Image Processing:
Presentation

Winter term 2004/05

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http://diuf.unifr.ch/courses04-05/improc
What is Image Processing?

- The analysis, manipulation, storage, and display of graphical images such as photographs, drawings, or video

- Used in applications such as
  - digital photography,
  - television and film,
  - medicine, science, ...
  - military, satellite imaging, astronomy, ...
  - machine vision in robotics
  - computer–based pattern recognition
  - ...

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Terminology

- Levels of image computation
  - Image Processing: image -> image
  - Image Analysis: image -> measurements
  - Image Understanding: image -> symbolic description (topic of Pattern Recognition)
  - Computer Graphics: symbolic description -> image
Issues of image processing

- Image capture and digitizing
- Image coding
- Image compression
- Image rendering
- Image enhancement
- Image classification and indexing
Illustration: image enhancement
Illustration: Image filtering
Illustration: Edge detection
Illustration: Color clusters
Illustration: Segmentation

demo from http://cs-people.bu.edu/liulf/demo (Boston university)
Illustration: JPEG compression

original size: 512 x 512 x 24 bits = 768KB

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Objectives

- Understand the basis of human vision
- Understand fundamental image processing theory
- Knowledge of classical image processing methods
- Implement and evaluate image processing algorithms
Content of the course

List of topics

- Fundamentals of Image Processing
- Human Visual System
- Point Operators
- Spatial Domain Operators
- Frequency Domain Operators
- Image Coding
- Image Segmentation
- Edge Detection
- Image Binarization
- Morphological Operators
- Application: Document Image Processing
Bibliography

- Rosenfeld, Kak, Digital Picture Processing, 2nd edition, 2 volumes, Academic Press, 1982


- ... many others
Organization

- Teacher: Rolf Ingold, rolf.ingold@unifr.ch, room 2.52, 026 300 84 66
- Assistant: Jean-Luc Bloechle, jean-luc.bloechle@unifr.ch, room 2.56, 026 300 84 79

- Course: Wednesday, 13:15-14:00 & 14:15-15:00
- Exercice: Wednesday, 15:15-16:00
  - requirements: 2/3 of series made, 1/2 considered satisfactory
- Home work: estimated to 5-6 hours per week
- Software tool: extensible home made image processing environment

- Exam:
  - oral, 20 minutes,
  - end of winter term (February 2005) or fall (Oktober 2005)
- Credits: 5ECTS