EE7150 - Computer Home Work I: Image Processing Fundamentals

Due Date: Sept 15, 2015

Note: Images used for this course can be downloaded from the textbook website:

http://www.imageprocessingplace.com/DIP-3E/dip3e_book_images_downloads.htm

For this first project the suggested image is uploaded on Pilot. The images are in uint8 tiff format. For example, figure Fig. 2.21(a) from the textbook is named,   Fig0221(a)(ctskull-256).tiff

To load a tiff image into Matlab, Make sure the image file is in the current directory. Then use,

```
img=imread(Fig0221(a)(ctskull-256).tiff'); % Reads file as a variable 'img'
```

Note: Grayscale images in the textbook are in uint8 format with 8-bit integer values between 0 and 255. You may observe metadata information on any image using,

imageinfo('Fig0221(a)(ctskull-256).tif');

 To perform mathematical operations, convert to double precision,

img_d = double(img) / 255; % divides by 255 and the result 'img_d ' is in double precision

Convert back to uint8 format using,

img_7bits = uint8(img_d * 128);   % Intensity level is halved in 'img_7bits'

figure (2)
imshow(img_7bits, [0 127]); % Displays 7-bit image

1. **Reduce the Number of Intensity Levels in an Image**

   a) Write a computer program to reduce the number of intensity levels in a image from 256 to 2, in integer powers of 2. The desired number of intensity levels needs to be a variable input to your program.
   b) Download Fig. 2.21(a) from the book web site and duplicate the results shown in Fig. 2.21 of the textbook.

2. **Zooming and Shrinking Images**

   a) Download Fig. 2.20(a) from the book web site and use your program to shrink the image by a factor of 4.
   b) Write a program to zoom the image in (a) back to the resolution of the original using "pixel replication". Explain the reasons for their differences.
   c) Repeat part (a)-(b), but use "bilinear transformation". (Hint: Matlab command: imresize)