Assignment #1

Due: Wednesday, Apr. 3, 11:59:59 pm

Please, provide a summary of the findings in your report and include all the code you used at the end of your report.

Problem 1. Download the file named "memorial_hdr.npy", load it, and try to display the image denoted as f. The image f presents challenges for analysis and manipulation. Design a script called "my_itf" with an intensity transformation function that will make this image "better", as follows:

$$g = \text{my\_itf}(f);$$

Below, you'll find examples of f as the input image and g as the desired output image.

Problem 2. Download the file named "memorial_hdr.npy", load it, and try to display the image denoted as f.

(a) Implement a histogram equalization function, as follows:

$$h = \text{histogram\_equalization1}(\textit{input image});$$

Apply histogram equalization in red, green, and blue channels separately. Do not use any built-in functions such as *equalizeHist()*.

(b) Compute one histogram from all red, green, and blue channels. Apply the same histogram equalization to red, green, and blue channels using the function implemented in (b).

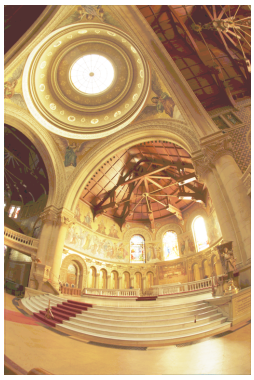
$$i = \text{histogram\_equalization2}(\textit{input image});$$

Explain why there is more color shift in h compared to i.

f

g

h



i

Problem 3. Download "rubiks_cube.png". Some pixels are corrupted by noise.

(a) Design a function called "BilaterFilter", as follows:

% g=BilaterFilter(f, w, $sigma\_d$, $sigma\_r$)
% input: f is an input image
% w is a kernel size
% $sigma\_d$ is a variance of spatial
% $sigma\_r$ is a variance of range
% output: g is an output image

Try with different variances. Explain the effect of sigmas.

(b) Apply the same spatial Gaussian filter to the input image. Display f, g from (a), and the Gaussian filtered image. Discuss the visual differences between the two filtered images.