

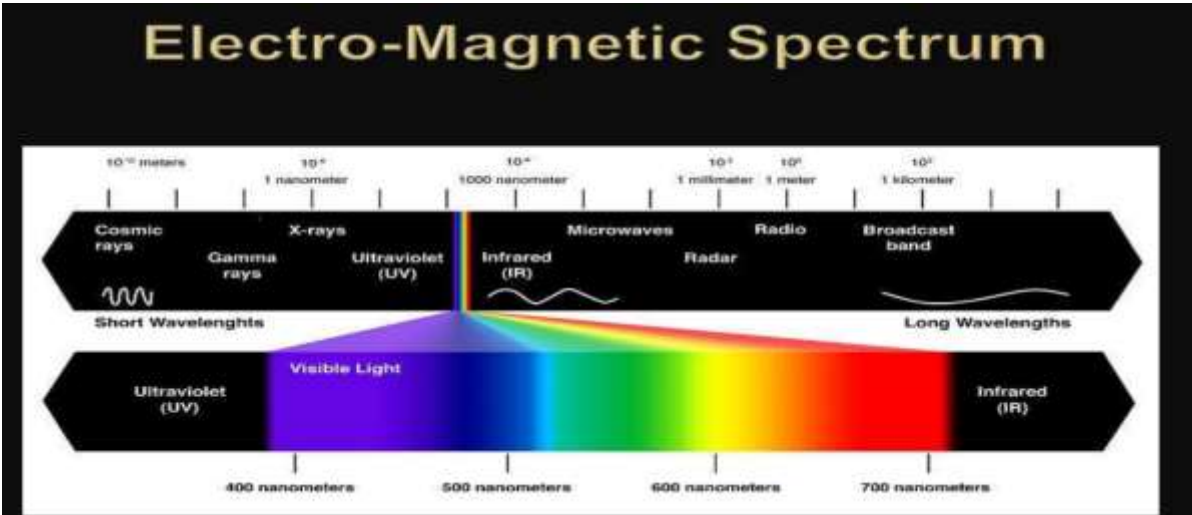
# IMAGE PROCESSING

B.SC(HONOURS) SEM 5 2020-2021

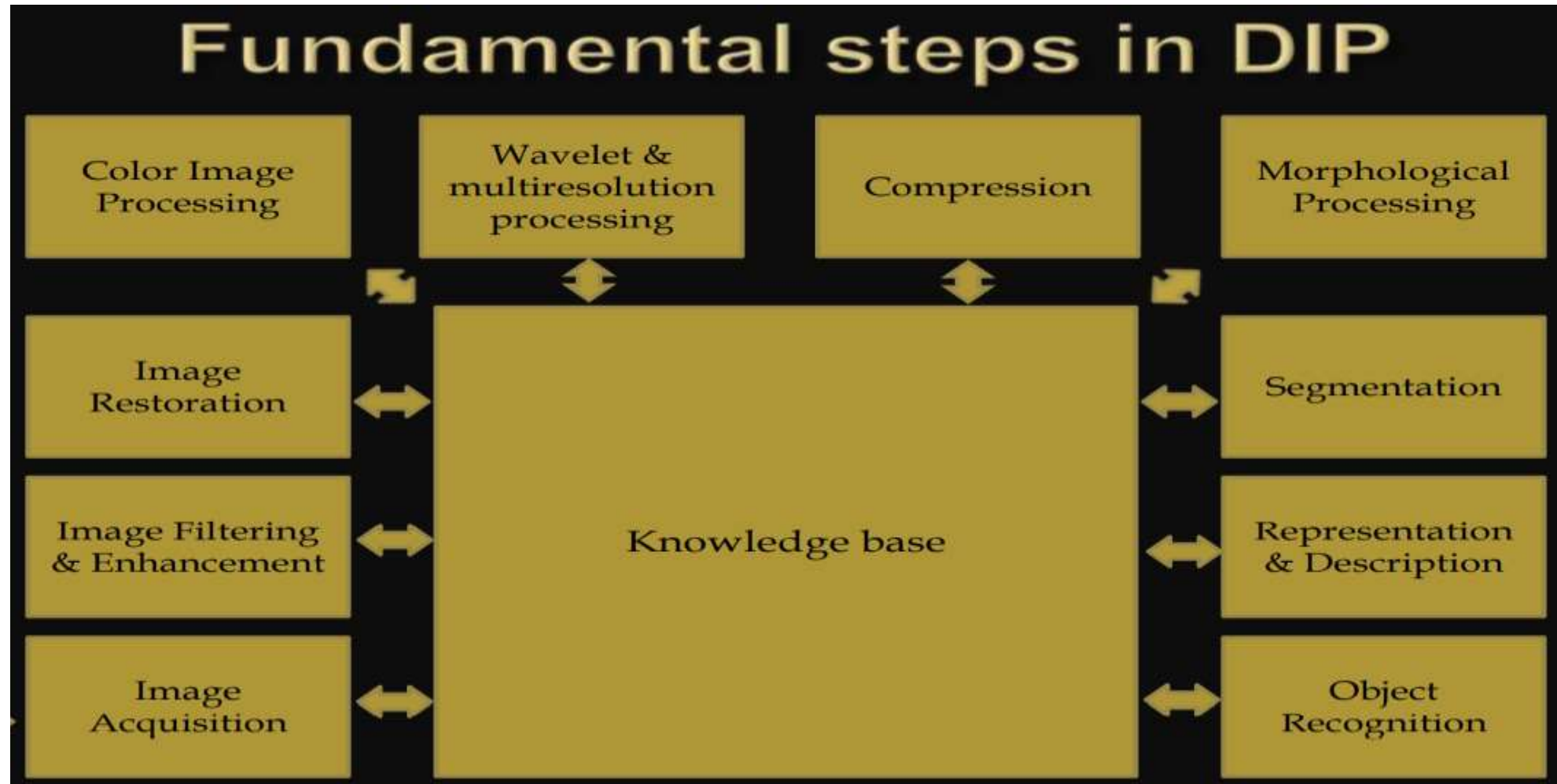
# DIGITAL IMAGE PROCESSING

- Processing images which are digital in nature.
- Why do we need Image Processing?
  - (i) Improvement of pictorial information for human perception.
  - (ii) Image processing for autonomous machine application.
  - (iii) Efficient storage & transmission
- Typical applications:
  - Noise filtering
  - Content Enhancement
  - Contrast enhancement
  - Deblurring
  - Remote sensing

# EXAMPLES



# IMAGE PROCESSING



# FUNDAMENTAL STEPS-

- Image Acquisition: First process

Involves image pre-processing viz. scaling

- Image Enhancement:

Process of image manipulation to make it more suitable for specific use

Different images require different enhancement methods

Subjective technique

- Image Restoration:

- Based on mathematical or probabilistic models of image degradation thus objective technique.

# FUNDAMENTAL STEPS-

- Color Image Processing:

Gained importance due to increase use of internet

- Wavelets:

Used mainly for image data compression & pyramidal representation where images are divided into smaller regions.

- Compression:

Technique for reducing the storage required to save image, or bandwidth required to transmit it.

JPEG (Joint Photographic Experts Group)

TIF(Tagged Image File) or TIFF(Tagged Image File Format)

PNG(Portable Network Graphics)

