# Advance Image Processing
# Homework 2

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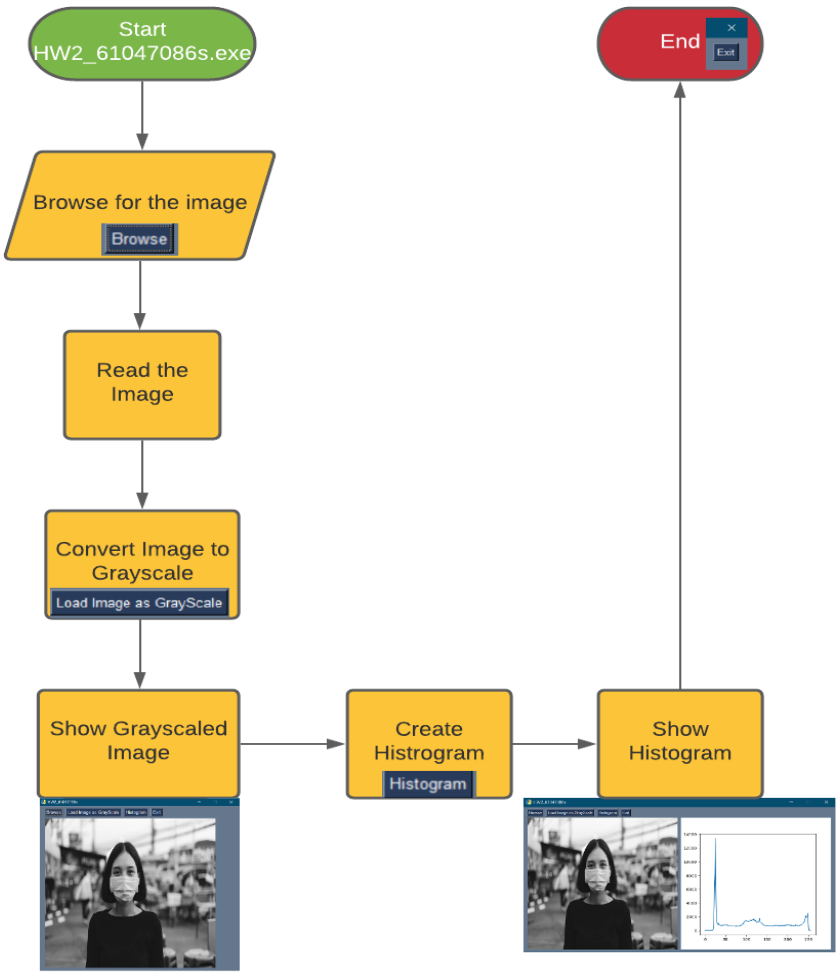
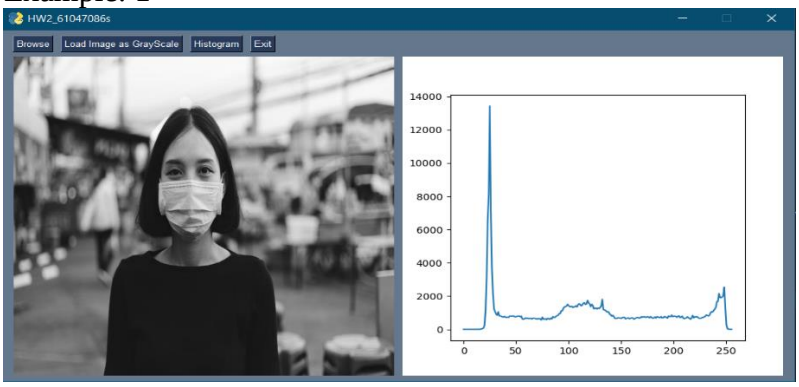
1. Project topic: Image Histogram
2. Programming language and Compiler: Python 3.7.8
3. Library- OpenCV Latest, Numpy Latest, PySimpleGUI- Latest, Matplotlib- Latest
4. The main functions of the program:
   (a) Read image files: including JPG files, BMP files, PPM files and PNG files
   (b) Show Histogram of image file
5. The flowchart of the program:



