Matlab hands-on 3

Make the Matlab program as instructed below.

1. File I/O

1) Load 'lenna.txt' using load(). (hint: 'lenna.txt' is ASCII type then we MUST load ASCII type data as like matrix = load(filename, 'ASCII')
2) Display the image on the screen. (hint: Use figure and imshow())
3) Save the image into a mat file (lenna.mat).
4) Do the same thing from 1) to 3) using 'lenna.bmp' by using imread() and imwrite(). (hint: imread(filename , datatype) , imwrite(loaddata, filename, datatype) ,datatype => 'bmp')

2. Simple image processing 1

1) Using imread() read 'chest_xray.jpg' into a matrix ori_image.
2) Display the image size, min value, and max value.
3) Make a matrix rev_image which has the same size as ori_image. (hint: zeros(), size())
4) For each pixel calculate (max value) – (pixel value) and put the results into rev_image array.
5) Display ori_image and rev_image within the same window. (subplot(), imshow())
6) Put rev_image into a bmp file. (imwrite())

3. Simple image processing 2

1) Using imread() read 'lenna.bmp' and store it into image1 array, and display it into subplot1.
2) Get the size and mean value of image1.
3) Make zero matrix image2 and image3.
4) Change the pixel values of image2 by the rule below.

   If a pixel in image1 is lower than the mean value, put 0 at the same pixel location. Otherwise, move the pixels from image1 to image2.

5) Display image2 into subplot2

6) Make a function func1() that performs the same thing as 4). You need at least one input parameters: input image matrix.

7) Call func1() with image1 as an input parameter, store the results into image3, then display it into subplot3.

4. Image Type

1) Load the file 'koreaUniversity.jpg' and save as the variable 'a' (imread())

2) Display the variable 'a' on screen. (imshow())

3) 'a' is consist of 3 tables which have RGB information.(a(row, colume, color))

display the each color of 'a'. (imshow())

Tip. Using figure, you can see the result of imshow(), or plot() in a new window. (figure, imshow(image))

4) Make a gray scale image of 'a' and save as the variable 'b'.

(a) Make a function 'RGB_to_gray' with a RGB image as an input parameter and a gray scale image as an output parameter.

Tip. RGB to gray scale formula (gray = 0.3 * red + 0.59 * green + 0.11 * blue)

(b) Using 'RGB_to_gray', change 'a' into a gray scale image and save as the variable 'b'.

(c) Using the function 'rgb2gray' which is provided from the Matlab, change 'a' into a gray scale image and save as the variable 'b2'.

Tip. 'b' and 'b2' aren't totally same. Because the formula of 'rgb2gray' has the fourth decimal places precision and the formular of 'RGB_to_gray' has the second decimal places precision.

5) Display the image of 'b'. (imshow())

6) Make a binary image of 'b' and save as the variable 'c'. (binary image is consist of 0 and 1)

7) Display the image of 'c'. (Hint. normalization)

8) Save 'a' as the file 'RGB.png', save 'b' as the file 'gray.png', and save 'c' as the file 'binary.png'. (imwrite())

Tip. When you save a binary image, put '1' in 'bitdepth' information. (search using 'help')

9) Compare the sizes of the three files.

10) Which file has more information? (color, brightness)

11) Which file's size is smaller?

5. Sampling

1) Load the file 'lenna.bmp' and save as the variable 'lenna'. (imread())

2) Display the image of 'lenna'. (imshow())

3) Display the size information of 'lenna'. (whos() or size())

4) Resize the image of 'lenna'.(imresize())

5) Resize the image of 'lenna' into 1/2 rows and 1/2 columns and save as the variable 'lenna2'.

6) Resize the image of 'lenna' into 1/4 rows and 1/4 columns and save as the variable 'lenna3'.

7) Resize the image of 'lenna' into 1/8 rows and 1/8 columns and save as the variable 'lenna4'.

   (a) Resize the images of 'lenna2', 'lenna3', and 'lenna4' into the size of the original image of 'lenna'. (imresize())

   (b) Display the images of 'lenna', 'lenna2', 'lenna3', and 'lenna4'. (imshow(), subplot())

   (c) Find the damaged parts of the displayed images of 6. (eg. hair, face, hat)

6. Exercises

Chapter 2 – 3 or 4, 7