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Report

Digital Image Processing

« Assignments »

2014-2015

Summary

A. Image segmentation

A.1 Problem statement

(a) Develop a program to implement the Roberts, Prewitt, Sobel, the Marr-Hildreth and the Canny edge detectors. Use the image 'building.tif' to test your detectors. (For technique details of Marr-Hildreth and Canny, please refer to pp.736-747 (3rd edition, Gonzalez DIP) or MH-Canny.pdf at the same address of the slides.)

(b) Develop a program to implement the Otsu's method of thresholding segementation, and compare the results with the global thresholding method using test image 'polymersomes.tif. (For technique details, please refer to pp.763-770 (3rd edition, Gonzalez DIP), or Otsu.pdf at the same ftp address of slides.)

A.2 Python implementation

Three programs :

- Marr-Hildreth edge detector : **marr.py**
  Usage : **marr.py [-h] [-s SIGMA] image_path**
  Use **python marr.py -h** to see the help.

- Canny edge detector : **canny.py**
  Usage : **canny.py [-h] (–roberts | –sobel | –prewitt) [-s SIGMA] [–th TH] [–tl TL] image_path**
  Use **python canny.py -h** to see the help.

- Otsu's method of thresholding segmentation : **otsu.py**
  Usage : **otsu.py [-h] [-o] [-g] image_path**
  Use **python otsu.py -h** to see the help.

