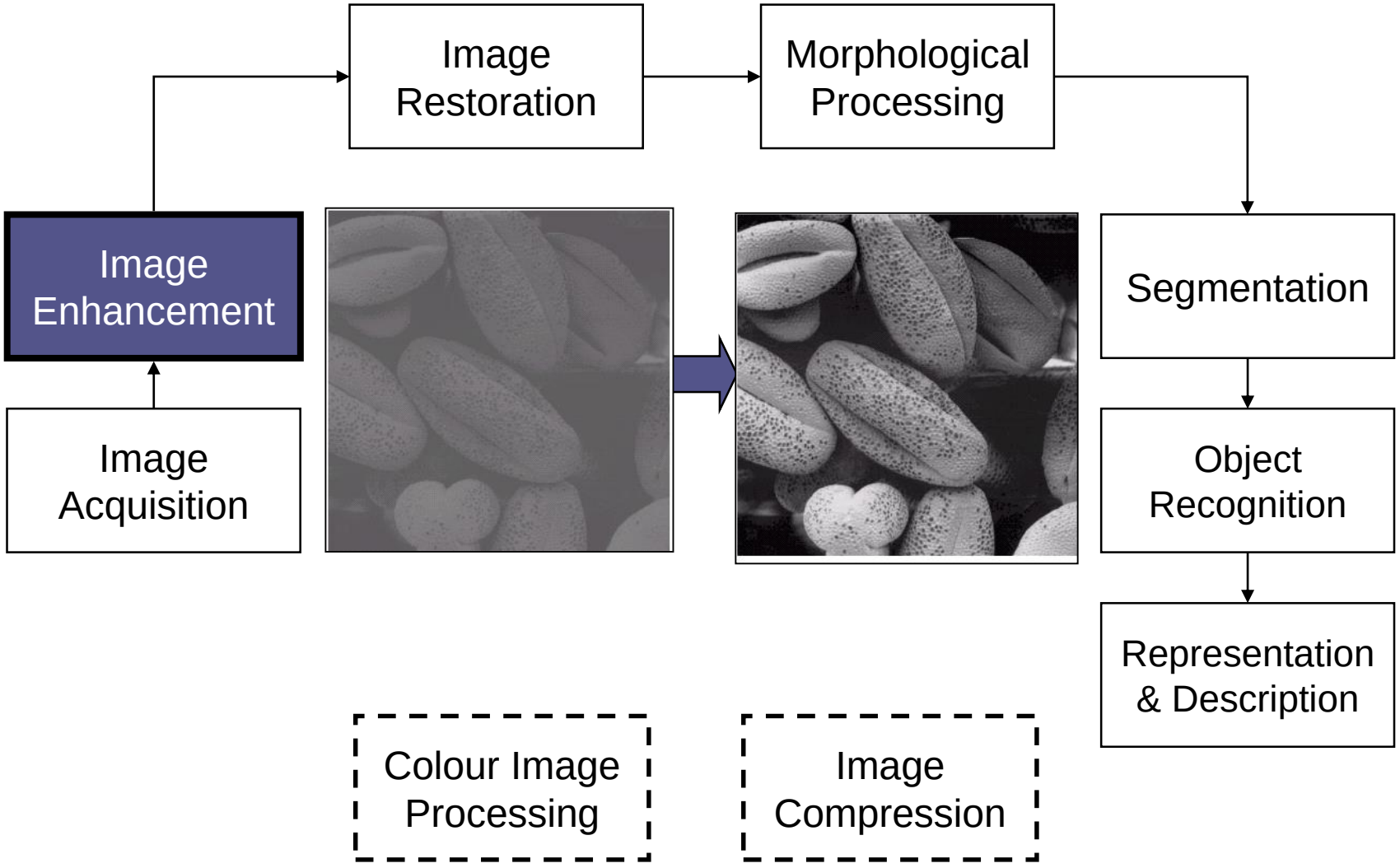
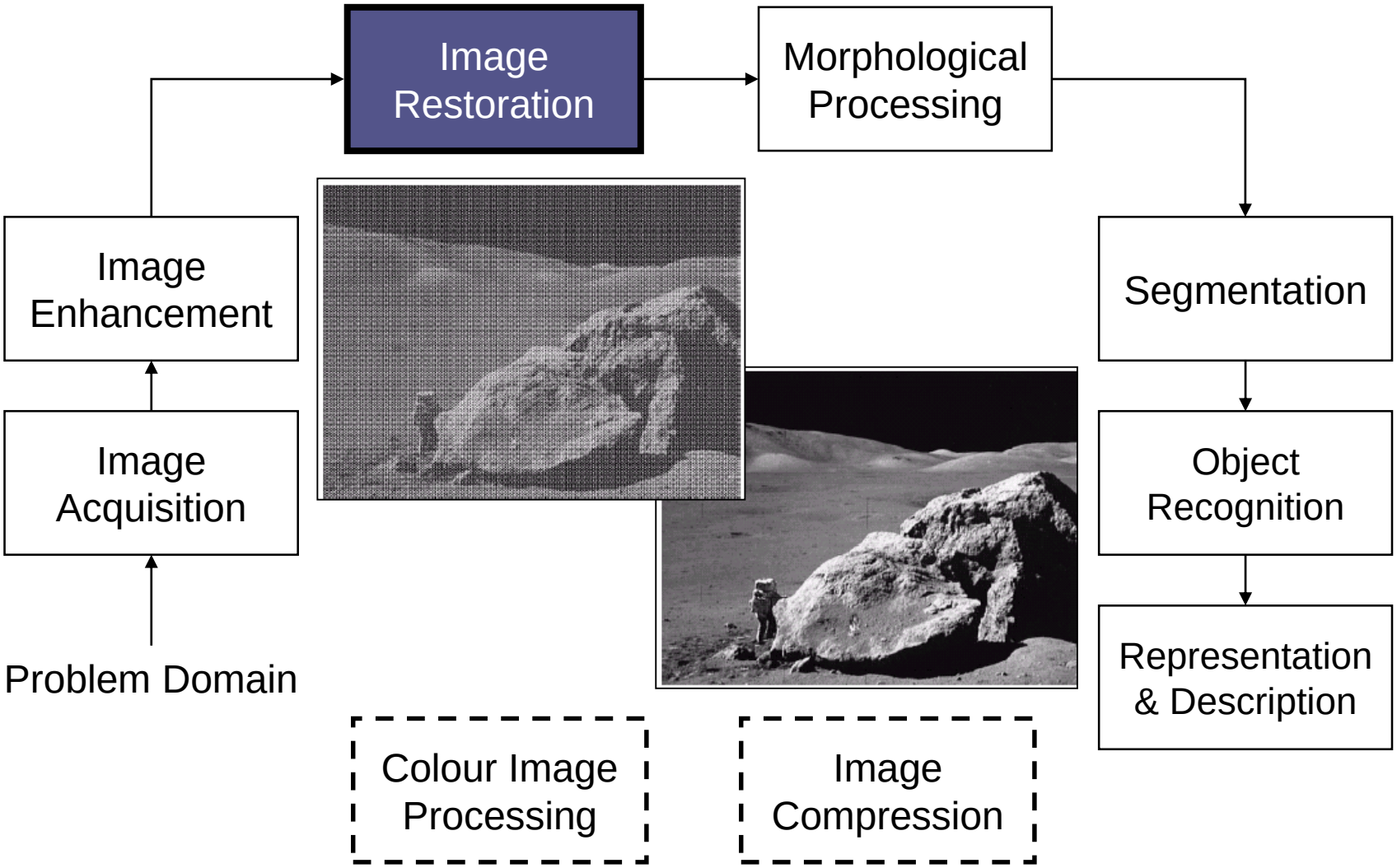
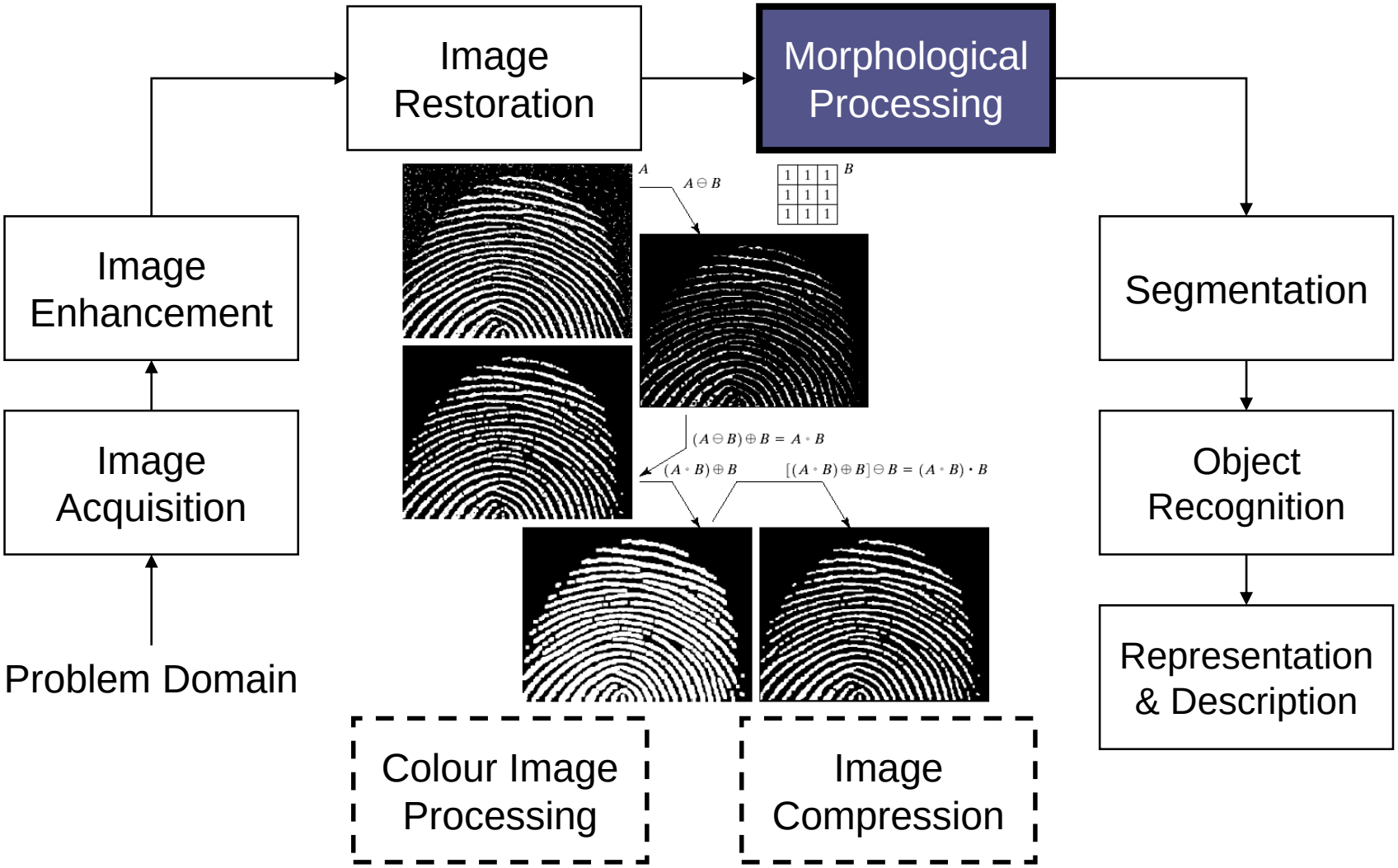


