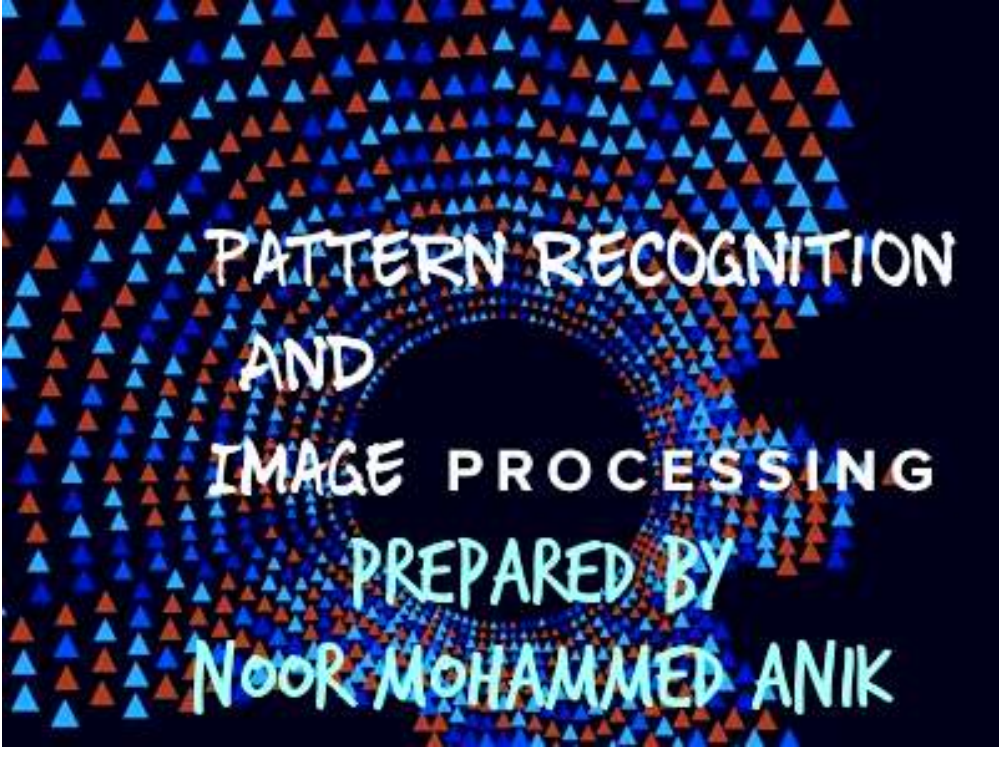

Midterm

PATTERN RECOGNITION AND IMAGE PROCESSING

Prepared by –
Noore Mohammed Anik
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[1] Write down the difference between analog image and digital image.

Ans:

Analog Image	Digital Image
(1) An analog image is an image represented by continuous variation in tone, such as a photograph.	(1) A digital image is a numeric representation (binary) of a two dimensional image.
(2) continuous	(2) Matrix of pixels.
(3) For human viewing	(3) For computer system

[2] Define Sampling and Quantization.

Ans: An image may be continuous with respect to the x and y coordinates and also in amplitude. To converct it to digital form, we have to sample the function in both coordinates and in amplitude.

Digitizing the coordinate values is called sampling.

Digitizing the amplitude values is called quantization.

[3] what is image interpolation?

Ans:- Image interpolation is a basic tool used in tasks such as zooming, shrinking, rotating and geometric corrections.

Image interpolation is about digital to Analog conversion.

[4] How to convert an analog image into digital image?

Ans: Analog to digital image conversion take place in 3 steps -

1. Sampling

Sampling which measure the amplitude of the signal at equal interval.

2. Quantization

It is the process of rounding of the signal to the nearest finite level.

3. Code word generation

Finally converts the analog image into binary form.

[5] Describe the image formation in the eye.

Ans:

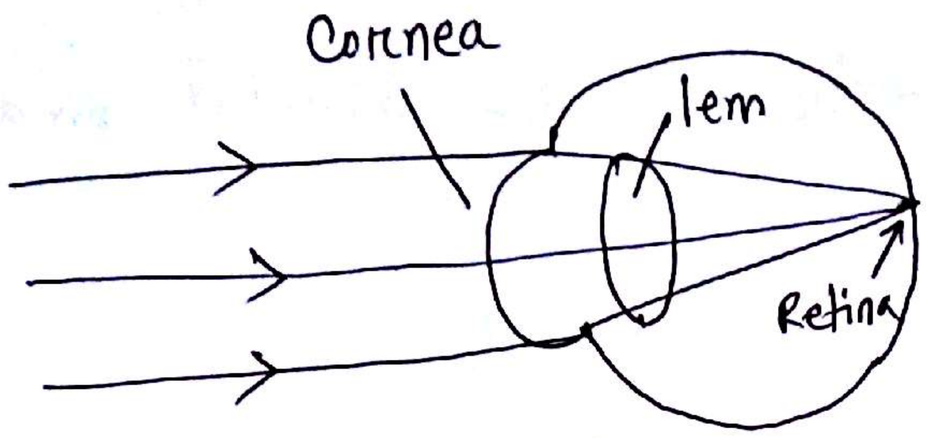

Fig: Image formation in the eye.

Referring to the simplified diagram, ~~the~~ Light rays travel into the cornea and refracted by the cornea and the lens. In a normal eye, the image is formed on the retina and is upside down.

[6] Write the effects of different quantization parameteres (m, n, l) on image quality.

Ans: (1) When m, n and l increase, quality increases but computation efficiency reduces.

(2) In many cases high m, n, l not required due to the specific nature of application

(3) For images with large amount of details, only a few amount of gray level (l) are needed.

[7] Give an example of digital image acquisation process.