A.3 Marr-Hildreth edge detector

python marr.py -s 4 building.tif

Figure A.1 – Original image

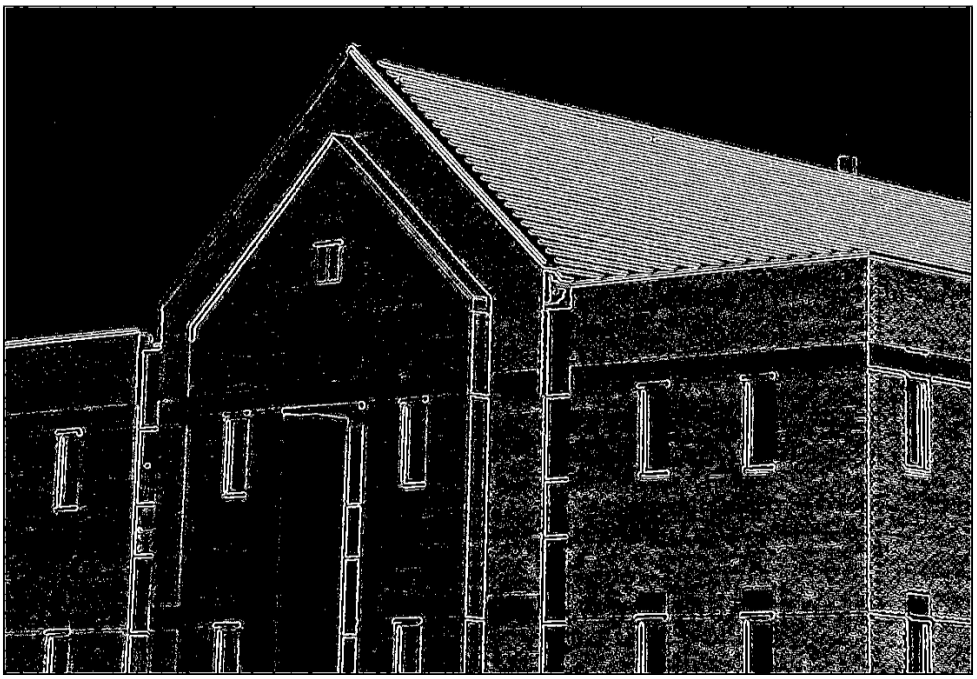

Figure A.2 – Marr-Hildreth

A.4 Canny edge detector

A.4.1 Roberts

python canny.py –roberts -s 4 –tl 0.04 –th 0.10 building.tif

Figure A.3 – Original image

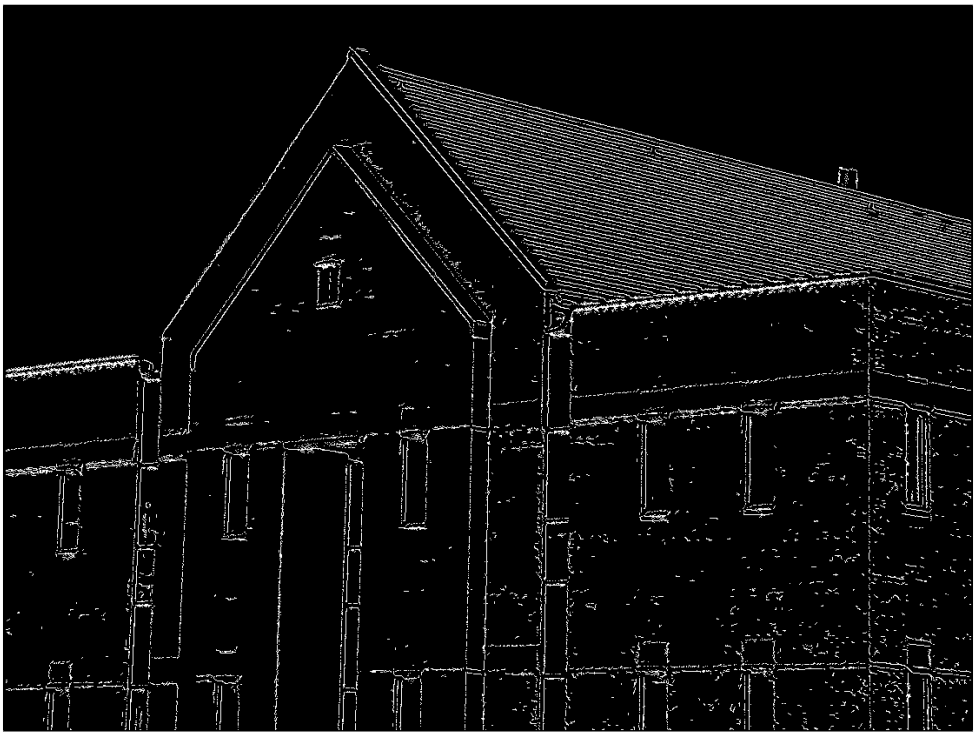