6. Testing results (4 examples)

Example: 1

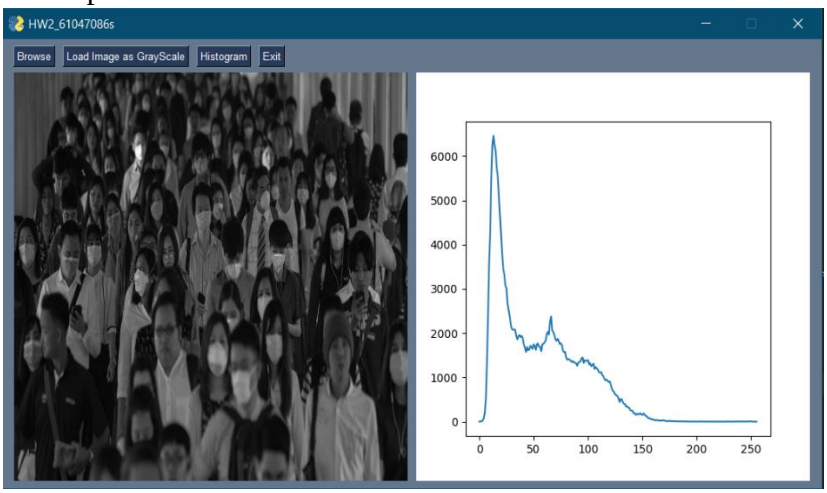



(Input Image) (Output Result)

Example: 2

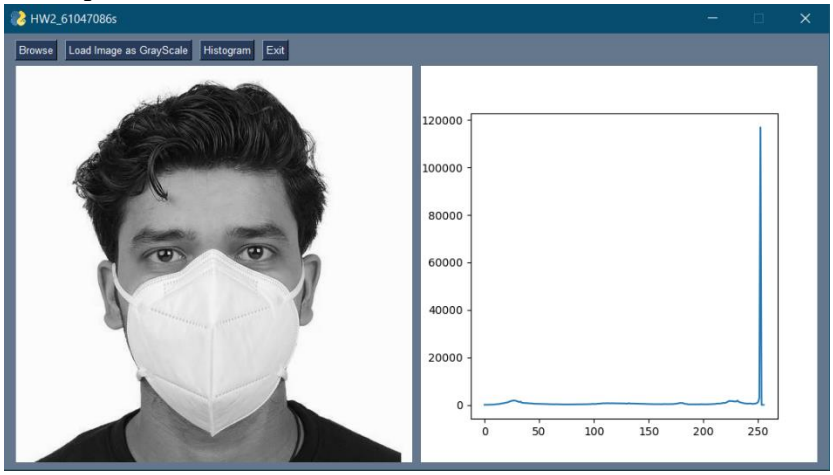

(Input Image) (Output Result)

Example: 3




(Input Image) (Output Result)

Example: 4




(Input Image) (Output Result)

7. What you have learned in this homework?

   This homework taught me 4 important things:

   1. How to create a grayscale image
   2. How to create a histogram of grayscale image
   3. How to create a blank canvas using Tkinter on pysimpleGUi
   4. How to update the histogram of image in pysimpleGUI

   For grayscaling the image, I found two ways, one is using applying some predefined weighted conversion formula.

   Grayscale_image =0.114(Value of blue channel) + 0.587(Value of green channel) + 0.299*(Value of red channel)

   The other one is using average of pixels.

   (R+G+B)/3

   I used the average method which produced the grayscale image.

   For creating the histogram of the image, I added + 1 to each pixel specific to that particular height and width to create the intensity and plotted using matplotlib. The next challenge I faced was how to update the histogram for different images on the same window. I found out that I can simply close the plot. So, I created a count so that the first plot doesn't get destroyed after creation. The grayscaling and histogram functions take some time to implement, due to me using nested loops. I am very glad that I finally understood the basic concepts of image processing and I am looking forward to more learnings.