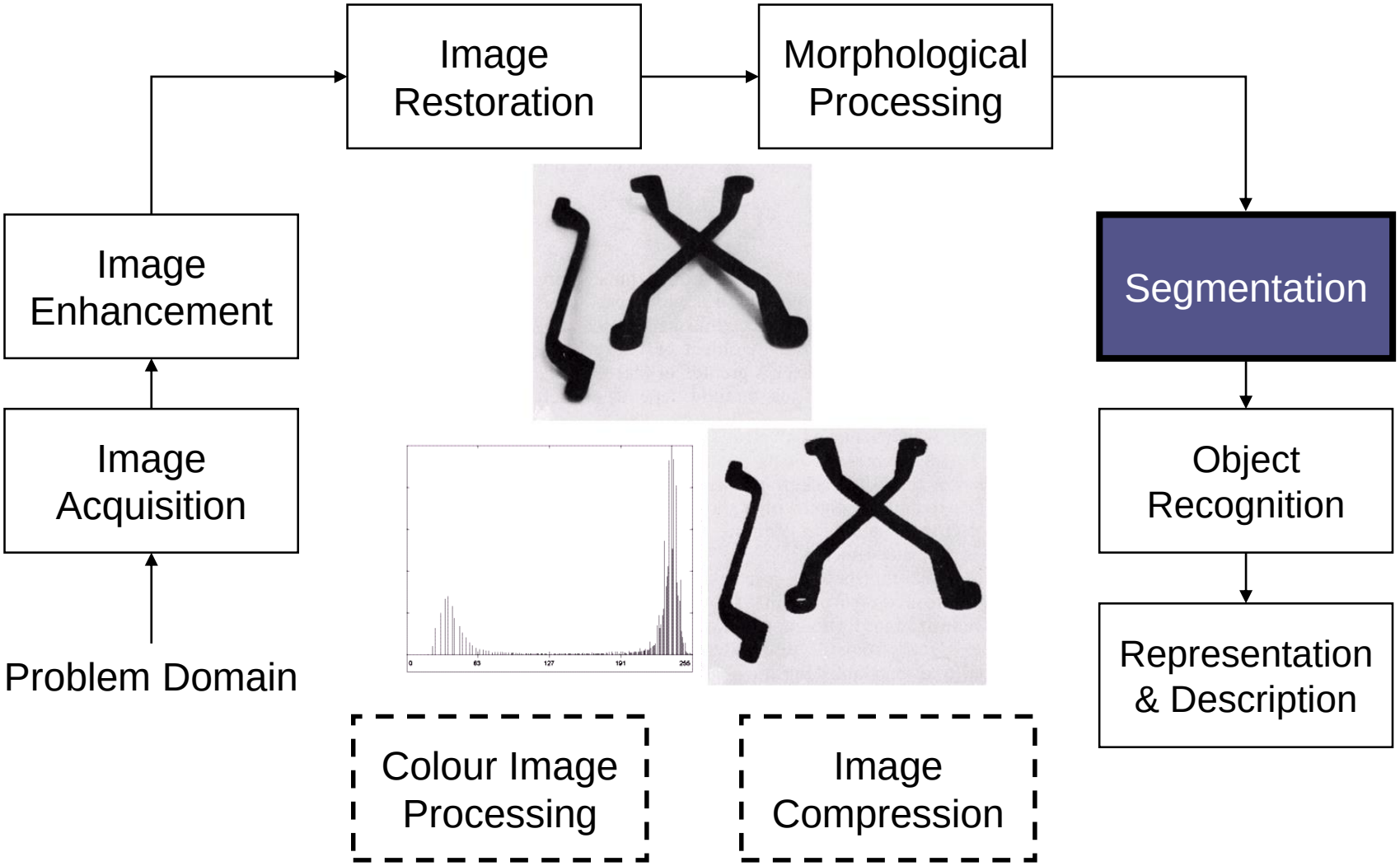
Image Restoration



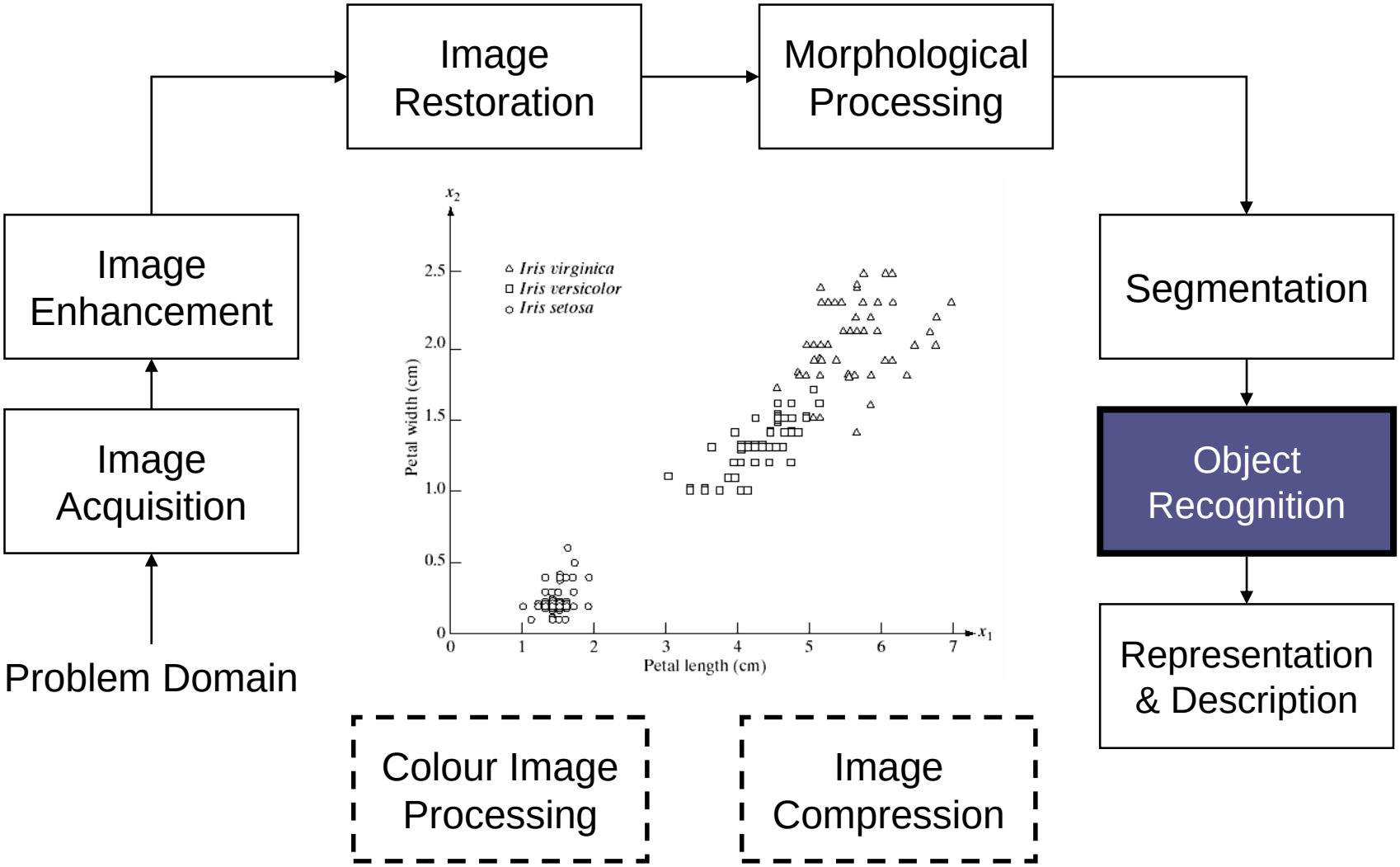