Figure A.4 – Roberts

A.4.2 Prewitt

python canny.py –prewitt -s 4 –tl 0.04 –th 0.10 building.tif

Figure A.5 – Original image

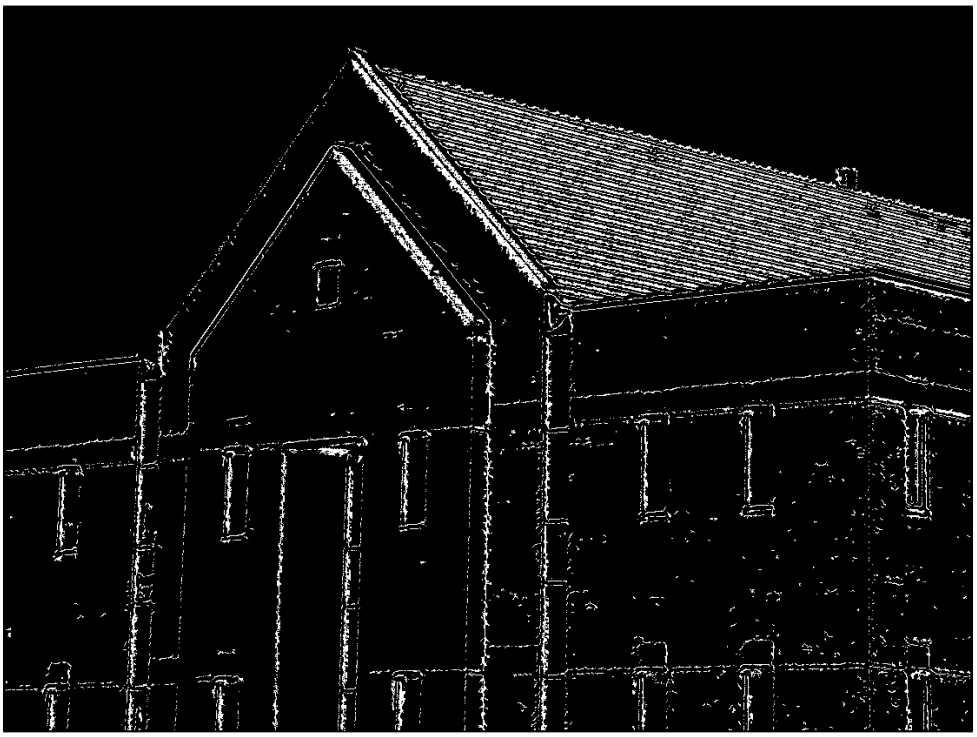

Figure A.6 – Prewitt

A.4.3 Sobel

python canny.py –sobel -s 4 –tl 0.04 –th 0.10 building.tif

Figure A.7 – Original image

