

# Fundamental steps in Digital Image Processing

- Image Acquisition

This is the first step or process of the fundamental steps of digital image processing. Image acquisition could be as simple as being given an image that is already in digital form. Generally, the image acquisition stage involves preprocessing, such as scaling etc.

- Image Enhancement

Image enhancement is among the simplest and most appealing areas of digital image processing. Basically, the idea behind enhancement techniques is to bring out detail that is obscured, or simply to highlight certain features of interest in an image. Such as, changing brightness & contrast etc.

- Image Restoration

Image restoration is an area that also deals with improving the appearance of an image. However, unlike enhancement, which is subjective, image restoration is objective, in the sense that restoration techniques tend to be based on mathematical or probabilistic models of image degradation

- Color Image Processing

Color image processing is an area that has been gaining its importance because of the significant increase in the use of digital images over the Internet. This may include color modeling and processing in a digital domain etc.

- Wavelets and Multiresolution Processing

Wavelets are the foundation for representing images in various degrees of resolution. Images subdivision successively into smaller regions for data compression and for pyramidal representation.

- Compression

Compression deals with techniques for reducing the storage required to save an image or the bandwidth to transmit it. Particularly in the uses of internet it is very much necessary to compress data.

- Morphological Processing

Morphological processing deals with tools for extracting image components that are useful in the representation and description of shape.

- Segmentation

Segmentation procedures partition an image into its constituent parts or objects. In general, autonomous segmentation is one of the most difficult tasks in digital image processing. A rugged segmentation procedure brings the process a long way toward successful solution of imaging problems that require objects to be identified individually.

- Representation and Description

Representation and description almost always follow the output of a segmentation stage, which usually is raw pixel data, constituting either the boundary of a region or all the points in the region itself. Choosing a representation is only part of the solution for transforming raw data into a form suitable for subsequent computer processing. Description deals with extracting attributes that result in some quantitative information of interest or are basic for differentiating one class of objects from another.

- Object recognition

Recognition is the process that assigns a label, such as, “vehicle” to an object based on its descriptors.

- Knowledge Base:

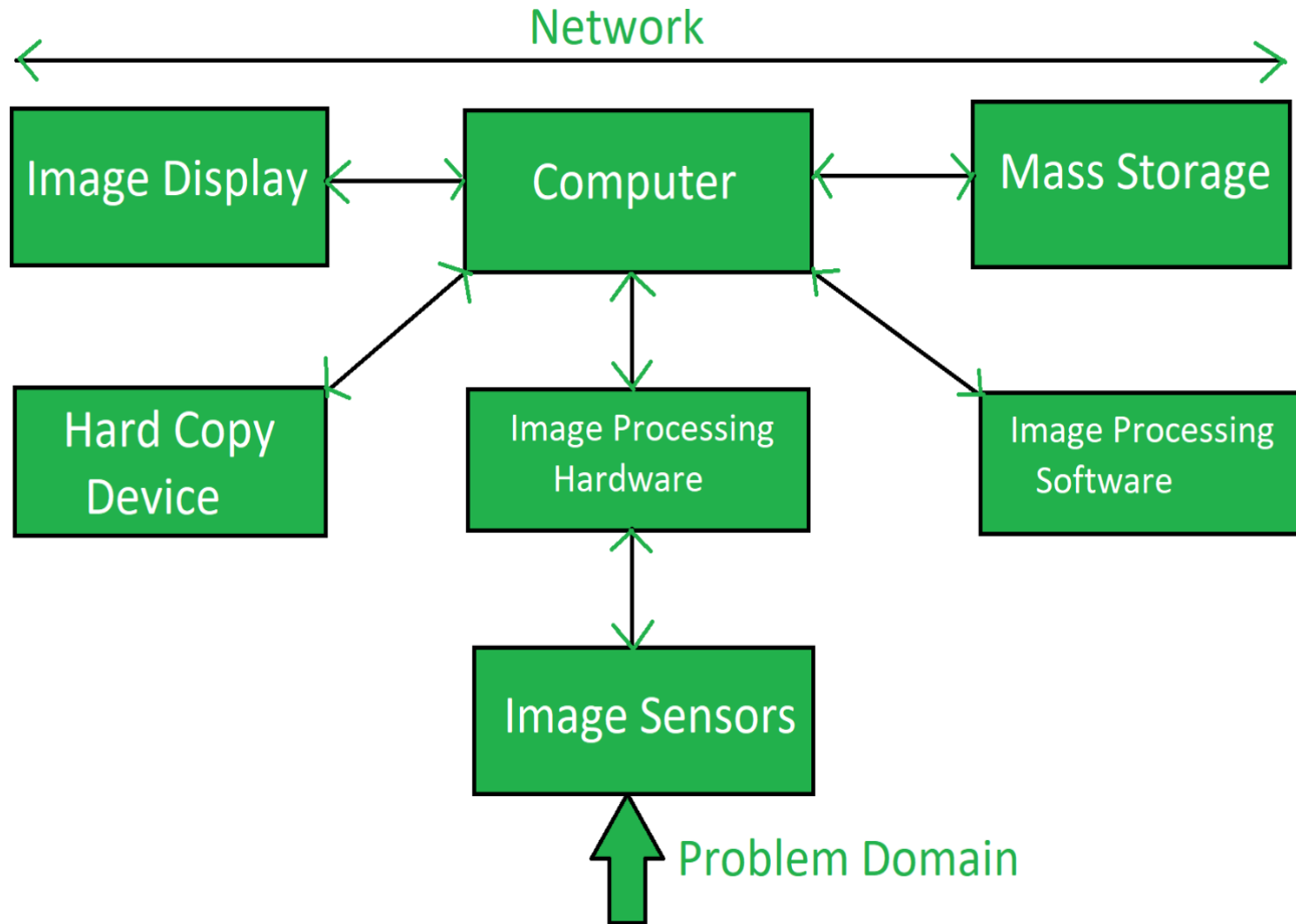
Knowledge may be as simple as detailing regions of an image where the information of interest is known to be located, thus limiting the search that has to be conducted in seeking that information. The knowledge base also can be quite complex, such as an interrelated list of all major possible defects in a materials inspection problem or an image database containing high-resolution satellite images of a region in connection with change-detection applications.



# Components of Image Processing System

- [Image Processing System](#) is the combination of the different elements involved in the digital image processing.
- Digital image processing is the processing of an image by means of a digital computer.
- Digital image processing uses different computer algorithms to perform image processing on the digital images.

# Components of Image Processing System



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- **Image Sensors:**  
Image sensors sense the intensity, amplitude, co-ordinates and other features of the images and pass the result to the image processing hardware. It includes the problem domain.
- **Image Processing Hardware:**  
Image processing hardware is the dedicated hardware that is used to process the instructions obtained from the image sensors. It passes the result to a general purpose computer.
- **Computer:**  
Computer used in the image processing system is the general purpose computer that is used by us in our daily life.

# Components of Image Processing System

- **Image Processing Software:**  
Image processing software is the software that includes all the mechanisms and algorithms that are used in image processing system.
- **Mass Storage:**  
Mass storage stores the pixels of the images during the processing.
- **Hard Copy Device:**  
Once the image is processed then it is stored in the hard copy device. It can be a pen drive or any external ROM device.
- **Image Display:**  
It includes the monitor or display screen that displays the processed images.
- **Network:**  
Network is the connection of all the above elements of the image processing system.

# Text & Reference Books

- Rafael C. Gonzalez & Richard E. Woods, “Digital Image Processing”, Pearson Education.
- A.K. Jain, “Fundamental of Digital Image Processing”, PHI.