**CS390S Assignment 4 (10 points+bonus)**

**Reference:**

Students are encouraged to write your own code to generate the noise and add noise to the original image to generate the noisy image.

However,

Matlab Function imnoise() or other functions/python libraries that generate different noise can be used. Functions that add noise to the original image and then generate the noisy image in one step are **NOT** accepted.

Other reference code:

<http://fourier.eng.hmc.edu/e161/dipum/imnoise2.m>

**Requirements:**

1. **Generate a 256x256 grayscale image with only two different intensity levels (0.4 and 0.7 within the range [0-1]). The intensity of the center part (the distance between the pixel and the center point < 80 pixels) of the image is set to 0.4 and the intensity of the left part of the image is set to be 0.7.**

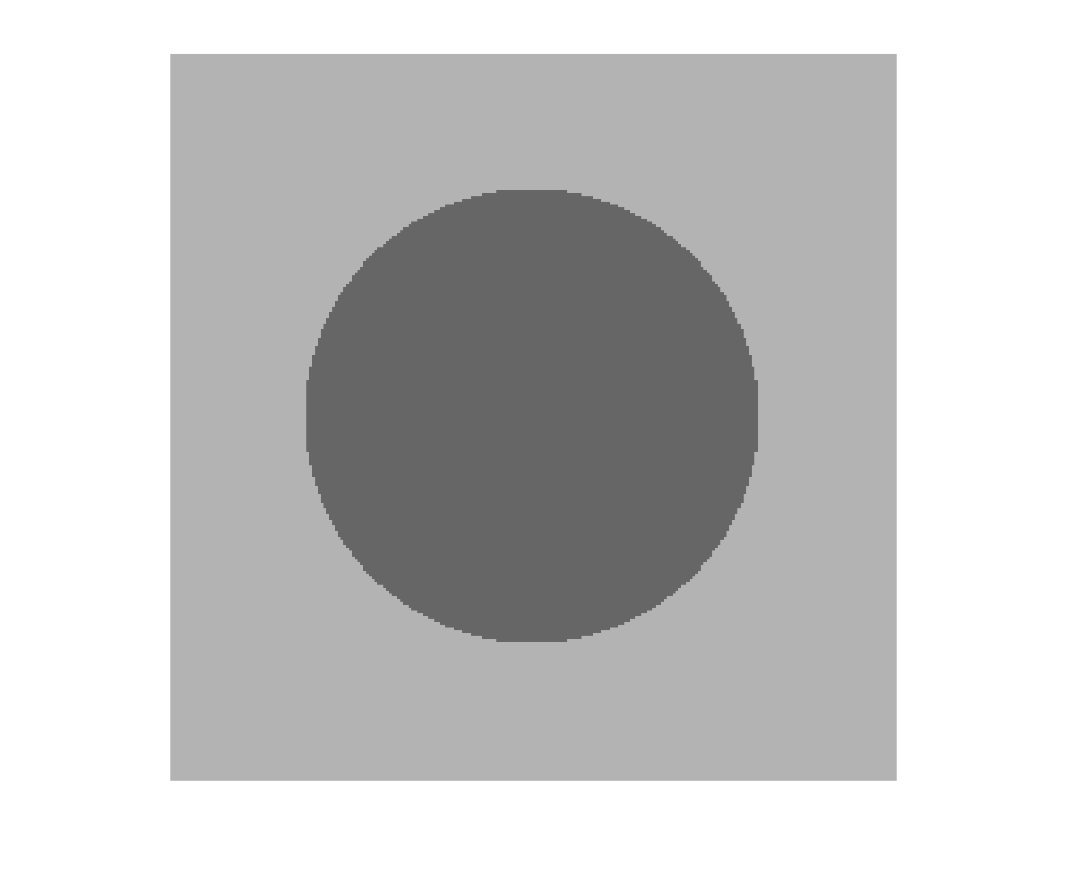


Figure1. Original Image

1. **Generate three types of noises**
2. **Gaussian noise with mean 0 and variance 0.01.**
3. **Uniform noise with range [-0.05 to 0.05]**
4. **Salt and pepper noise with d = 0.02 (2% of pixels get affected by S&P noise)**
5. **Add the three types of noises to the grayscale image. Please include the noisy images and the histogram of the noisy images in your report.**
6. **Select proper type of filter and use them to restore the noisy images. Include the restoration results and discussions of your filtering approach in your report. (up to 3 bonus points for advanced filtering approach)**

**What to submit:**

1. **Your report “Firstname\_Lastname\_HW4.docx/doc” or “Firstname\_Lastname\_HW4.pdf”**

In your report, please always include the input and output images and a brief discussion of your design or explanation of your code.

1. **A compressed “.zip” file** (**NO** “.rar” files accepted) including all the source code files and source images, output images, “read me” file or other support files to run your code.

* Students using Python need clearly specify what libraries are used in your report (and “imported” in your .py code files).
* Python source code must be submitted using “.py” extension (“.ipynb” files are not accepted).
* Image path in the source code must be relative path (e.g. “./iris.bmp” or “./image/iris.bmp”). **Absolute input/output path such as “C:/image/iris.bmp” is NOT accepted.**
* Resubmissios are accepted only:

1. Draft version (80% work is done) is submitted before deadline.

2. Resubmission is submitted within one week after the deadline.