

CS 3570 多媒體技術概論

Introduction to Multimedia

- **Class Meeting:** T5F5F6 資電館 234
- **Instructor:** 賴尚宏, 資電館 639,
Phone: ext. 42958, Email: lai@cs.nthu.edu.tw
- **Office Hours:** T2, F7 or by appointment
- **Teaching Assistants:**
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Course Objective

- This course will introduce fundamental techniques for digital image/audio/video representation, compression, and processing.
- Students will learn the knowledge of the multimedia signal processing techniques, and practical implementations of various multimedia applications.

Course Contents

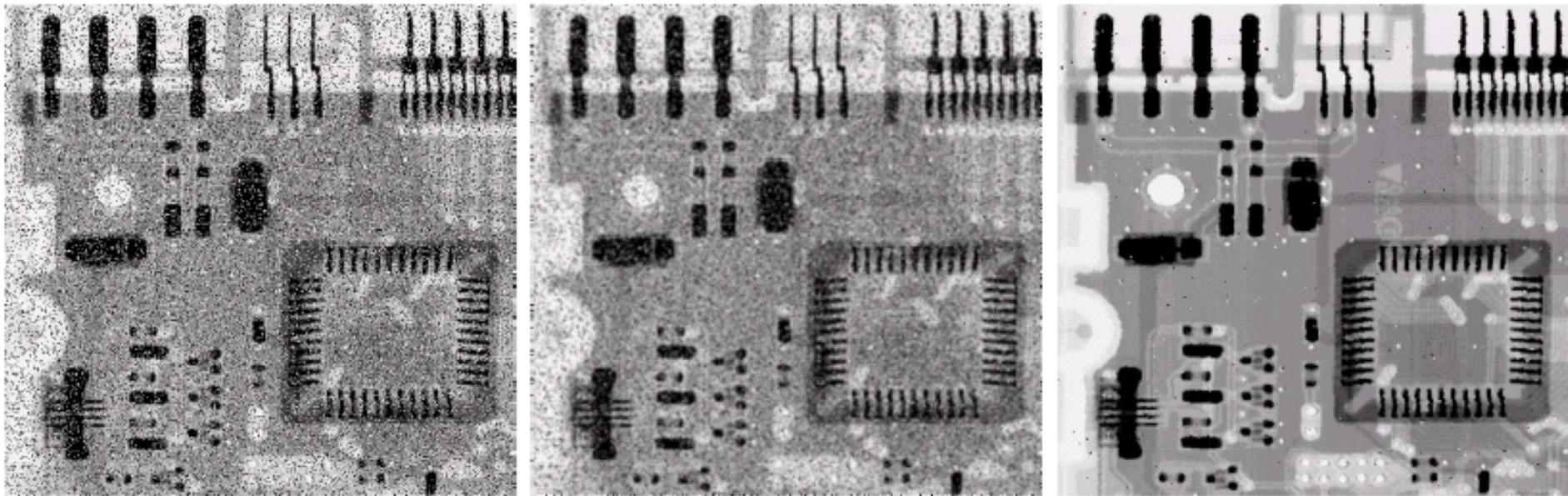
- Digital Data Representation and Communication
- Digital Image Representation
- Digital Image Processing
- Digital Audio Representation
- Digital Audio Processing
- Digital Video Representation and Communication
- Digital Video Processing
- Multimedia Authoring

