



HCMC University of Technology and Education

Faculty of Electrical & Electronic Engineering

IMAGE PROCESSING

Chapter 1:

Introduction

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Introduction

6. Image source

- A sample color digital image, 800*600*24 captured from a electronic camera
- 24-bit of color for each pixel

Information of color image

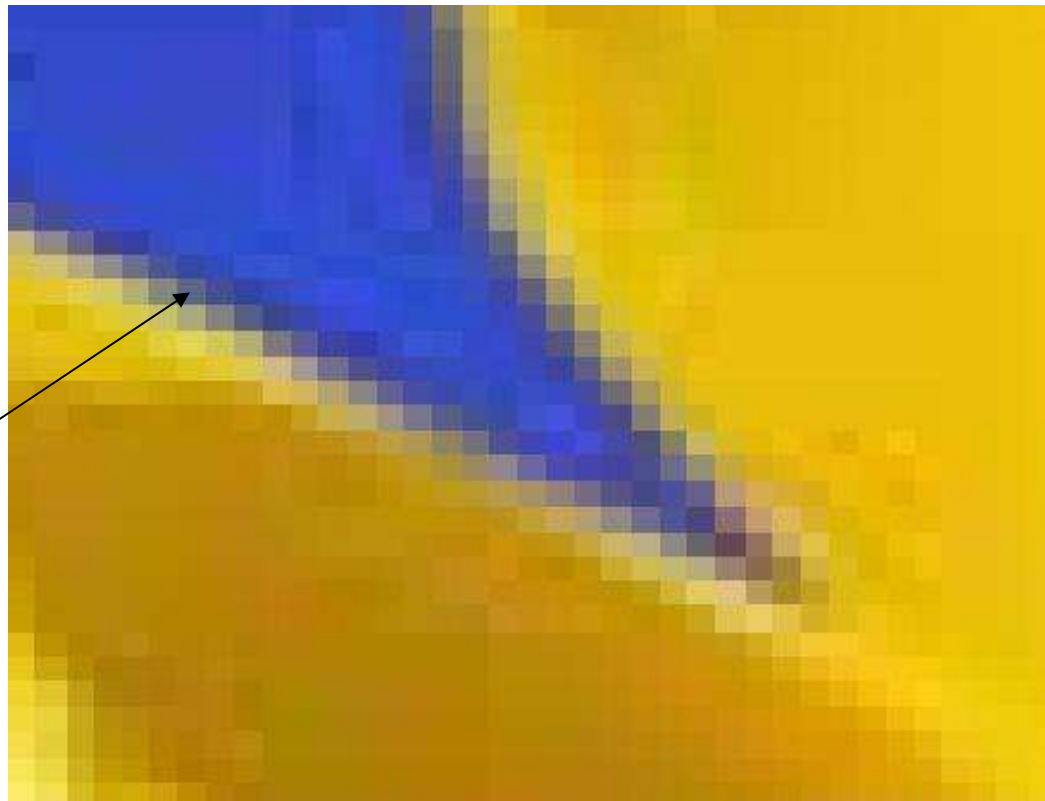


Introduction

Pixel Description

- Pixel: The smallest element of a digital image.

Pixels



Introduction

First Image

- One of the first applications of digital images was in the newspaper industry, when pictures were first sent by submarine cable between London and New York.

