Biomedical image processing: Fall 2020

Homework 1

Due: **9/23 AM 9:10**

Notice: Please email your homework, including the editable document (.doc/.docx file) and the programming script (.m file) to me (phwu@mail.ee.nsysu.edu.tw). NO late homework permitted.

A MRI axial scan of human brain is provided in the format of *double*. Please transform this image into grayscale images with different numbers of gray-scale levels.

a) Write a MATLAB script to be able to adjust the number of intensities of this image from 256 to 2, in integer powers of two. The number of intensity levels needs to be a variable as an input in your script. Note that the original image was provided in *double* format, and you might define an appropriate range of intensity first for better display.
(Hint: The MATLAB built-in functions you might use include, but not limit to, *image*, *colormap*, *imshow*, *round*, *colorbar* …)

b) An 8-bit monochrome image can be obtained using the script in (a). Show the most-significant bit (MSB) plane image.

c) What would happen if the MSB is set to zero? Describe your answer in details using the 8-bit image in (b).

d) Redo (3) when the least-significant bit is set to zero.

Note: Please do NOT save your results as JPG files, which degrades the image quality for size reduction, and insert them in your document. You are suggested to copy figure directly from MATLAB figure window (by clicking **Edit > Copy Figure**).