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FACULTY OF EGINEERING

Digital Image Processing
LECTURE-03

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OUTLINE

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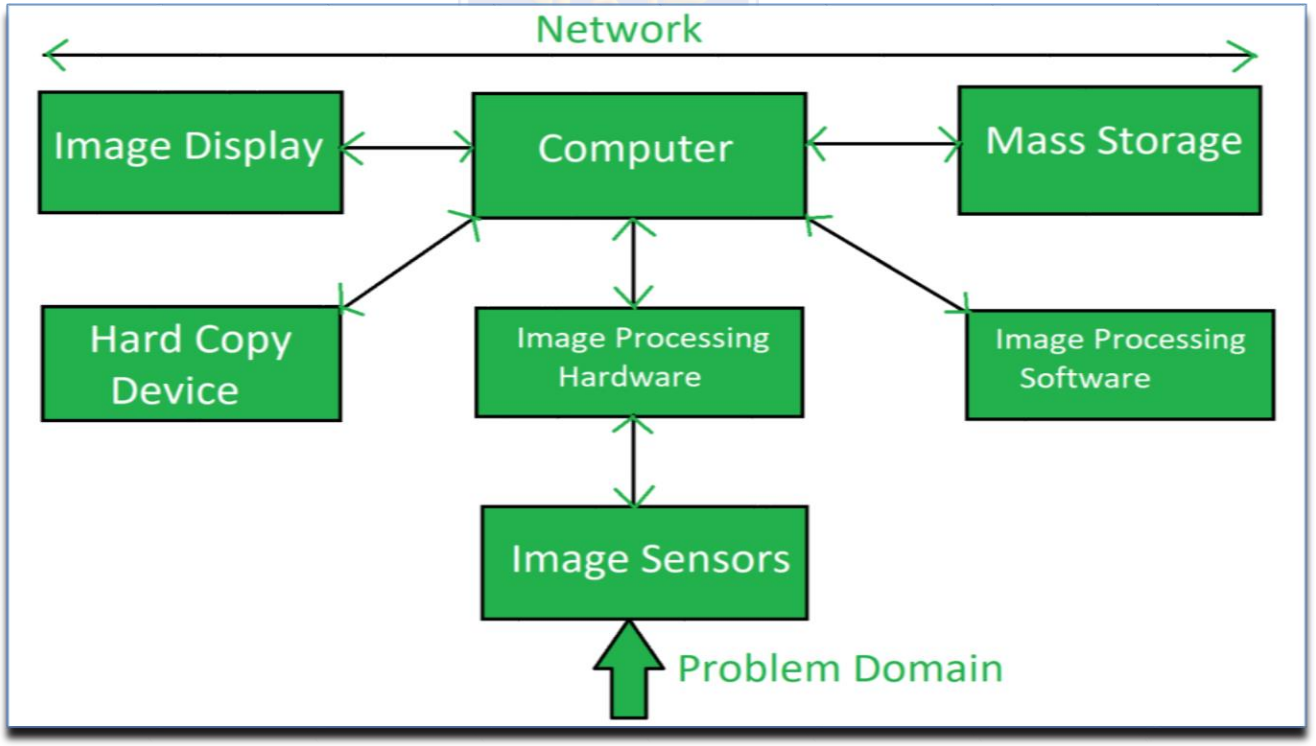
Components of Image Processing System

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. It consists of following components:-



Components of Image Processing System

Image Sensors:

Image sensors senses the intensity, amplitude, co-ordinates and other features of the images and passes 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 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.

Image Processing Software:

Image processing software is the software that includes all the mechanisms and algorithms that are used in image processing system.

Components of 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.

Signal and System Introduction

Analog signals

- The analog image processing is applied on analog signals and it processes only two-dimensional signals. Analog signal is time-varying signals so the images formed under analog image processing get varied. It is generally continuous and not broken into tiny components.
- The main characteristics of analog signals are frequency, amplitude, and phase. Analog signals recorded sound waves better than digital sound.

Frequency in the analog signal

- In a given amount of time, the number of waves that passed through a fixed position is called frequency in the analog system.

Amplitude in the analog signal

- It describes the height of a signal that is on the horizontal axis and the amplitude is always equal to the point given on waveform.