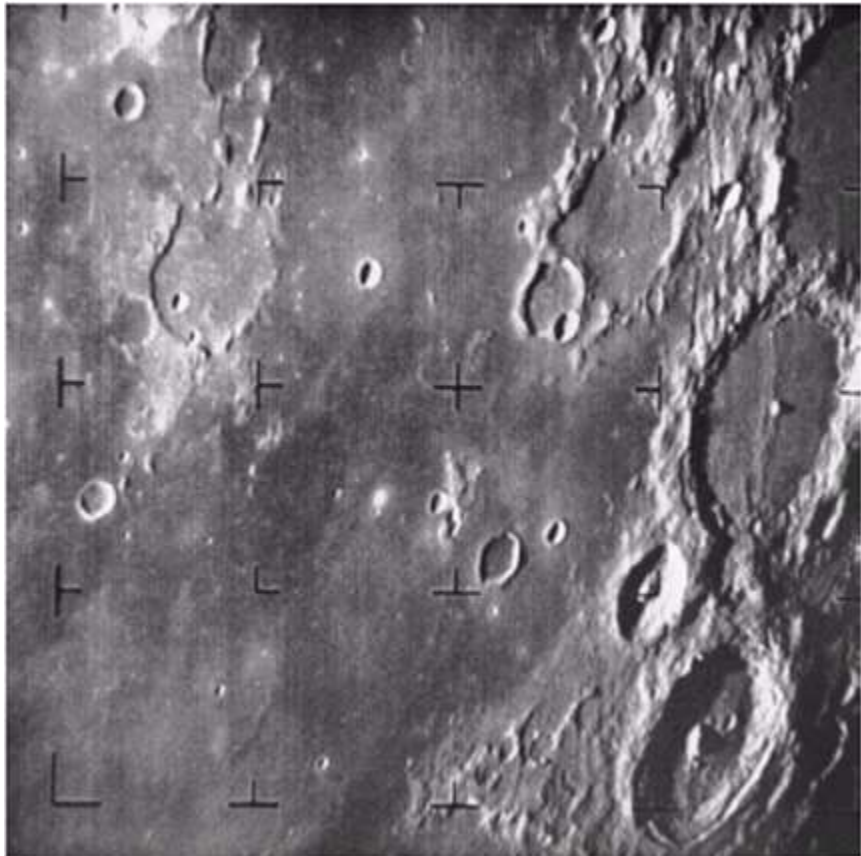
Digital picture, 1921
(McFarlane)



Introduction

Moon image

The first picture of the moon by a US spacecraft, July 31, 1964 (NASA).



Introduction

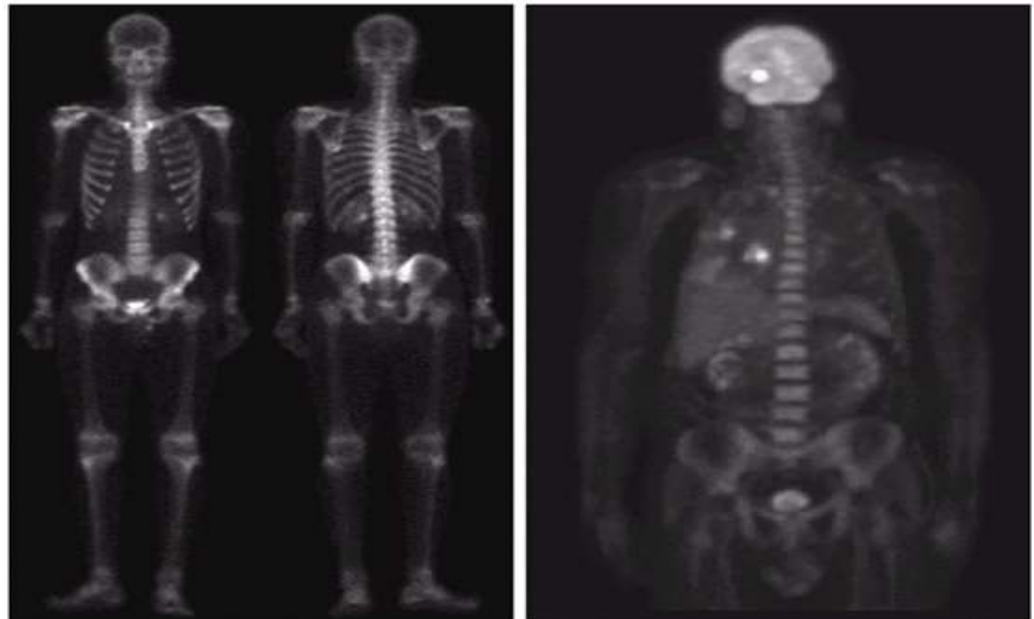
Image is every where

- Medical imaging
- Remote Earth resource observations
- Astronomy
- High-energy plasmas and electron microscopy
- Personal Computer
- Camera
- Other sensors

Introduction

Biomedical image

- a. Bone scan
- b. PET image



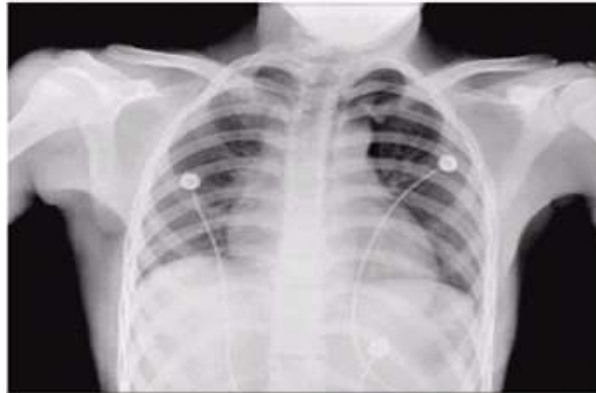
(a)

