

影像處理概論

Introduction to Image Processing

Spring 2024 515518 T7F34-EC114

Kuan-Wen Chen (陳冠文)

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An Introduction to Kuan-Wen

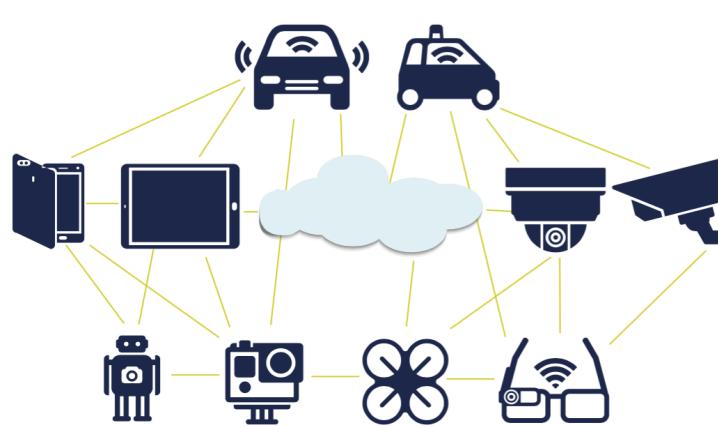
- Associate professor at Dept. of Computer Science (Aug. 2021 ~)
- Education
 - B.S. degree (2000 - 2004) - Dept. of Computer and Information Science, National Chiao Tung University
 - Ph. D. degree (2005 - 2011) - Dept. of Computer Science and Information Engineering, National Taiwan University
- Work Experience
 - Assistant professor at Dept. of Computer Science ((Feb. 2016 ~ July, 2021))
 - Intel-NTU connected context computing center (renamed as NTU-IoX Center since 2016)
 - Postdoc researcher (Aug. 2012 - Sep. 2014)
 - Assistant research fellow (Oct. 2014 - Dec. 2015)

An Introduction to Kuan-Wen

- Research interests:
 - **computer vision**, pattern recognition, **visual localization**, multimedia, and internet-of-**visions**

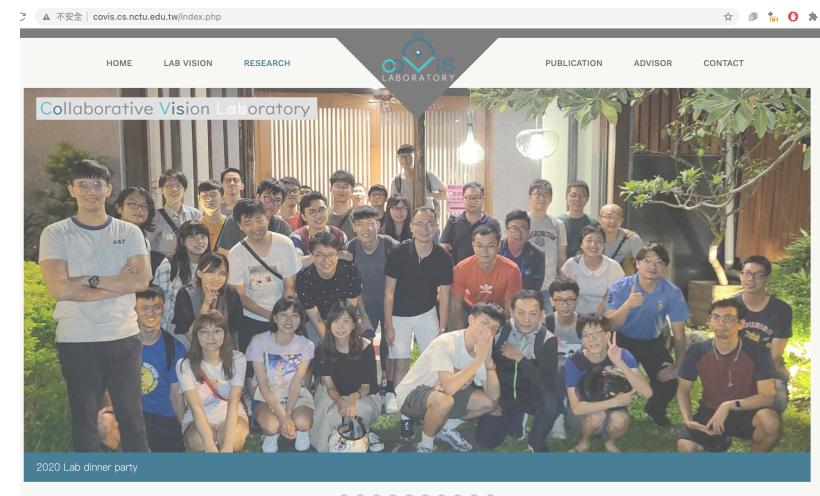
An Introduction to Kuan-Wen

- Research interests:
 - computer vision, pattern recognition, visual localization, multimedia, and **internet-of-visions**
 - ▶ Cameras and sensors are everywhere, and IoT enables them connected.
 - surveillance camera
 - smart phone
 - dashcam
 - smart glasses
 - robot
 - ...



CoVis Lab

- **Collaborative Vision Lab** (協同視覺實驗室, EC223b)



<http://covis.cs.nctu.edu.tw/>

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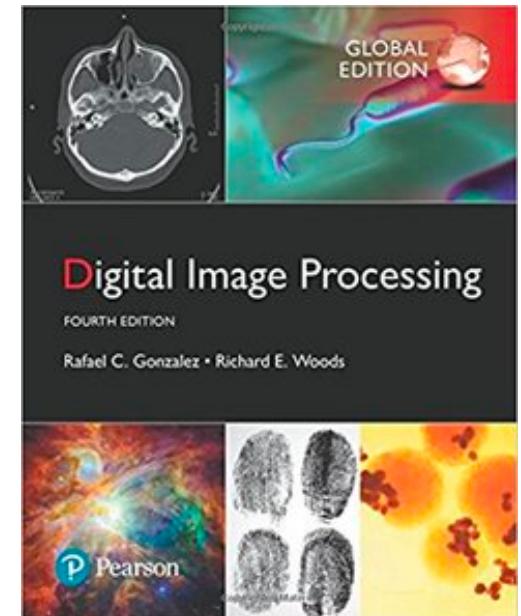
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Textbook

