Advance Image Processing
Homework 4

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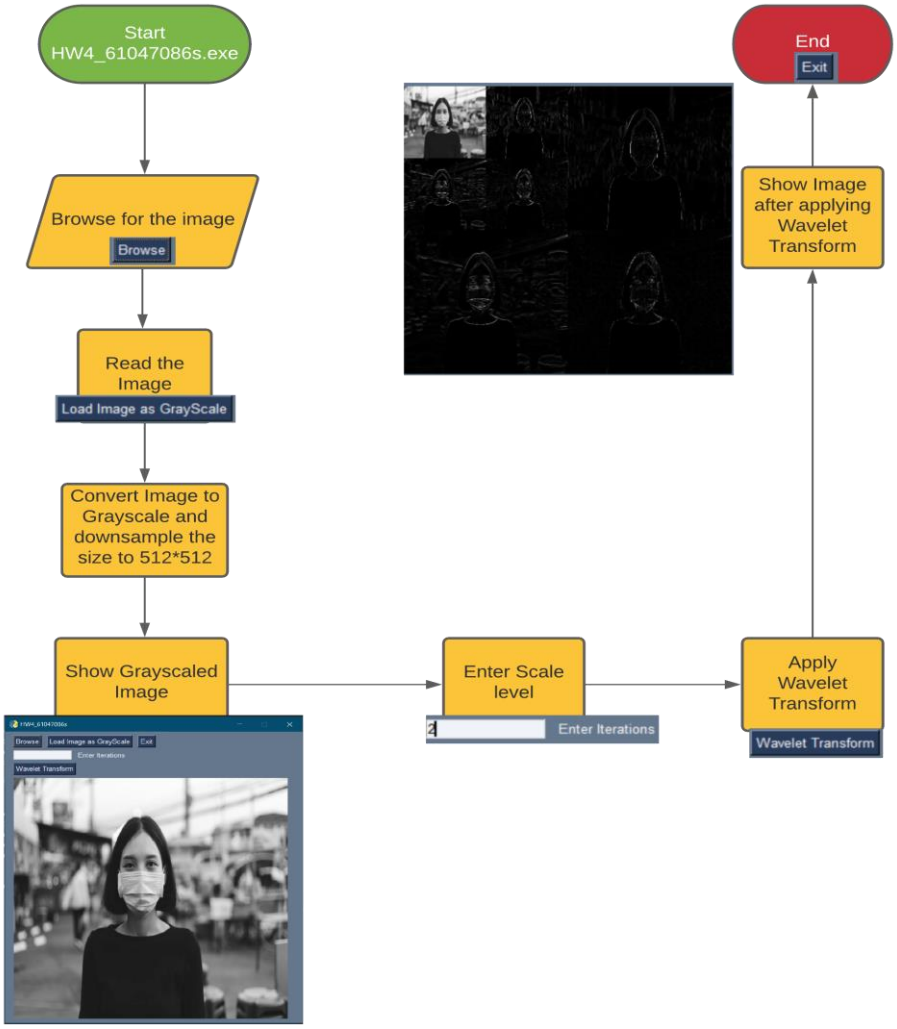
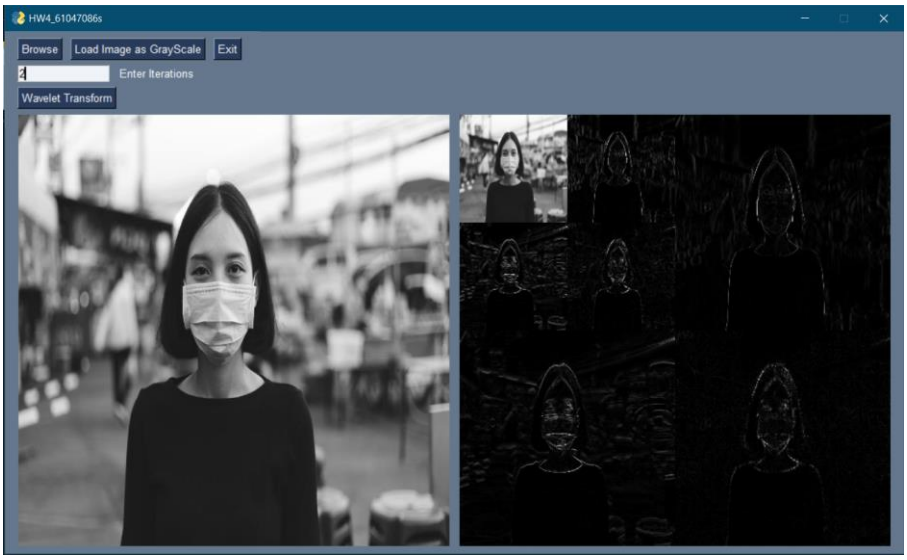
1. Project topic: Discrete wavelet transform
2. Programming language and Compiler: Python 3.7.8
3. Library- OpenCV Latest, Numpy Latest, PySimpleGUI- Latest
4. The main functions of the program:
    (a) Read image files: including JPG files, BMP files, PPM files and PNG files
    (b) Input Iterations
    (c) Apply the wavelet transform
    (d) Show the wavelet transformed image
5. The flowchart of the program:



