

# 數位影像處理實驗室

## Digital Image Processing Laboratory

規劃人: 陳飛欽 副教授

### 一、成立宗旨:

在今日的資訊社會中, 高速處理與傳輸資料的需求與日俱增, 電腦與產業、醫學及軍事等各行各業的結合是必然的趨勢。高效率、低成本的工業自動化、生物醫學和遙測等資料處理, 實是當務之急。這些資料的處理與以數位影像處理為基礎的電腦視覺與圖形辨識息息相關。因此, 簡單、快速且有效的數位影像處理技術是非常重要的。

本實驗室主要是開發各種數位影像處理技術的演算法, 並經電腦模擬, 以驗證這些演算法的有效性。

### 二、研究領域:

影像邊界偵測, 影像增強, 影像分割, 影像紋路分類, 圖形識別等。

### 三、用途:

1. 提供該老師與其研究生有良好之研究環境。
2. 執行國科會、工研院計畫、產學合作計畫。
3. 提供多種數位影像處理技術模擬及專題研究之場所。

### 四、研究發展計劃:

1. 96 年研究發展計劃: 富兆網科技股份有限公司產學合作計畫(類神經網路圖案辨識系統)。
2. 97 年研究發展計劃: 富兆網科技股份有限公司產學合作計畫(以數學形態學做影像之增強)。
3. 98 年研究發展計劃: 富兆網科技股份有限公司產學合作計畫(非線性濾波器去除影像雜訊之研究)。
4. 99 年研究發展計劃: 南高科技有限公司產學合作計畫(使用非線性濾波器於影像分析之研究)。
5. 100 年研究發展計劃: 南高科技有限公司產學合作計畫(以小波轉換及類神經網路做影像之辨識)。
6. 101 年研究發展計劃: 南高科技有限公司產學合作計畫(數位影像復原之研究)。

### 五、現有儀器設備:

設備名稱	數量	經費
MATLAB(含主程式, 影像處理工具箱, 信號處理工具箱, Image Acquisition Toolbox)	2 套	NT203,000
Scanner	1 套	NT 5,000
攝錄影機	1 套	NT 45,000
個人電腦	2 套	NT 60,000
Printer	1 套	NT 6,500
筆記型電腦	1 套	NT 50,000

### 六、發表期刊論文:

1. Soo-Chang Pei and Fei-Chin Chen, 1991, "Subband decomposition of monochrome and color image by mathematical morphology," Optical Engineering, pp. 921~933.
2. Soo-Chang Pei and Fei-Chin Chen, 1994, "3-D spatiotemporal subband decomposition of image sequence by mathematical morphology," Journal of the Chinese Institute of Engineers, pp. 289~303.

3. Soo-Chang Pei and Fei-Chin Chen, 1994, "3-D spatiotemporal subband decomposition for hierarchical compatible video coding by mathematical morphology," Signal Processing: Image Communication, pp. 83~89.
4. Soo-Chang Pei and Fei-Chin Chen, 1994, "Image sampling structure conversion by morphological filters," Signal Processing: Image Communication, pp. 13~24.
5. Soo-Chang Pei and Fei-Chin Chen, 1995, "Hierarchical image representation by mathematical morphology subband decomposition," Pattern Recognition Letters, pp. 183~192.
6. Fei-Chin Chen, 2000, "Direction-Based Morphological Edge Detection," Journal of China Institute of Technology, pp. 38~48.
7. Fei-Chin Chen, 2002, "Texture classification using hierarchical image representation based on morphological subband decomposition," Journal of China Institute of Technology, pp. 73-90.
8. Chun-Hong Lin, Fei-Chin Chen, Tsung-Huang Hsieh, 2005, "A hybrid image compression algorithm based on fractal and wavelet transforms," Journal of China Institute of Technology, pp. 1-10.
9. Fei-Chin Chen, Chun-Hong Lin, 2005, "Boundary detection and segmentation of images," Journal of China Institute of Technology, pp. 29-39.
10. Chun-Hong Lin, Fei-Chin Chen, 2006, "A fast-speed fractal image compression algorithm based on eigenvalue searching," Journal of China Institute of Technology, pp.153-162.
11. Chun-Hong Lin, Fei-Chin Chen, "A lossless image compression algorithm based on linear prediction coding and Huffman coding," Journal of China Institute of Technology, 2007.12
12. Fei-Chin Chen, Chun-Hong Lin, "Image Enhancement Using Mathematical Morphology," Journal of China Institute of Technology, 2009.5
13. Chun-Hong Lin, Fei-Chin Chen, "A Lossless Image Compression Algorithm Based on Wavelet Transform," Journal of China University of Science and Technology, 2010.5

### 七、研究方向暨研究成果:

以數學形態學做影像之增強: In this paper, we present a morphology-based method that simultaneously uses the histogram equalization and morphological edges detector to achieve good image enhancement performance. We introduce an edge detector based on mathematical morphology using multi-direction structuring elements to detect the edges of an image, and then to make the image enhancement.

Through a carefully designed process, the image edge elements are fine tuned for the image enhancement purpose. This method takes into account not only local intensity value, but also local edge information. Some experimental results are provided to show the validity of this method.



數位影像處理演算法開發環境 數位影像處理範例—影像增強