- **Digital Image Processing, 4th Edition,
R.C. Gonzalez and R.E. Woods,
Pearson Global Edition, 2018.**



<https://www.imageprocessingplace.com/>

Course Contents

- This course aims to introduce some fundamental techniques of 2D digital image processing
 - Chap 1. Introduction
 - Chap 2. Digital Image Fundamentals
 - Chap 3. Intensity Transformations and Spatial Filtering
 - Chap 4. Filtering in the Frequency Domain
 - Chap 5. Image Restoration and Reconstruction
 - Chap 6. Color Image Processing
 - Selected Topics Introduction

Course Contents

- This course aims to introduce some fundamental techniques of 2D digital image processing
 - Chap 7. Wavelet and Other Image Transforms
 - Chap 8. Image Compression and Watermarking
 - Chap 9. Morphological Image Processing
 - Chap 10. Image Segmentation
 - Chap 11. Feature Extraction
 - Chap 12. Image Pattern Classification

Course Requirement

1. Homework: 20%
2. 1st Midterm Exam: 30%
3. 2ed Midterm Exam: 30%
4. Term Project: 20%

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習題 or 程式

- 習題手寫繳交
- 程式另行公告

- Homework Submission Policy
 - Late submission:
 - within 24 hours after its due will incur 20% penalty
 - after 24 hours and within seven days of its due will incur 50% penalty
 - after seven days of its due will not be graded
 - **Note:** One minute late is the same as 23 hours late.

Course Requirement

1. Homework: 20%
- 2. 1st Midterm Exam: 30%**
- 3. 2ed Midterm Exam: 30%**
4. Term Project: 20%

- 筆試
- 這門課的傳統(手算影像處理)
- 題型跟習題很像

Course Requirement

1. Homework: 20%
2. 1st Midterm Exam: 30%
3. 2ed Midterm Exam: 30%

4. Term Project: 20%

- 分組進行 (1~3人)
- 後面講不考的內容的時候，大家就做這個
- 會是稍微有點事做的作業
- 跟深度學習有關
- 影像處理相關題目
- 題目及進行方式期中後公布

Term Project Last Year (111-2)

題目: **Image Colorization** (黑白照片影像轉彩色)

- 分組進行，**每組1~3人** (如無意外，3人會同分。除了幫別人評分部分為個人分數)
- 可使用現有開源方法與已訓練好之模型 (需能執行程式，不可使用現有無開源之工具或App，例如: Photoshop)。**至少需要能成功執行某篇論文的方法才有基本分**。
- 助教會提供30張古早照片 (**非現有資料庫影像**)，為此期末專題的主要測試與評分影像。

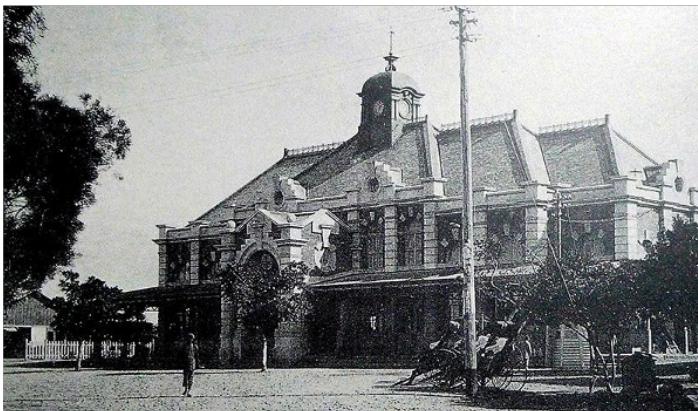


Term Project Last Year (111-2)

題目: **Image Colorization** (黑白照片影像轉彩色)

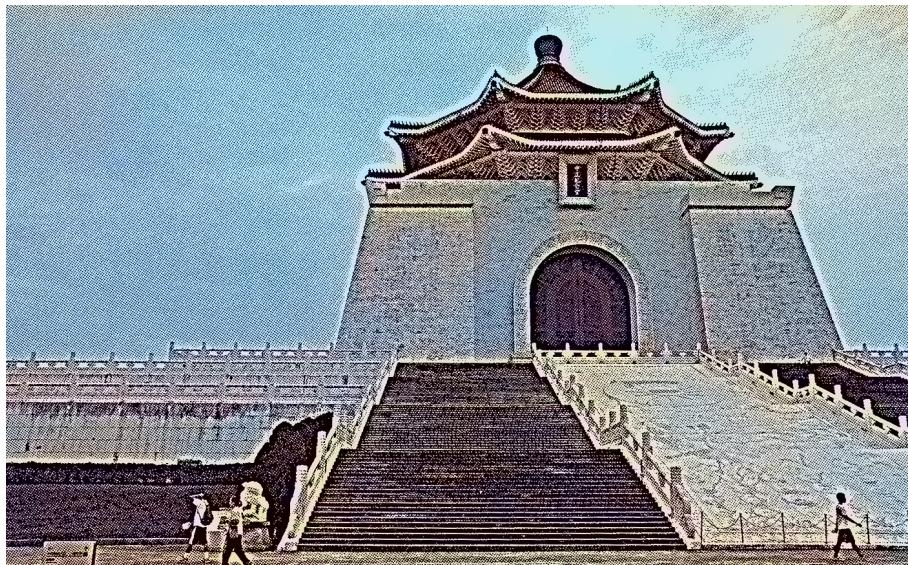
- 分組進行，**每組1~3人** (如無意外，3人會同分。除了幫別人評分部分為個人分數)
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台灣古早照片範例:



