Image Sources:

In image processing, image sources refer to the different methods or technologies used to generate capture images. These sources determine how an image is formed and what type of information it contains.

* Types of image Sources;

1. Electromagnetic (EM) Energy Spectrum -

Images are formed using different wavelengths of electromagnetic waves, such as:

- X-rays (Medical imaging, security scans)
- Infrared (Thermal imaging, night vision)
- visible light (Cameras, photography)

2. Acoustic Sources -
Images are created using sound waves; such as:
- Medical ultrasound (Used in pregnancy scans, internal organ imaging)
- Underwater imaging (sonar mapping, submarine navigation)

3. Ultrasonic Sources -
High-frequency sound waves are used for imaging in:
- Medical ultrasonography (internal body scanning)
- Dental Imaging (to check teeth and jaw)
- Material characterization (to detect flaws in industrial materials)

4. Electronics – Computer Generated Images (CGI)

Images are created digitally using computers such as:

- 3D modeling in movies and games.
- simulations in scientific research
- Artificial images in animation

* What is an image?
  - A rectangular grid of pixels.
  - Image can be represented using a two-dimensional function $f(x, y)$
  - x and y are the spatial coordinates.

* What is Digital image processing?

Using a computer to modify or improve a digital image is called digital image processing.

* Image processing has two main purposes:

1. For Humans -
   Enhancing images so people can see them better (e.g improving brightness, removing noise, sharpening details)
2. For Machines -
   Preparing images so computers can analyze, store, or recognize objects (e.g face recognition, medical scans, self-driving cars).

* computer vision make a decision but image processing is not have decision.

* what is computer vision?
  computer vision is when a computer analyzes images or videos, understands what they contain, and uses that information to make decisions.

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Computer vision?

Visual scene → extract → a task relevent information.

Ex:- • Optical Character recoghition

• Analysis of medical, satellite and microscopic images.

• Surveillance

- Identity verification.

• Quality Control in manufacturing.

* Components of an image Processing System

- Sensors & Digitizers:

Capture and convert images.

- Processing Hardware & software:

From general computers to supercomputers.

- Storage:

Temporary, online and archival storage.

- Displays - Monitors, graphic cards.

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Hardcopy Devices:
Printers, optical disks.

Network:
For data exchange.