Image Enhancement Example



Adjusting the image histogram to improve image contrast

Image Denoising Example

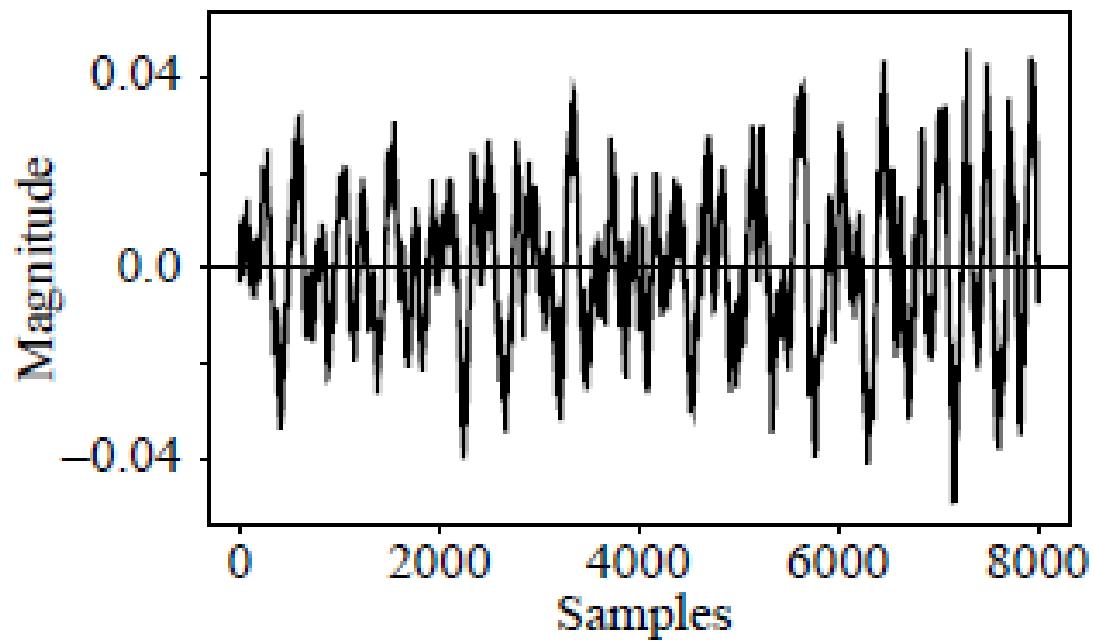


a b c

FIGURE 3.37 (a) X-ray image of circuit board corrupted by salt-and-pepper noise. (b) Noise reduction with a 3×3 averaging mask. (c) Noise reduction with a 3×3 median filter. (Original image courtesy of Mr. Joseph E. Pascente, Lixi, Inc.)

Application of the median filter

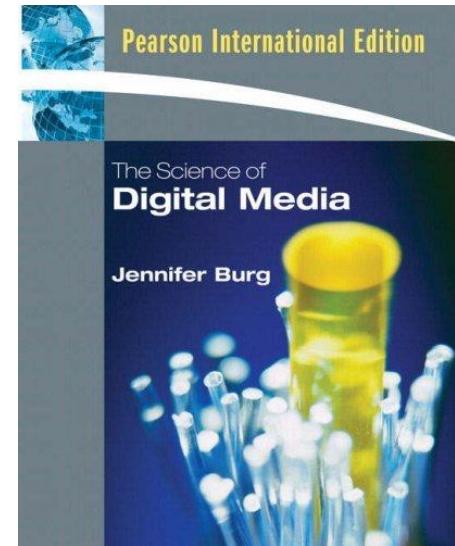
Audio Signal Processing



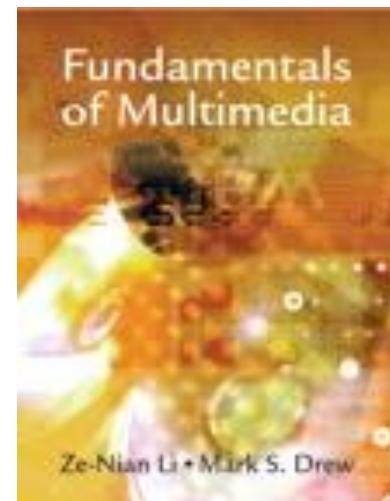
Textbook

Required:

Jennifer Burg, The Science of Digital Media, Pearson Prentice Hall, Inc., 2010



Reference: *Fundamentals of Multimedia*, by Ze-Nian Li and Mark S. Drew, Prentice Hall, 2004.



Prerequisites

- Linear Algebra
- Probability
- Basic programming skills

Grading

Midterm Exam. (May 6)	30%
Homeworks (5)	40%
Final Project	20%
Class Participation	10%

Homework Policy

- Homeworks will involve programming assignments (in Matlab, C, or C++).
- Discussion of homework is encouraged, but you have to write your own. No copying is **strictly** enforced.
- Homework should be delivered before the announced due time. The score of late homework will be reduced by 20% per day.