Term Project Last Year (111-2)

Some Results:



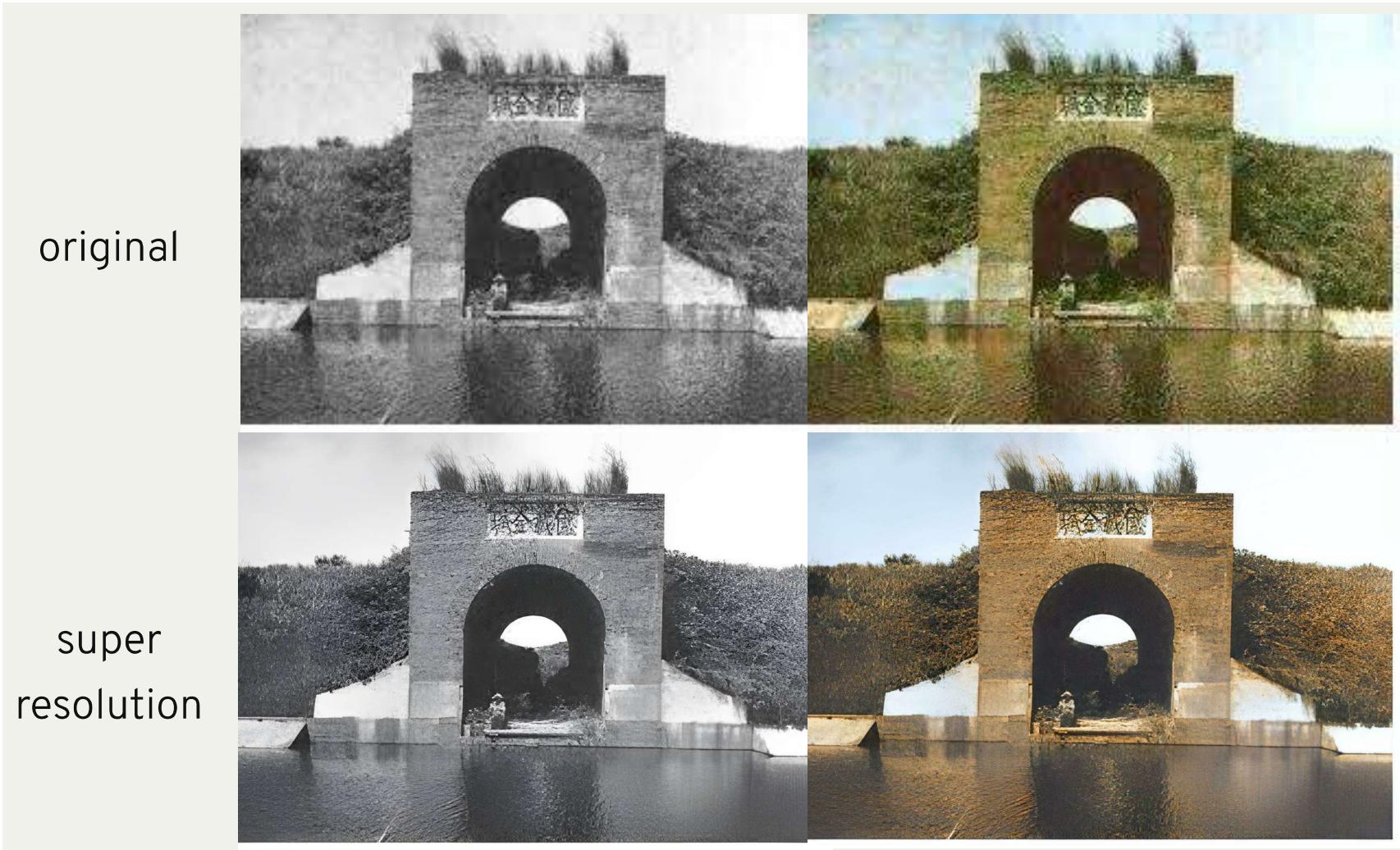
沒有Image Restoration



有Image Restoration

Term Project Last Year (111-2)

Some Results:



Term Project Last Year (111-2)

Some Results:



Pre-processing
Post-processing

(1) Pre-process HSI



(1) + Post-process HSI



(2) Pre-process with
histogram equalization



(2) + Post-process HSI

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