(b)

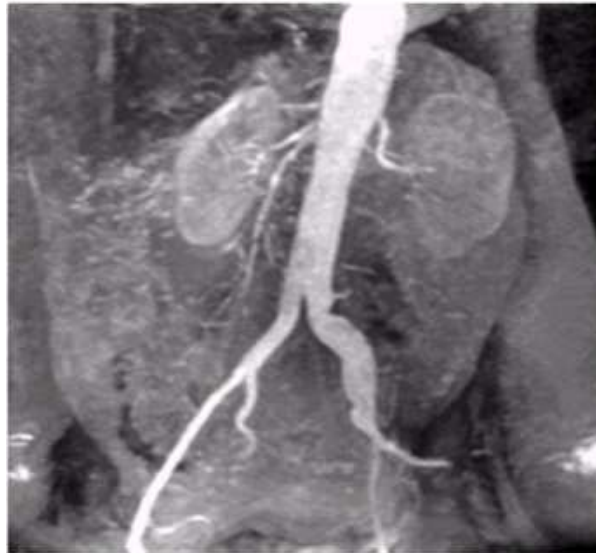
Introduction

- a. Chest X-ray
- b. Aortic angiogram
(động mạch chủ bằng X-ray)
- c. Circuit boards

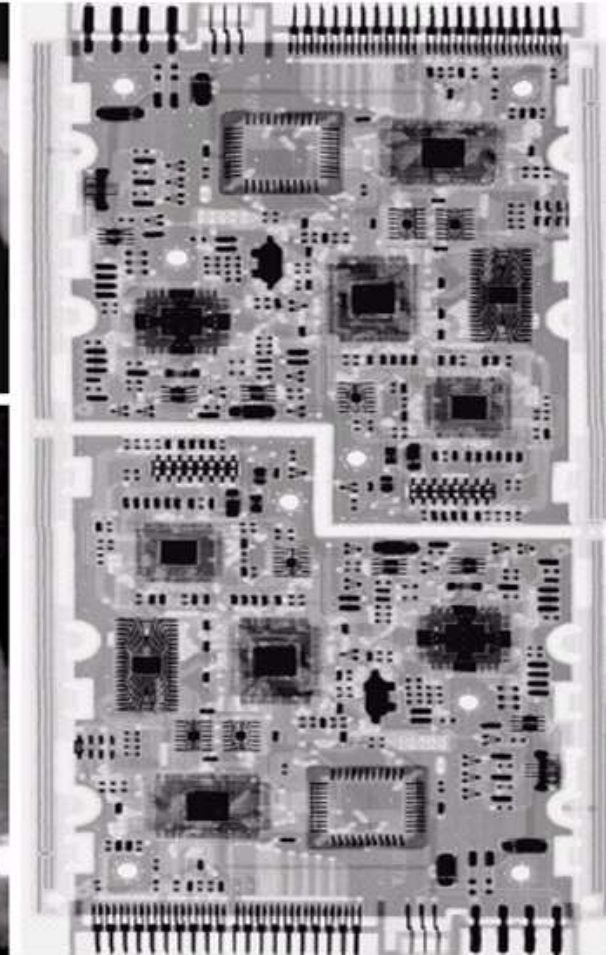
(a)



