Digital Image Processing(03/16/2019)

HOMEWORK ASSIGNMENT #2

Edge Detection and Geometrical Modification

Due Date: 11:59am on 03/27/2019

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: EDGE DETECTION

Given three images as shown in Fig. 1. For each given image, you are required to generate several edge maps using the following methods. [Please mark the edge points with intensity value 1 and background points with intensity value 0.]

(a) Perform 1st order edge detection and output the edge map as E_1.

(b) Perform 2nd order edge detection and output the edge map as E_2.

(c) Perform Canny edge detection and output the edge map as E_3.

For each method, please apply different parameters and provide some discussions on how they would affect the resultant edge maps. From the observations of your results, please list the pros and cons of each method.

(a) sample1.raw (b) sample2.raw (c) sample3.raw

Fig. 1: Three testing images.

PROBLEM 2: GEOMETRICAL MODIFICATION

Given a gray-level image I_2 as shown in Fig. 2(a), please follow the instructions below to create several new images.

(a) Perform edge crispening on I_2 and denote the result as *C*. Show the parameters and provide some discussions on the result as well.

(b) Design a warping method to produce *D* from *C*. As shown in Fig. 2(b), D is a swirled disk with diameter of 256 pixels.

Fig.2(a): sample4.raw

Fig.2(b): warped image

Appendix:

Problem1: EDGE DETECTION

sample1.raw	Fig.1(a)	256×256 image	gray-scale
sample2.raw	Fig.1(b)	256×256 image	gray-scale
sample3.raw	Fig.1(c)	256×256 image	gray-scale

Problem2: GEOMETRICAL MODIFICATION

sample4.raw	Fig.2(a)	256×256 image	gray-scale