Ans: An example of the digital image acquisition process

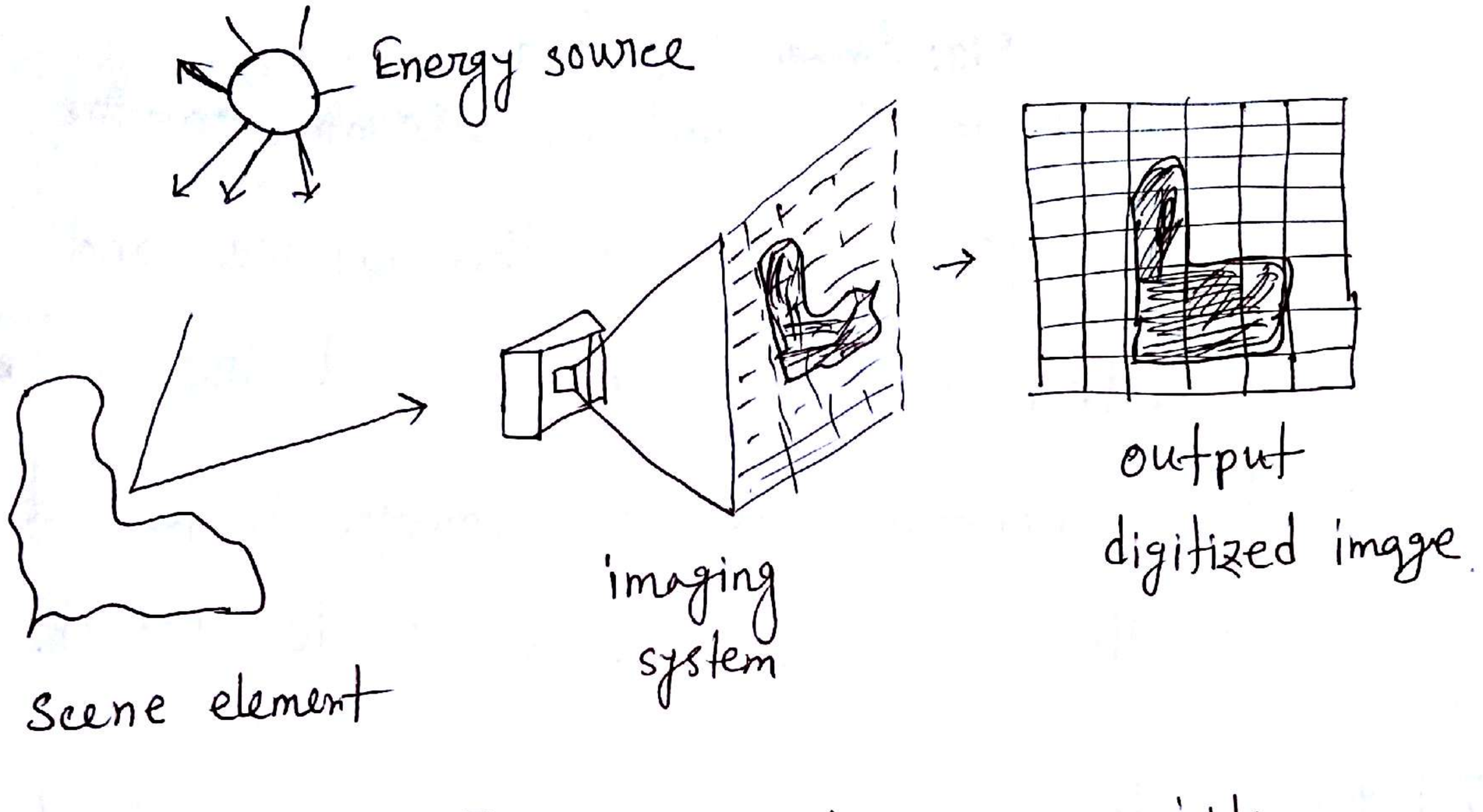

Fig: Example of image acquisition.

[8] Write down the types of acquisition devices.

Ans: There are three types of acquisition devices.

1) Single image sensor.
2) Linear sensor
3) Array sensor.

[9] Find the resolution (in PPI) of a 15″ monitor working on 640 × 480.

Ans: Aspect ratio $= \frac{\text{width}}{\text{height}} = \frac{640}{480} = \frac{4}{3} = 4:3$

So, $(4x)^2 + (3x)^2 = (15)^2$

or, $16x^2 + 9x^2 = 225$

or, $25x^2 = 225$

or, $x = 3$

Now, length $= 4x = 4 \times 3 = 12$

$$\text{resolution} = \frac{640}{12}$$

$$= 53.3 \text{ PPI} \quad \text{(Ans)}$$

[10] Find the resolution (in PPI) of an image 12″ × 9″, which is converted from a 35 mm photo negative with 4500 PPI.

Ans: Here, 35 mm = 3.5 cm [10 mm = 1 cm]

we know, 2.54 cm = 1 inch [দেওয়া]

$$3.5 \text{ cm} = \frac{3.5}{2.5} \text{ inch}$$

1 inch has = 4500

$\frac{3.5}{2.54}$ " " $= \frac{3.5}{2.54} \times 4500$

$= 6200$ PPI

In 1" the value of pixels are $= \frac{6200}{12}$

$= 516.67$ PPI

(Ans)

11 Write down the some basic relationship between pixel.

Ans:

- Neighbors of pixels:
  - 4-neighbors of P, $N_4(P)$
  - diagonal neighbors of P, $N_d(P)$
  - 8-neighbors of P, $N_8(P)$
- Adjacency
- Connectivity
- Regions
- Boundaries.

Prepared by
Noor Mohammed Arik
Dept. of CSE, IIUC