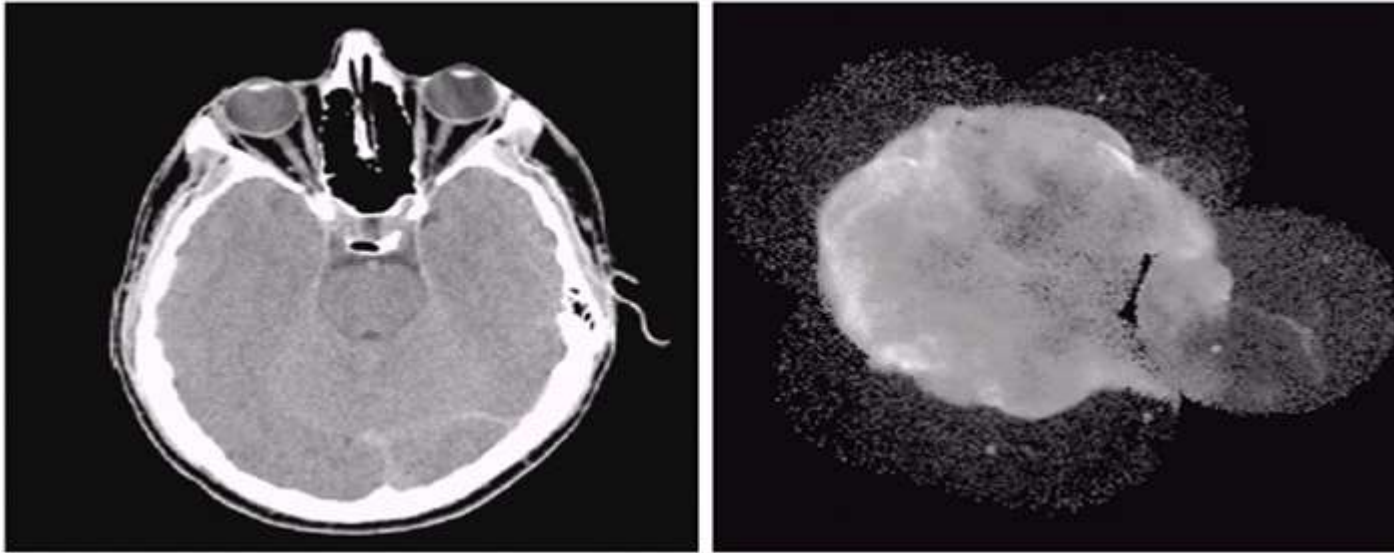
(b)



(c)



