Chapter 1: Introduction of Digital Image Processing

Origin42

Question 3. [Marks: 13]

a) i. Mention two techniques those made the digital representation of analog world possible. [3] [5]

ii. "The more intensity level used, the finer level of detail discernible in an image"- explain why? [2]

3.a. Solution: O24

(i)

The process of transforming a continuous analog image into a discrete approximated image is called digitization.

There are two techniques in this process:

Sampling

- Digitizing coordinates
- A process which converts the continuous analog space into a discrete space

Quantization

- Digitizing amplitudes (gray scale values)
- A process of converting a continuous analogue signal into a digital representation of that signal

(ii)

Let intensity level = 3. So, max intensity = 2^3 = 8
Let intensity level = 5. So, max intensity = 2^5 = 32

For intensity level 3 an image will have 8 different types of shades, but for intensity level 5 the same image will have 32 different types of shades in the same image, which will make the image more clear and vivid.

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2. a) Define the following terms: L-3 [4]

i) Digital Image ii) Resolution iii) Sampling and Quantization

Solution: 024

Digital Image: A digital image is a representation of a two-dimensional image as a finite number of elements, each one has a particular location and value.. These elements are called picture elements, image elements or pixels.

Resolution: Spatial resolution = MxN, Gray level resolution = MxNxk. Here M=row, N=column, k=bit depth.

Sampling: Digitizing coordinates through a process which converts the continuous analog space into a discrete space.

Quantization: Digitizing amplitudes through a process of converting a continuous analogue signal into a digital representation of that signal.