

Introduction

Wednesday, January 9, 2019 7:57 AM

Why in EE?

Why images?

images	words
sight	hearing
parallel	serial
spatial	3
universal	language-specific
more info	
vague	specific
concrete	abstract

What is an image?

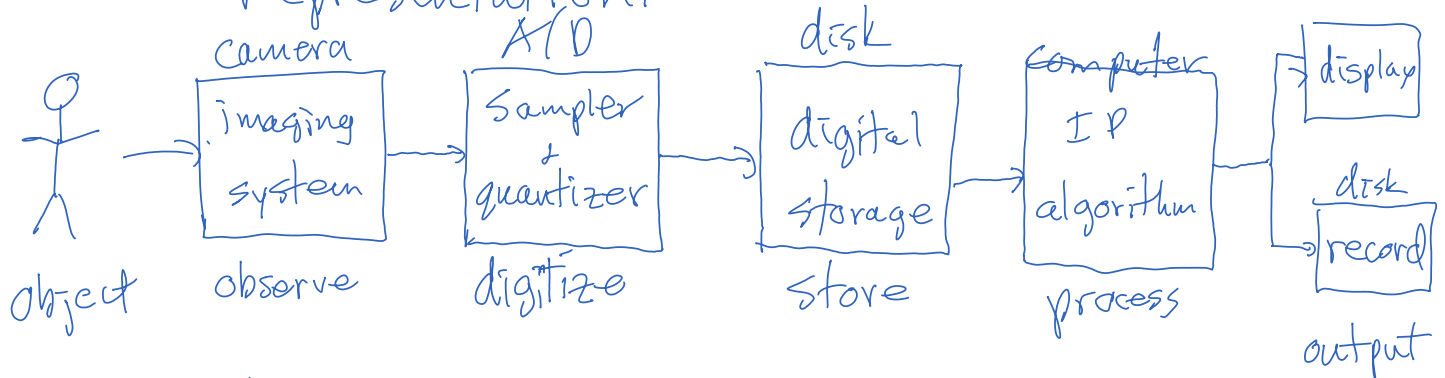
- luminance of a scene (standard picture)
- absorption characteristics of an x-ray
- radar cross-section of a target
- temperature profile of a scene (infrared)

general \Rightarrow any 2-D function that contains information

What is digital image processing?

- using a computer to process 2-D data.

Generally, the input is an image, and the output is another image or image representation.



typical image processing sequence

Image representation

- continuous vs. discrete
- digital processing requires sampling + quantization
 - must sample finely enough to preserve relevant information
 - must quantize so that quantization noise (roundoff error) is acceptable
- an image sample is called a picture element (or pixel or pel). An image is represented as a large array of #'s.

- a monochrome image is usually quantized to 256 gray levels, or 8 bits.
- a color (red, green, blue) image is 8 bits/color.

Applications

enhancement — accentuating certain features or improving the look of the image for analysis or display

- edge sharpening
- contrast enhancement
- smoothing
- color manipulation

geometric transformations — changing coordinate system or warping image

restoration — removal or minimization of known degradations

Ch. 2.1-2.2

correcting some of nonlinearities

- correcting sensor nonlinearities
- removing blurring effects of optical systems
- correcting geometric distortion

Compression — reducing the number of bits required to represent an image

⇒ images contain an enormous amount of information

- reduction in storage (consumer photos, databases, medical records, etc.)

- reduction in transmission time or bandwidth (teleconferencing, streaming

Computer image analysis, digital TV, counting objects, face recognition, identifying regions of interest / boundaries

Computer graphics

Computer vision