

Introduction

Monday, January 6, 2020 10:44 AM

Why in EE?

Why images?

images	words
• instantaneous parallel	time-sequential
• immediate (emotional)	logical process
• concrete	abstract
⇒ vague	specific
• spatial	?

words require patience,

Read Ch.1, Ch.2.3-2.4

What is an image?

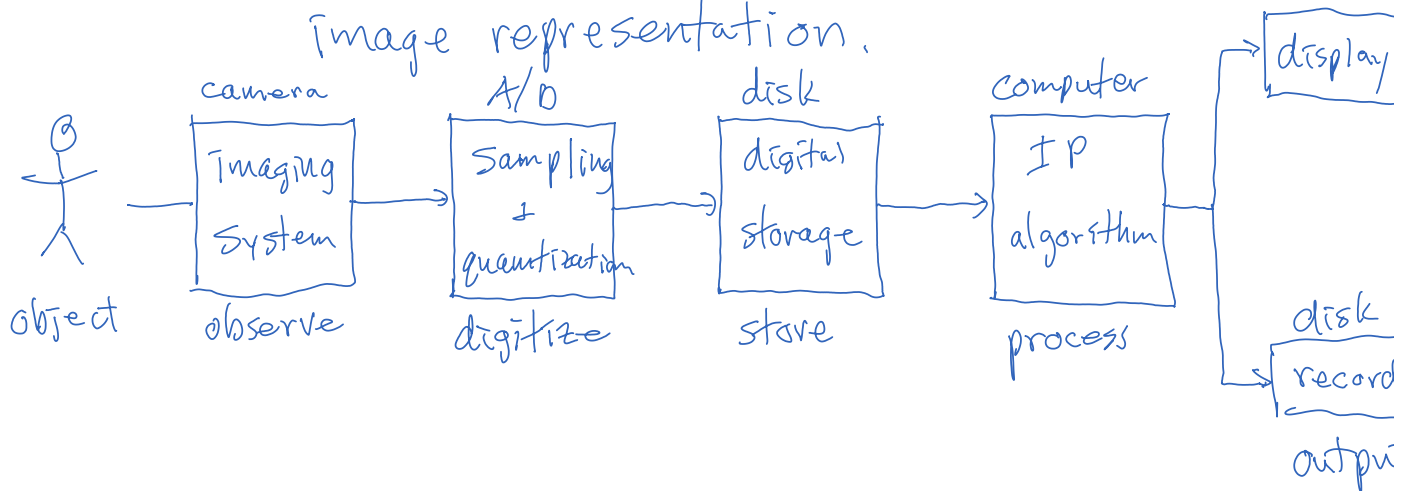
- luminance of a scene (standard photo)
- absorption characteristics of an x-ray
- radar cross-section of a target
- temperature profile of a scene (infrared)

general ⇒ 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 or discrete
- digital processing requires sampling + quantization
 - must sample finely enough to preserve 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 by a large array of #'s.
- a monochrome image is usually quantized

to 256 gray levels or 8 bits.

(Color - RGB - is 8 bits per color channel)

Applications

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

- edge sharpening
- contrast enhancement
- smoothing
- color manipulation

geometric transformation — changing coordinate system, warping image

restoration — removal or minimization of known degradations

- Correcting for sensor nonlinearities
- removing blurring effects of optical system
- correcting geometric distortion

Read Ch. 2.1-2.2

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

⇒ image contains an enormous amount of information

- reduction in storage (consumer photos, databases, medical records)
 - reduction in transmission time or bandwidth (video chat, teleconferences, streaming movies, remote diagnosis)
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Computer image analysts — finding/counting objects, identifying special regions, finding boundaries

Computer graphics

Computer vision