CS5190 Spring 2024 - Assignment 1

Total points: 50 + (10 Extra Points)

Due date: Monday, March 11, 2024

1. **Image Histogram**
   a. (20 pts) Build your own implementation of the histogram equalization function **from scratch**, which takes an image as its input and returns an image that has been histogram equalized.
   b. (5 pts) Perform your function on an image of your interest (you can pick any image you like) and compare the result with that of using OpenCV function cv2.equalizeHist(·).

2. **Image Smoothing**
   a. (20 pts) Build your own implementation of the Gaussian smoothing function **from scratch,** which takes an image, a filter size, and sigma (standard deviation) as its inputs and returns an image that has been blurred. Please note that
      a. cv2.getGaussianKernel(), cv2.filter2D(), cv2.sepFilter2D(), cv2.GaussianBlur() are **NOT allowed to be used** in your implementation.
      b. (Optional) 10 extra points will be given if separable 1D Gaussian kernels are used to reduce the computational cost.
   b. (5 pts) Perform your function on an image of your interest (you can pick any image you like) and compare the result with that using OpenCV function cv2.GaussianBlur(·).

What to Submit?

1. Python source codes **in ".ipynb" format**. Please note that
   a. don't use .py format
   b. use **relative file paths** to load (save) images from (to) disk.
   c. comment some important code lines,
2. Input images used.
3. Output images generated.
4. Please zip all documents as yourname_assignment1.zip and submit it on Canvas.