Advance Image Processing
Homework 3

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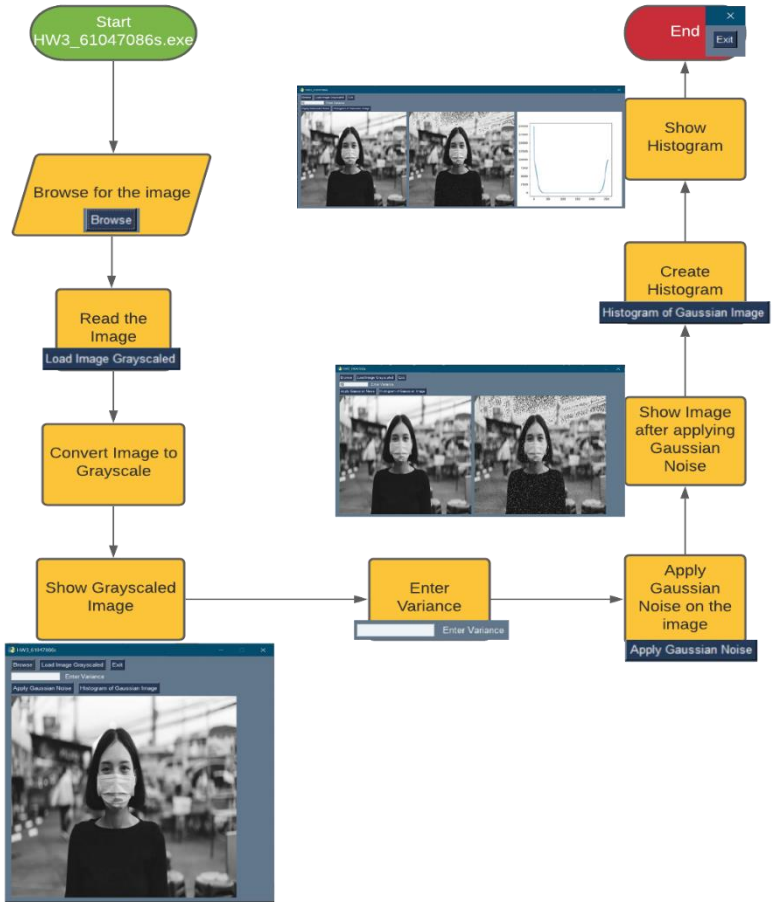
1. Project topic: **:** Generation of additive, zero mean Gaussian noise
2. Programming language and Compiler: Python 3.7.8
3. Library- OpenCV Latest, Numpy Latest, PySimpleGUI- Latest, Matplotlib- Latest, Math
4. The main functions of the program:
    (a) Read image files: including JPG files, BMP files, PPM files and PNG files
    (b) Read variance from User.
    (c) Apply Gaussian Noise.
    (d) Show the noisy image.
    (e) Show the histogram of noisy image.

5. The flowchart of the program:



6. Testing results (4 examples)

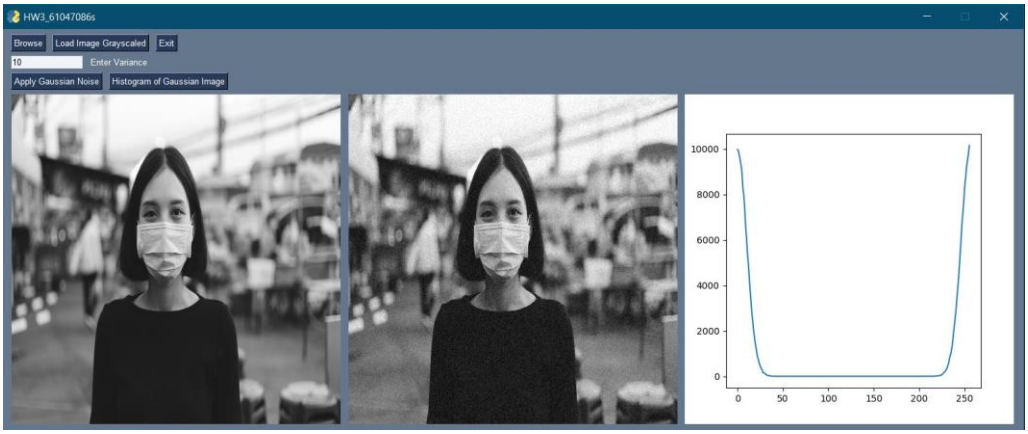
Example: 1

(Input Image) (Output Result) (Output Histogram)

Example: 2

(Input Image) (Output Result) (Output Histogram)

Example: 3



(Input Image) (Output Result) (Output Histogram)

Example: 4

(Input Image) (Output Result) (Output Histogram)

7. What you have learned in this homework?
   This homework taught me how to create Gaussian noise on the image. I found some challenges while implementing the histogram specific to the Gaussian image. But unfortunately I couldn't implement the normal distribution like histogram in the end. The main challenge I faced was the optimal sigma value which will change the image noise. After further research I found that if I just use Gaussian Noise even on a smaller sigma, I will get a Gaussian distribution histogram. So, the sigma value just increases the noise on the image but the distribution histogram follows the same pattern. I am looking forward to more learning like this.