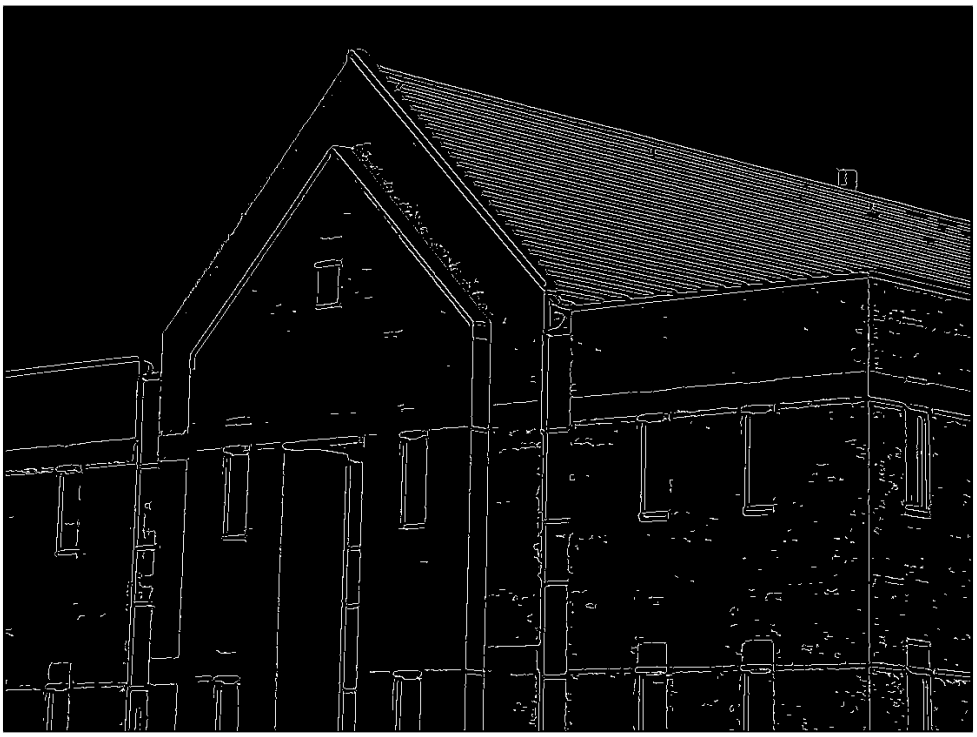

Figure A.8 – Sobel

A.5 Thresholding segmentation

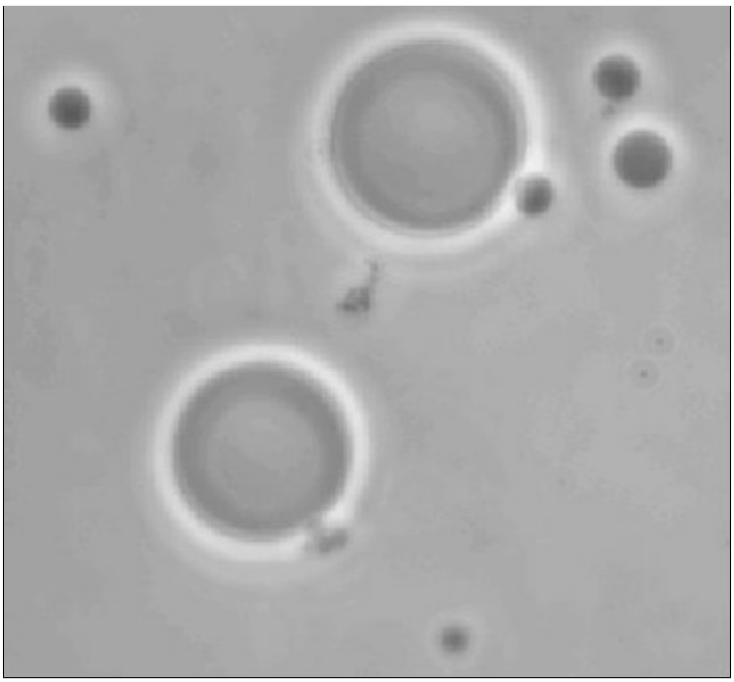

Figure A.9 – Original image

A.5.1 Otsu

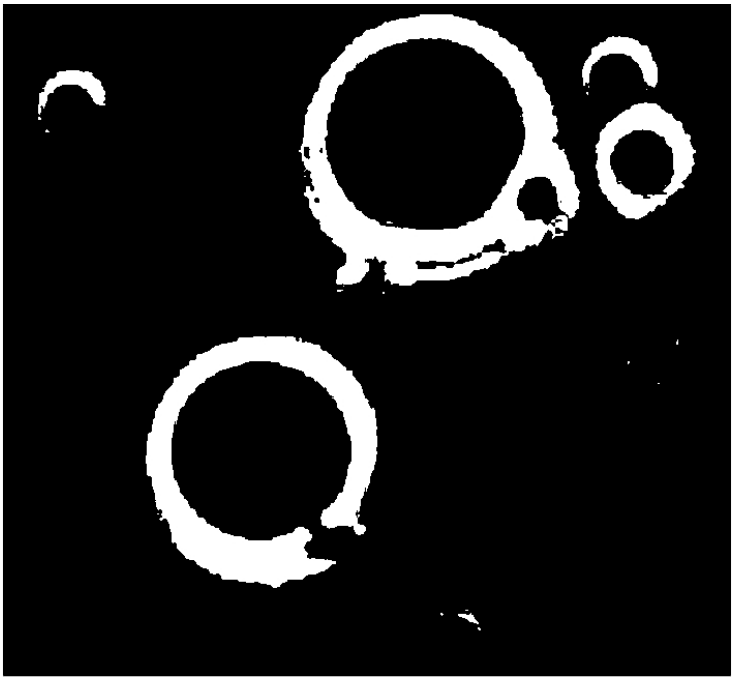

Figure A.10 – Otsu

A.5.2 Global thresholding

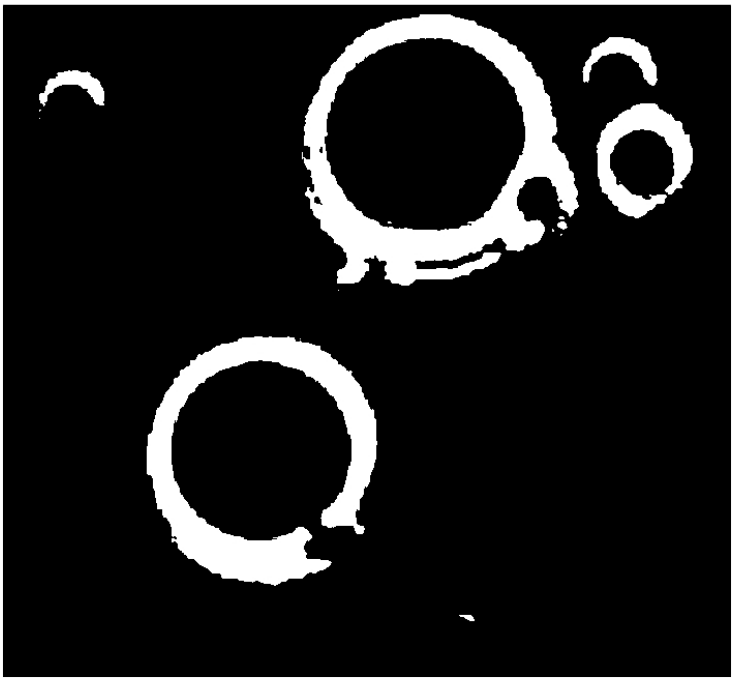

Figure A.11 – Global thresholding