Elements of Visual Perception

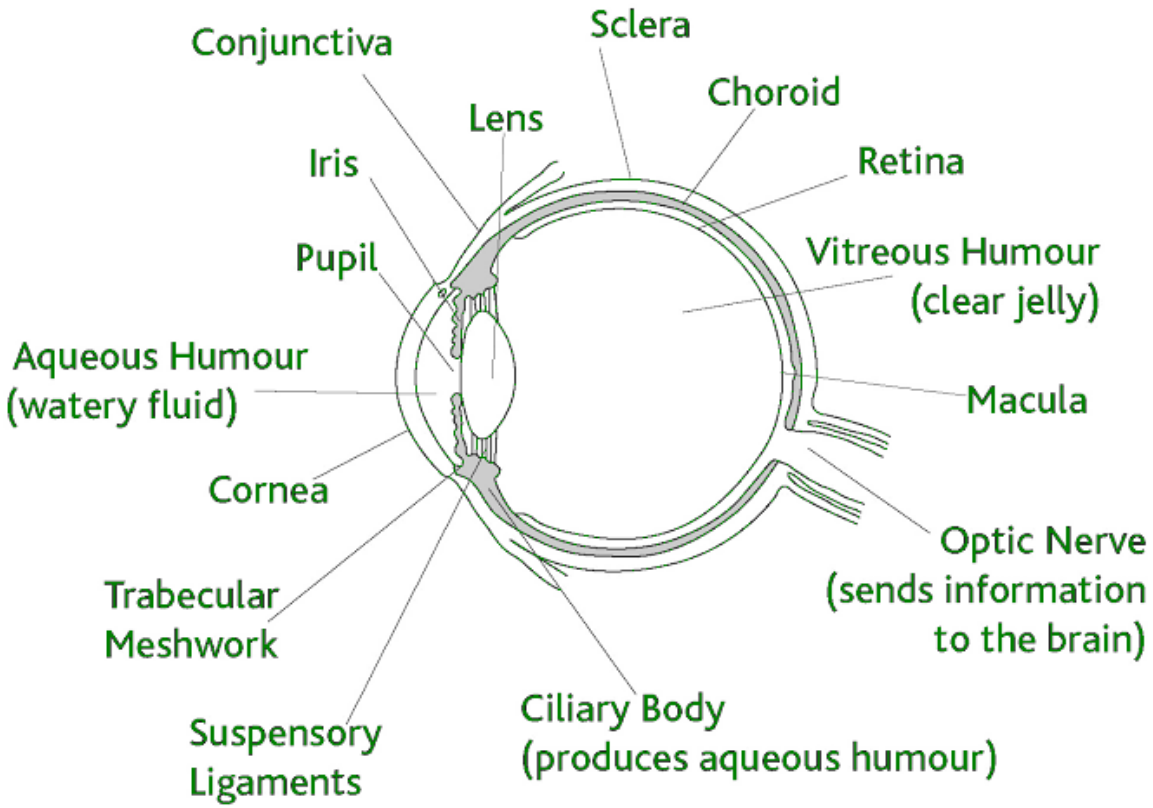
▪The field of digital image processing is built on the foundation of mathematical and probabilistic formulation, but human intuition and analysis play the main role to make the selection between various techniques, and the choice or selection is basically made on subjective, visual judgments.

▪In human visual perception, the eyes act as the sensor or camera, neurons act as the connecting cable and the brain acts as the processor.

The basic elements of visual perceptions are:

- Structure of Eye
- Image Formation in the Eye
- Brightness Adaptation and Discrimination

Elements of Visual Perception



MCQ

1. The type of Interpolation where for each new location the intensity of the immediate pixel is assigned is _____

   a) bicubic interpolation

   b) cubic interpolation

   c) bilinear interpolation

   d) nearest neighbour interpolation

2. The type of Interpolation where the intensity of the FOUR neighbouring pixels is used to obtain intensity a new location is called _____

   a) cubic interpolation

   b) nearest neighbour interpolation

   c) bilinear interpolation

   d) bicubic interpolation

3. Dynamic range of imaging system is a ratio where the upper limit is determined by

   a) Saturation

   b) Noise

   c) Brightness

   d) Contrast

MCQ

4. For Dynamic range ratio the lower limit is determined by
   a) Saturation
   b) Brightness
   c) Noise
   d) Contrast
5. The smallest discernible change in intensity level is called _____
   a) Intensity Resolution
   b) Contour
   c) Saturation
   d) Contrast

References

- https://www.javatpoint.com/digital-image-processing-tutorial
- https://www.geeksforgeeks.org/
- Digital Image Processing 2nd Edition, Rafael C. Gonzalvez and Richard E. Woods. Published by: Pearson Education.
- Digital Image Processing and Computer Vision, R.J. Schalkoff. Published by: JohnWiley and Sons, NY.
- Fundamentals of Digital Image Processing, A.K. Jain. Published by Prentice Hall,Upper Saddle River, NJ.