Biomedical Image Investigation: Fall 2024

Homework 1

Due: **9/23 PM 2:10**

Notice: Please upload your homework, including the editable document (.doc/.docx file) and the programming script (.m file), to Cyber University. NO late homework permitted.

An 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 which can adjust the number of intensity levels for the given 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 detail using the 8-bit image in (b).

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

Note: Provide descriptive context and the generated results in the doc. file. Please do NOT save your results as JPG files as it degrades the image quality for size reduction. You are suggested to copy figure directly via MATLAB figure window by clicking **Edit** > **Copy Figure**.