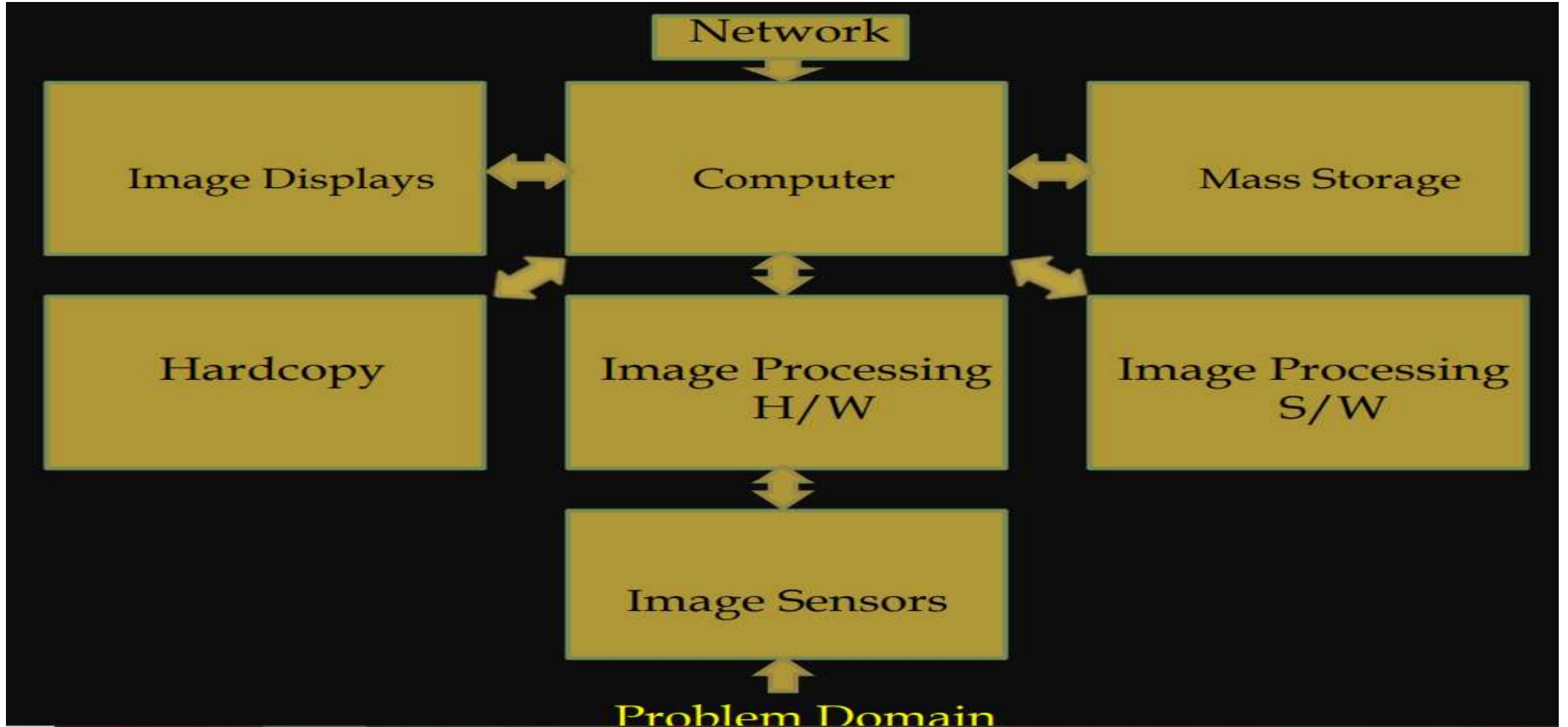
GIF(Graphics Interchange Format)

BMP(Bitmap image file)

# FUNDAMENTAL STEPS-

- Morphological Processing :  
Deals with tools for extracting image components
- Segmentation:  
partition an image into constituent parts or objects.
- Representation & description:  
follows output of segmentation with raw pixel data usually boundary information or regional description.
- Object recognition:  
process of assigning a label to an object based on its description.

# COMPONENTS OF IMAGE PROCESSING SYSTEM





# COMPONENTS OF IMAGE PROCESSING SYSTEM

- Sensors:

Two elements required to acquire digital images

Physical device: sensitive to the energy radiated by the object we wish to image.

Digitizer: converts output of physical sensing device into digital form.

- Specialized image processing hardware:

Digitizer + hardware

Hardware: Performs Arithmetic Logic Unit (ALU) on entire image.

- Computer:

Image processing system ranging from PC to supercomputer

- Image Processing Software:

Specialized modules performing specific tasks.

- Mass Storage:

Image of size  $1024 * 1024$  pixels with pixel intensity of 8-bit requires 1 Mb storage space.

- Image Displays:

Flat screen, TV, Monitors, LCD, LED, 3D displays

- Hardcopy:

Laser Printers, Camera Films, Heat Sensitive devices, inkjet units, digital units like optical and CD-ROM.

- Networking:

Communicating with remote sites on internet.

- END