Digital Image Processing(03/27/2019)

HOMEWORK ASSIGNMENT #3

Morphological Processing, Texture Analysis

Due Date: 11:59am on 04/10/2019

Please read the submission guideline carefully before getting started. All images in this homework can be downloaded from our class website: https://ceiba.ntu.edu.tw/1072_DIP. 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. Please follow the instructions below to create several new images along with discussions about the results.

(a) Perform boundary extraction on I_1 to extract the objects' boundaries and output the result as an image B.

(b) Perform connected component labeling on I_1 to obtain an image C where different objects are labeled with different colors.

(c) Perform thinning and skeletonizing on I_1 and output the results as image D_1 and D_2.

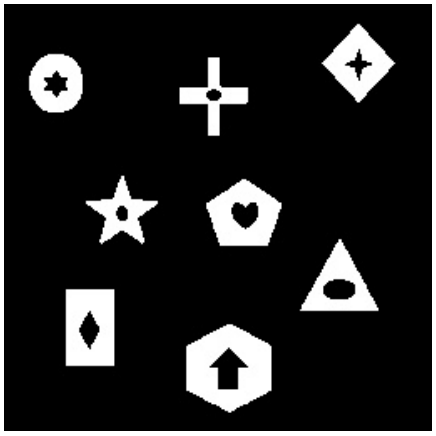

Fig. 1: sample1.raw

PROBLEM 2: TEXTURE ANALYSIS

As shown in Fig. 2, image I_2 is composed of several different textures.

(a) Perform Law's method on I_2 to obtain the feature vector of each pixel.

(b) Use k-means to classify each pixel and label same kind of texture with same gray-level intensity. Please output the result as E.

(c) Based on E, try to generate another texture image by exchanging the types of different texture patterns. Please output the result as G.

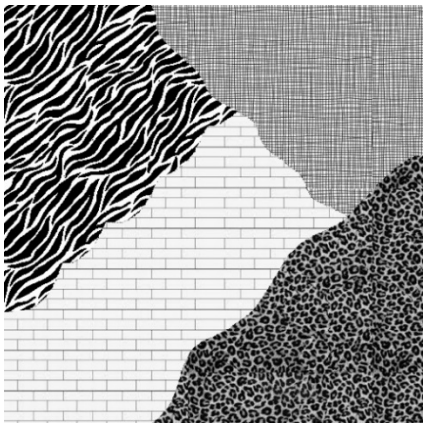

Fig. 2: sample2.raw

[Bonus]

Fig. 3 shows a gray-level image I_3. Please design an algorithm to count the number of berries in the image. Please describe the proposed method in detail.

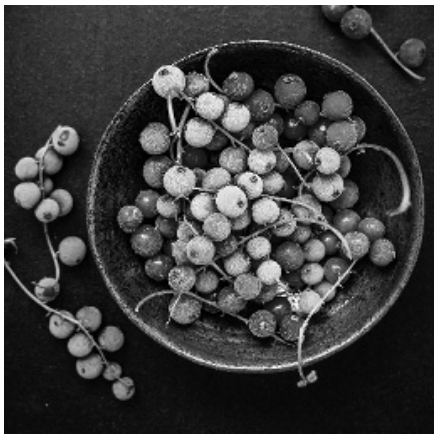

Fig. 3 sample 3.raw

Appendix:

Problem1: MORPHOLOGICAL PROCESSING

sample1.raw	Fig. 1	256×256 image	binary

Problem2: TEXTURE ANALYSIS

sample2.raw	Fig. 2	512×512 image	gray-scale

Bonus

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