

HOMWORK ASSIGNMENT #2

Edge Detection, Geometrical Modification

Due Date: 11:59am on 04/11/2018

Please read the submission guideline (posted on the class website) carefully before getting started.

All images in this homework can be downloaded from our class website:

<https://ceiba.ntu.edu.tw/1062DIP>. Images are in the raw file format. The size of each image is listed in the appendix.

For MATLAB users, you are **NOT** allowed to use the MATLAB Image Processing toolbox except the `imshow()` and `image()` functions.

PROBLEM 1: EDGE DETECTION

- (a) Given an image I_1 as show in Fig. 1(a), please perform 1st order edge detection, 2nd order edge detection, and Canny edge detection to obtain corresponding edge maps. Please describe each method in detail, specify each parameter clearly and discuss how each of them affects the resultant edge map. What are pros and cons of each method? [Please output the edge points with intensity value 1 and background points with intensity value 0.]
- (b) Given an image I_2 with periodic noise as shown in Fig. 1(b), please design your own method to generate the edge map by avoiding obtaining edges of the noise. [Please output the edge points with intensity value 1 and background points with intensity value 0.]



Fig.1(a): sample1.raw



Fig.1(b): sample2.raw

PROBLEM 2: GEOMETRICAL MODIFICATION

Given an image I_3 as shown in Fig. 2(a).

- (a) Please perform edge crispening on I_3 and denote the result as C. Show the parameters adopted and provide some discussions on the result as well.
- (b) Please design a warping function to convert the image C to image D with a shape similar to Fig. 2(b).

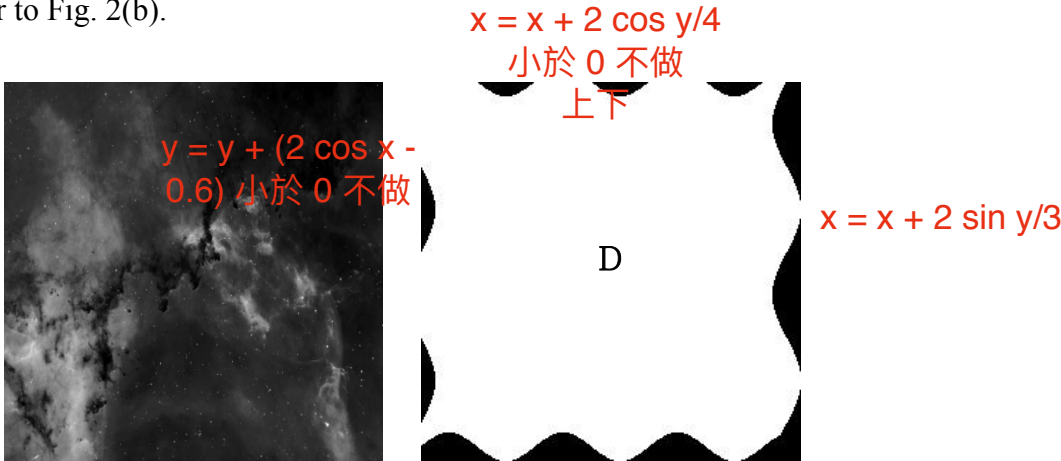


Fig.2(a): sample3.raw

Fig.2(b): warped image
 $y = y - (2 \cos x + 1.6)$ 大於 512 不做

[Bonus]

Please design an algorithm to enhance the following two images as best as you can. The top 10% students will get the extra credit.

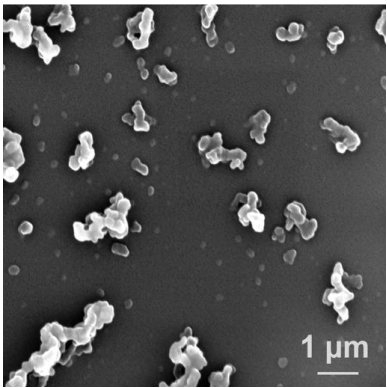


Fig.3(a): sample4.raw

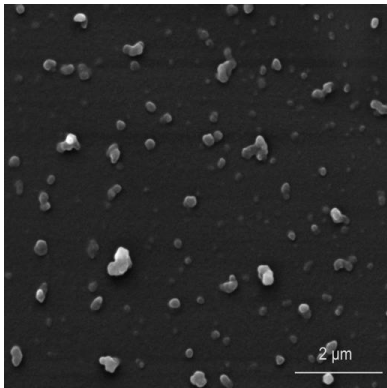


Fig.3(b): sample5.raw

Appendix:

Image files

Problem1: EDGE DETECTION

sample1.raw	Fig.1(a)	512 x 512 image	gray-scale
sample2.raw	Fig.1(b)	512 x 512 image	gray-scale

Problem2: GEOMETRICAL MODIFICATION

sample3.raw	Fig.2(a)	512 x 512 image	gray-scale
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[Bonus]

Sample4.raw	Fig.3(a)	512 x 512 image	gray-scale
Sample5.raw	Fig.3(b)	512 x 512 image	gray-scale