Morphological Processing



Segmentation



Object Recognition



Representation & Description

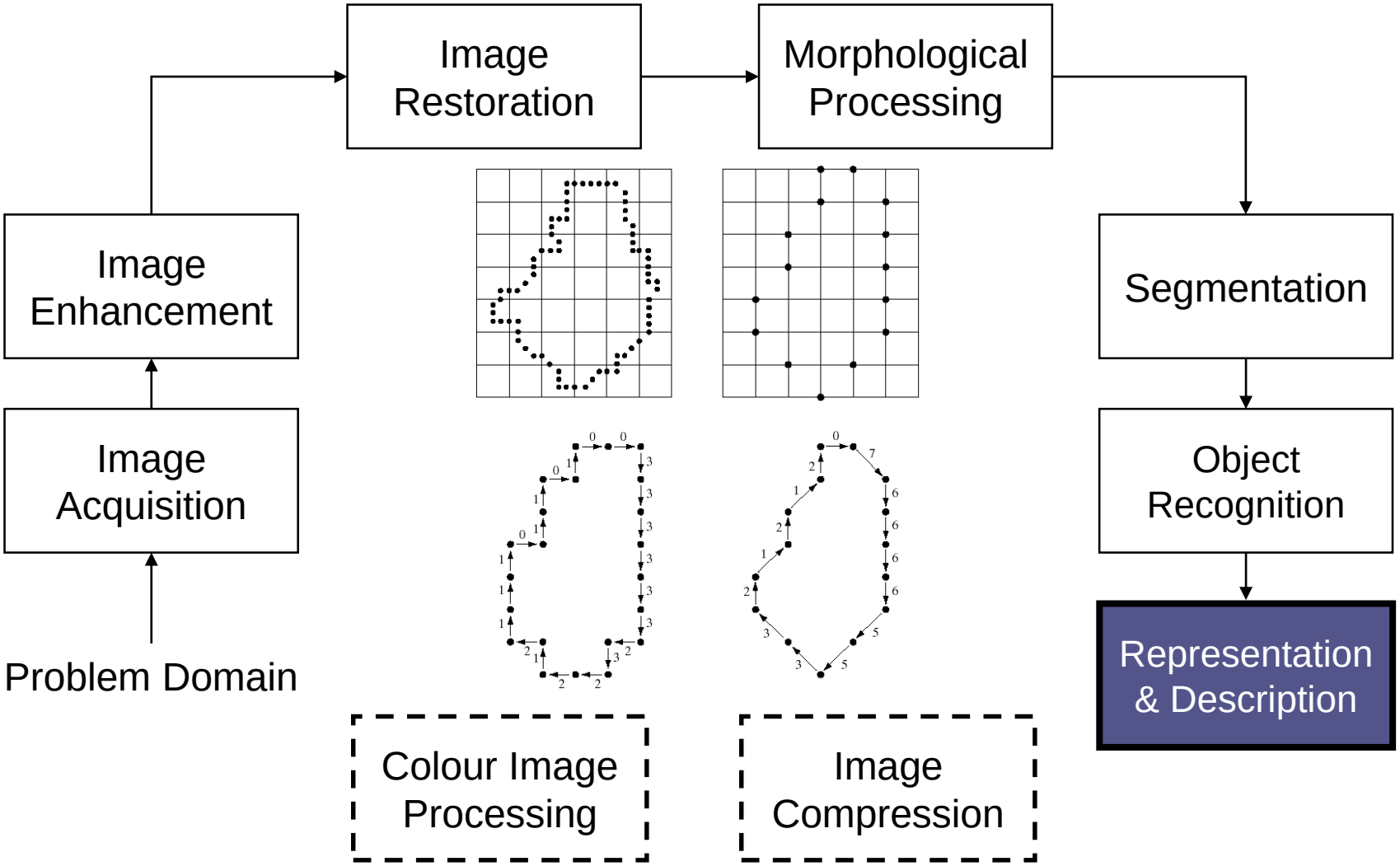
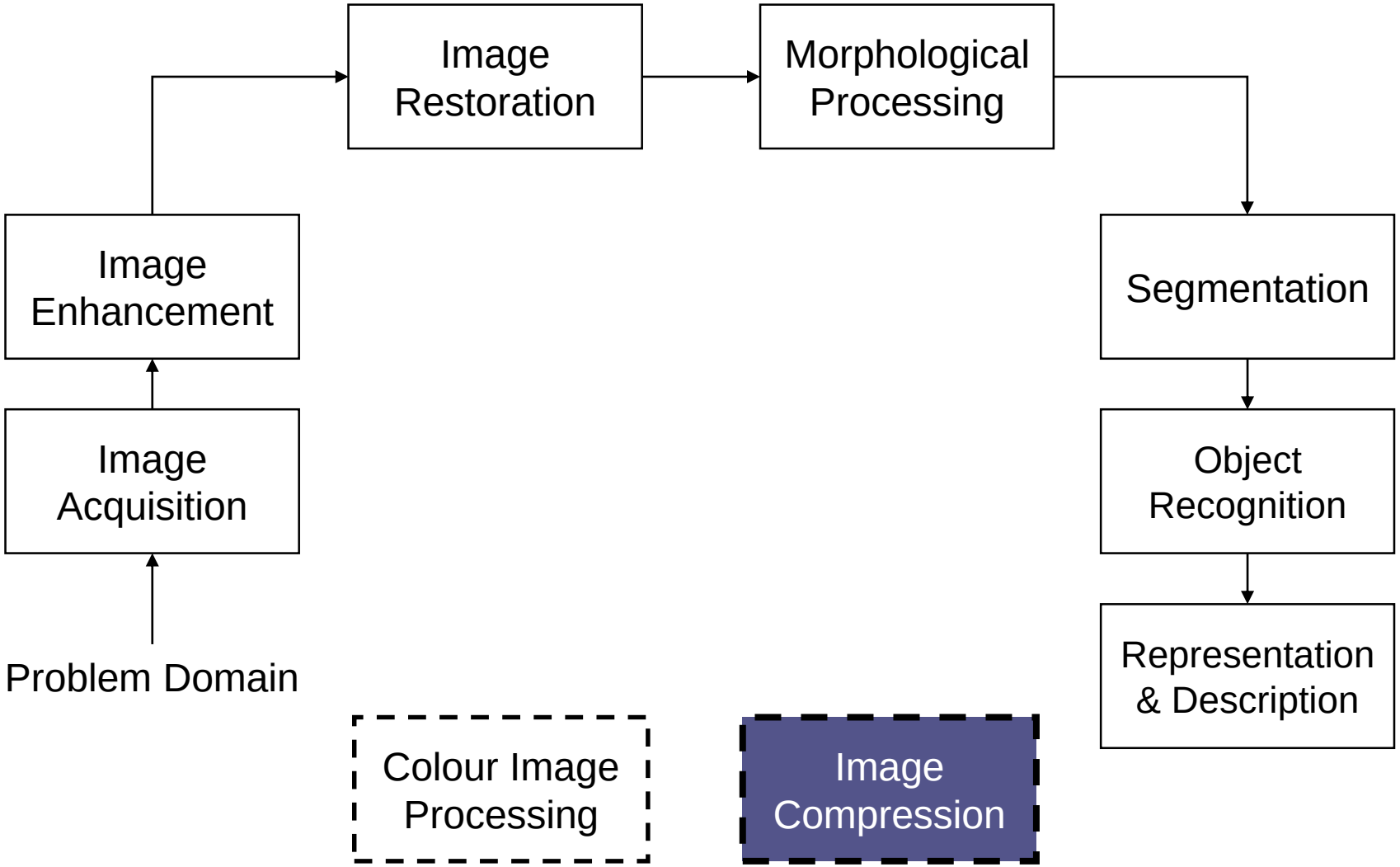
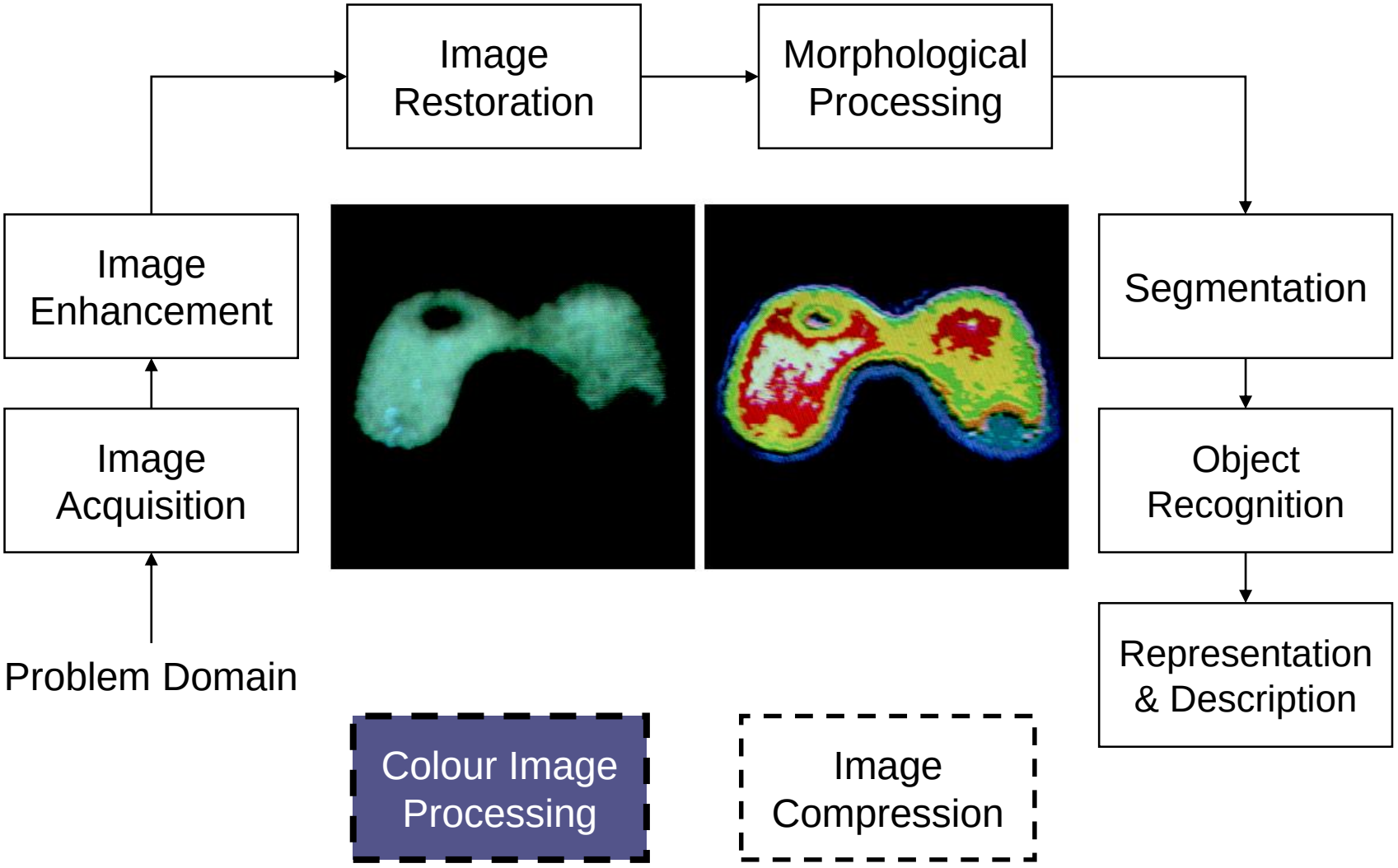


Image Compression



Colour Image Processing



Video processing

- Video consists of several frames
- Each frame is an image
- Image processing techniques are same for video processing
- Unlike Image processing, some video processing techniques are based correlation between frames
- Some of these techniques are
  - Compression
  - Object tracking
  - Segmentation

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