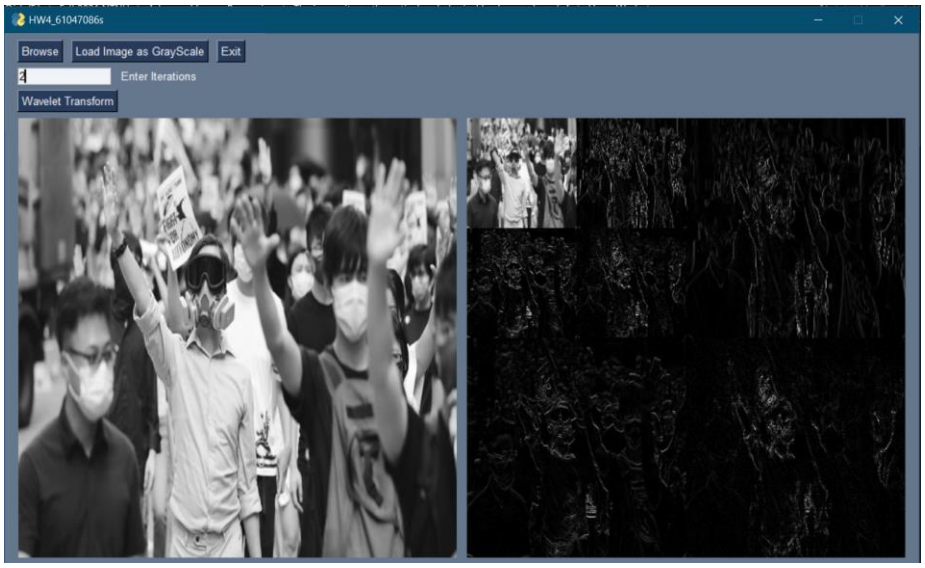
6. Testing results (4 examples)

Example: 1



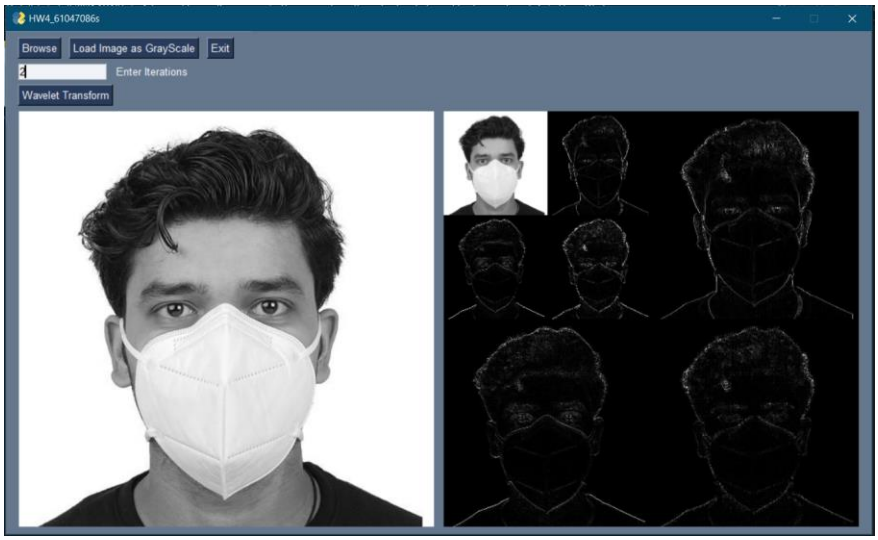
(Input Image) (Output Result)

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 about 2 important things: Recursion and Haar Wavelet Transform. The most challenging thing I found is how to iterate over the even pixels without index out of bound error. For this I just simply faced the challenge by using the

half loop strategy. I used Haar wavelet because it is easy to implement and visualize. For down sampling the image I just used cv2.resize and applied the general size of 512*512. For recursion I didn’t created a separate function but I used an auxiliary for loop which serves as a temporary recursion. In further prospects, I will try to use other transform algorithms to further deepen the understanding. I thank you the professor for giving me this opportunity to learn from this assignment.