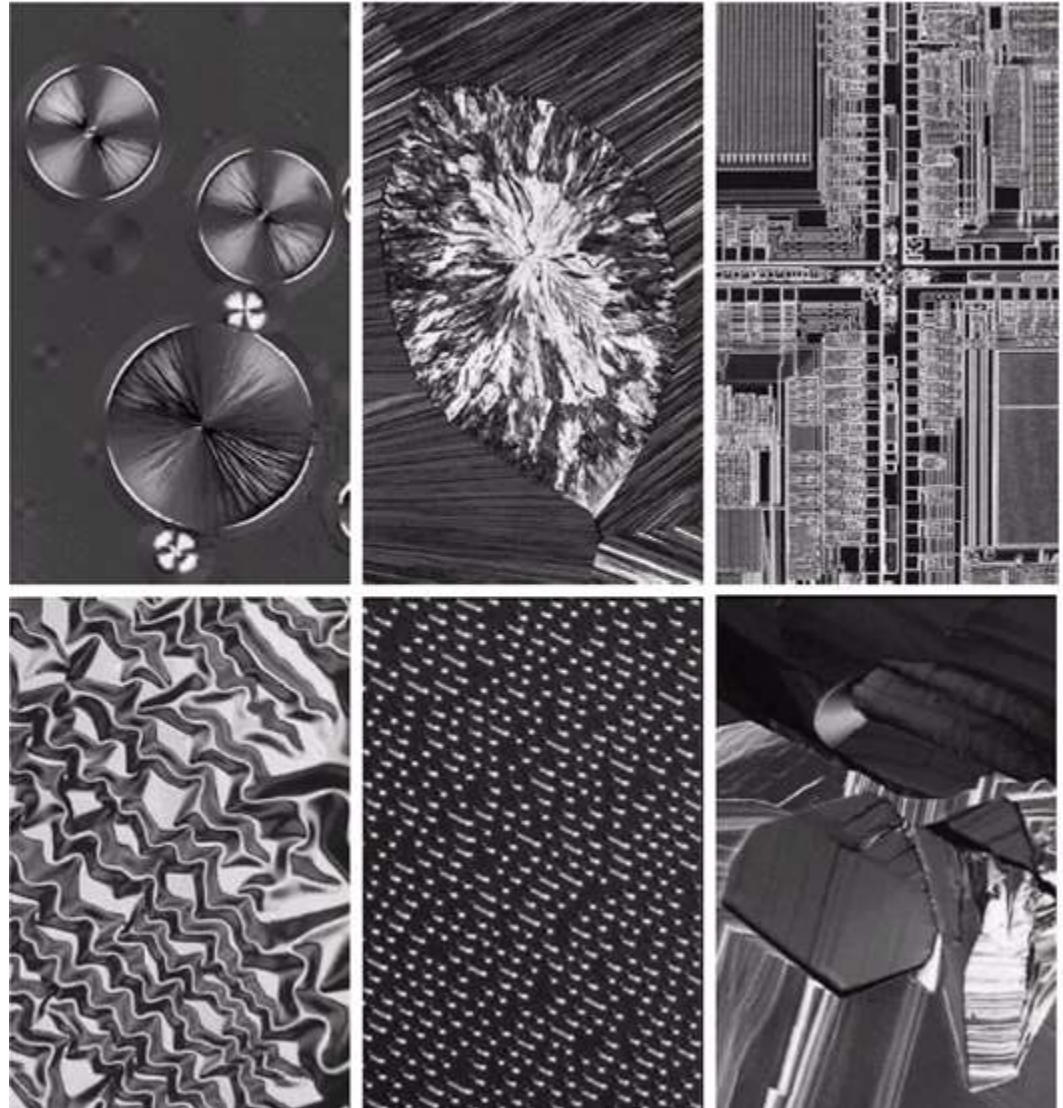
Introduction



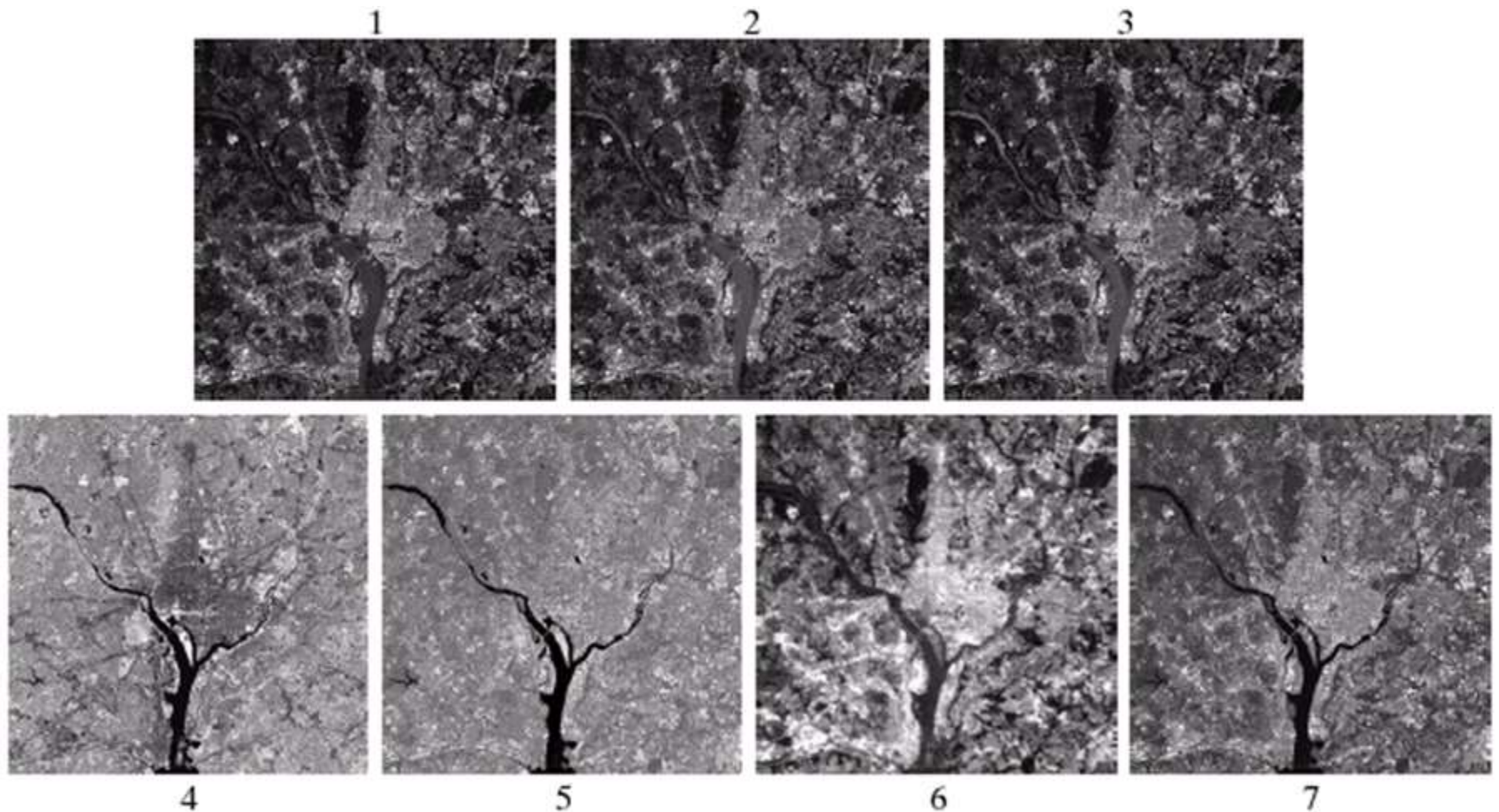
- a. Head CT
- b. Cygnus Loop (NASA)

