

## HOMEWORK ASSIGNMENT #3

### Morphological Processing, Texture Analysis

**Due Date: 11:59am on 05/02/2018**

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: Morphological Processing

Given a binary image  $I_1$  as shown in Fig. 1. White pixels represent the objects and black pixels represent the background. Please follow the instructions below to create several new images and describe the method in detail for each case.

- Perform boundary extraction on  $I_1$  to extract the objects' boundaries and output the result as image B. Please provide some discussions about image B.
- Please design an algorithm to count the number of objects in  $I_1$  based on morphological processing.
- Perform skeletonizing on  $I_1$  and output the result as image S. Please provide some discussions about image S.

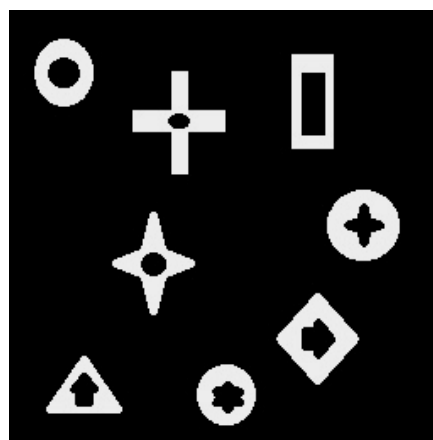


Fig. 1 sample1.raw

## PROBLEM 2: Texture Analysis

An image  $I_2$  which is composed of several different textures is given in Fig. 2.

- (a) Perform Law's method on  $I_2$  to segment the image into 3 different texture groups. Label the pixels of the same texture group with same intensity values. Please detail the method you choose, specify all the parameters and output the result as  $K$ .
- (b) Based on  $K$ , try to generate another texture image by exchange the types of different texture patterns.



Fig. 2: sample 2.raw

### [Bonus]

Given an image  $I_3$  shown in Fig. 3, please try to produce an image as illustrated in Fig. 4 by adopting appropriate morphological processing. Please describe the designed algorithm in detail and provide some discussions.



Fig. 3: sample 3.raw

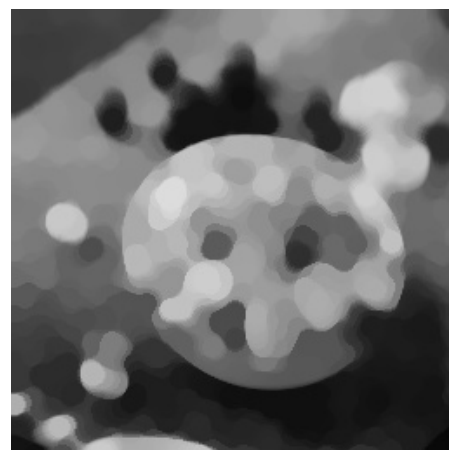


Fig. 4: The desired image

## **Appendix:**

### Image files

#### **Problem1: Morphological Processing**

sample1.raw	Fig. 1	256 x 256 image	binary
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#### **Problem2: Texture Analysis**

sample2.raw	Fig. 2	512 x 512 image	gray-scale
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#### **Bonus**

sample3.raw	Fig. 3	256 x 256 image	gray-scale
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