Final Project

- You are required to do a final project of a topic from a list of suggested topics.
- You can form a group to do the final project. A group can consist of one, two, or three students.

Course Webpage

- <http://cv.cs.nthu.edu.tw/courses.php>
- It will contain the course slides and basic course information.
- Important course announcement will also be posted on this webpage.

Class Participation

- Class attendance is required and treated as the basic requirement for class participation.
- Asking questions is strongly encouraged.
- There will be simple quizzes in class randomly held during the semester.

CS 4520 Classroom Rule

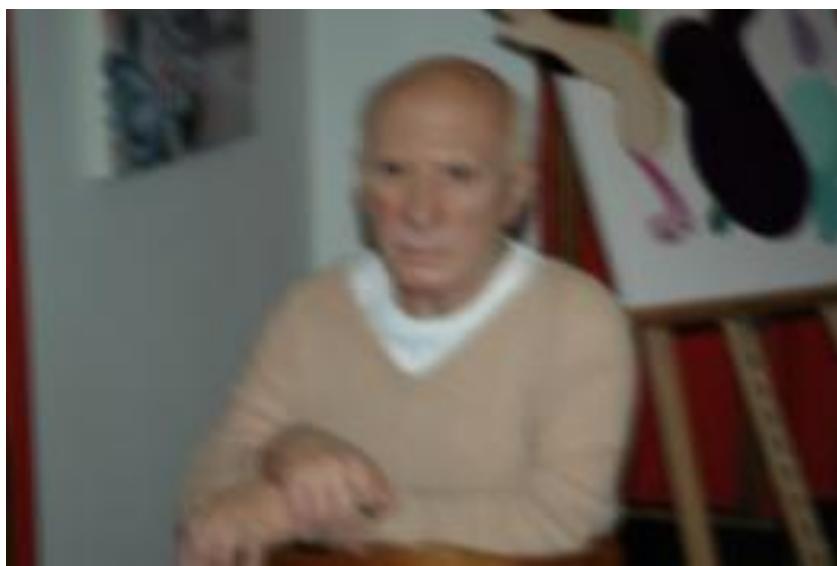
- No eating is permitted.
- No sleeping during the class.
- Disturbance to others in class should be minimized.
- Cell phone should be turned off during the class.

Image Restoration

Motion Deblurring, Image Stabilization



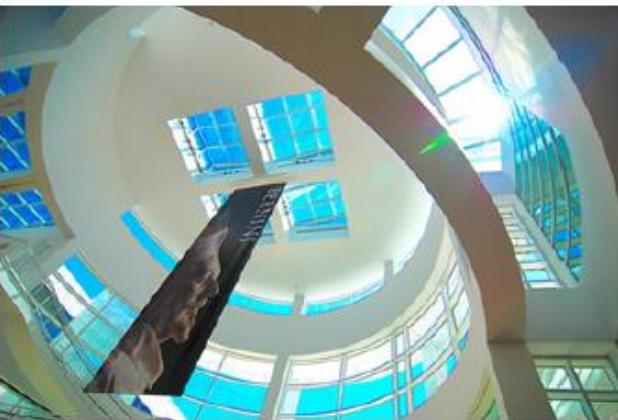
Motion Deblurring



Structure-Preserved Image/Video Retargeting



Input Image



Our results



Facial Animation: Caricature Generation

- Feature exaggeration
 - * Personal shape characteristics (C)
 - * Personal texture characteristics (T)
 - * Expressional style (E)



Input Images



C+T+E

Vision-Based User Interaction

- Real-time 3D motion capture of human gestures and body motion from 3D cameras
- Current video-based motion capture systems either need markers placed on human body or only work under very restricted conditions
- Control games with your own body motion/gesture and create immersive experiences by combining 3D personal image into the game scene



3D Video

- 3D cinema
 - Stereoscopic 3D, glasses-based
 - Increasing number of 3D movie production
- 3D TV - home entertainment
 - Stereoscopic
 - Autostereoscopic: multiple views
 - Various input formats and display sizes
 - Glasses may not be acceptable in the near future
- 3D mobile
 - Autostereoscopic two-view display with fixed viewing position
 - On the market



3D content creation will be the key to the emerging 3D market.