Introduction

- a. Taxol (anticancer agent_tác nhân ức chế ung thư)
 - b. Cholesterol
 - c. Microprocessor
 - d. Nickel oxide thin film
 - e. Surface of audio
 - f. Organic superconduction (siêu dẫn hữu cơ)
- (Michael W. Davidson, Florida State Uni.



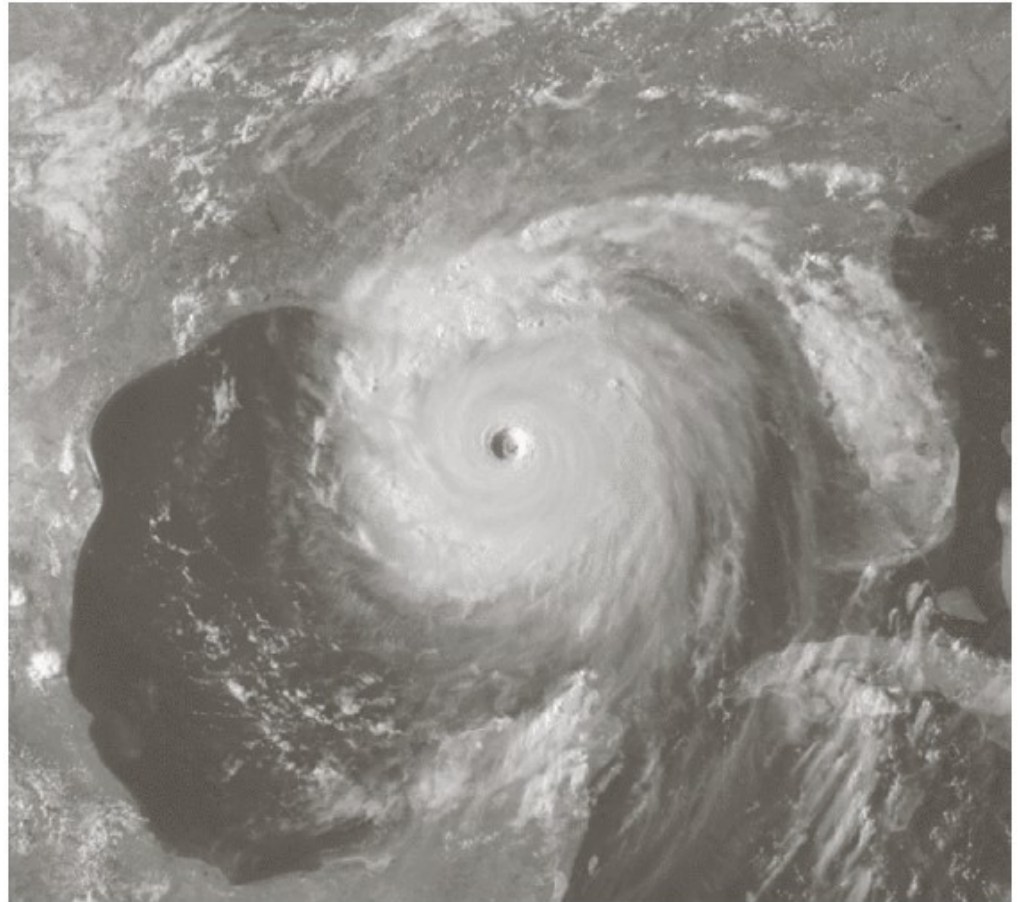
Introduction



LANDSAT Satellite images of the Washington D.C. area.
The number refer to the thematic band (Images courtesy
of NASA)

Introduction

- Weather Observation, **visible** and **infrared** bands
- Satellite image of Hurricane, Aug. 29th, 2005 (Courtesy of NOAA)



Introduction

- Infrared Satellite images of the Americas
- The small gray map is provided for reference (Courtesy of NOAA)



Introduction



a. Thumb print

b. Paper currency



c. and d. Automated license plate reading

Imaging in the visual spectrum, Courtesy of Dr. Juan Herrera

Introduction

Imaging in the Microwave Band

Spaceborne
radar image of
mountains in
southeast Tibet
(Images
courtesy of
NASA)



Introduction

MRI Imaging, Dr. David R. Pickens, Vanderbilt University Medical Center



a. Knee

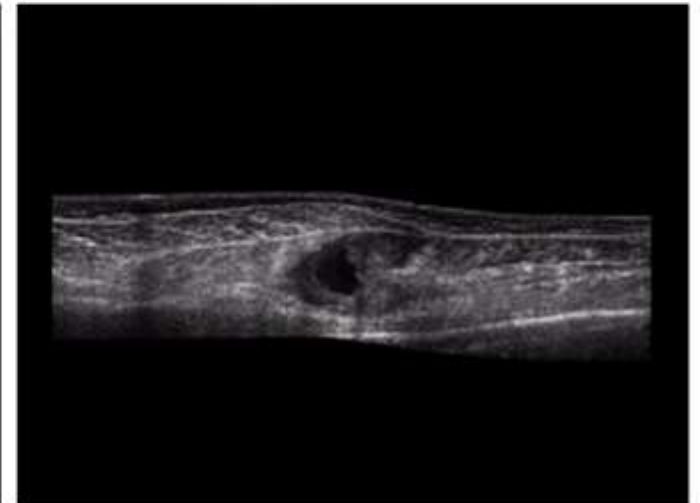
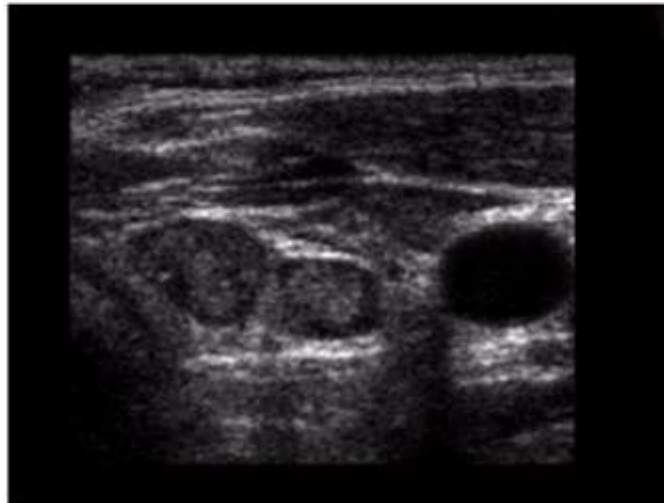


b. Spine

Introduction

Ultrasound Imaging, Courtesy of Siemens Medical Systems

- a. Baby
- b. Another view of baby
- c. Thyroids
- d. Muscle layers showing lesion



7. Applications

What is image processing? And its applications

Image processing has been developed in response to three major problems concerned with pictures:

- Picture digitization and coding to facilitate transmission, printing and storage
- Picture enhancement and restoration in order, for example, to interpret more easily pictures of the surface of other planets taken by various probes or to identify, rectify, classify pictures of security, medical, controls etc.
- Picture segmentation and description as an early stage in Machine Vision.

Introduction

Fields for application

1. Biomedical
2. Controls of robotic/wheelchairs
3. Traffic signs
4. Security
5. Pictures/movies
6. Recognition of product errors in industry
7. others

Topics for working in teams

1. Detect and recognize faces
2. Detect and recognize fruits
3. Detect and recognize traffic signs
4. Detect and recognize different shapes
5. Detect and recognize vehicles
6. Detect and recognize fingers
7. others

What things to do?

1. Collect images using video clips or cameras
2. Pre-processing images using methods
3. Extract features
4. Use methods for recognizing
5. Writing codes for processing images
6. PP Slides and final report

Introduction

The End