CS512 Assignment 2: Report

Parthkumar Patel
CWID: A20416508
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Department of Computer Science
Illinois Institute of Technology

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Abstract

This programming assignment deals with simple image manipulation using OpenCV. Here user has a choice to capture an image or read the image. Then user can perform operations on the image by pressing the specified keys to perform various operations on image.

1. Problem Statement:

The program should be designed to perform simple image manipulation using OpenCV for a given image. It should load an image by reading it from a file provided by the user or capture directly from a camera. Read image should be read as a 3-channel color image and it should work for any size image. The user should be allowed to perform manipulation to the image by pressing specific keys mentioned below:

- i to reload the original image
- w to save the current image
- g to view the grayscale image using OpenCV function
- G to view the custom grayscale image
- c to view the image in various color channels
- s to smooth the image with trackbar functionality
- S to view custom smoothing of image
- d to down sample the image by a factor of 2 without smoothing
- D to down sample the image by a factor of 2 with smoothing
- x to perform convolution with x derivative filter with normalization
- y to perform convolution with y derivative filter with normalization
- m to show the magnitude of the gradient normalized
- p to convert image to grayscale and plot the gradient vectors
- r to rotate the image with an angle theta

2. Proposed Solution

The program is developed to perform simple image manipulation for a specified image. To perform this functions user must enter specific keys. The program comprises of OpenCV function like imread, imwrite, cvtColor, pyrDown, convolve2d, normalize, getRotationMatrix2D, warpAffine etc. The images have been tested according to their various resolutions and displayed using windows.

3. Screenshots:

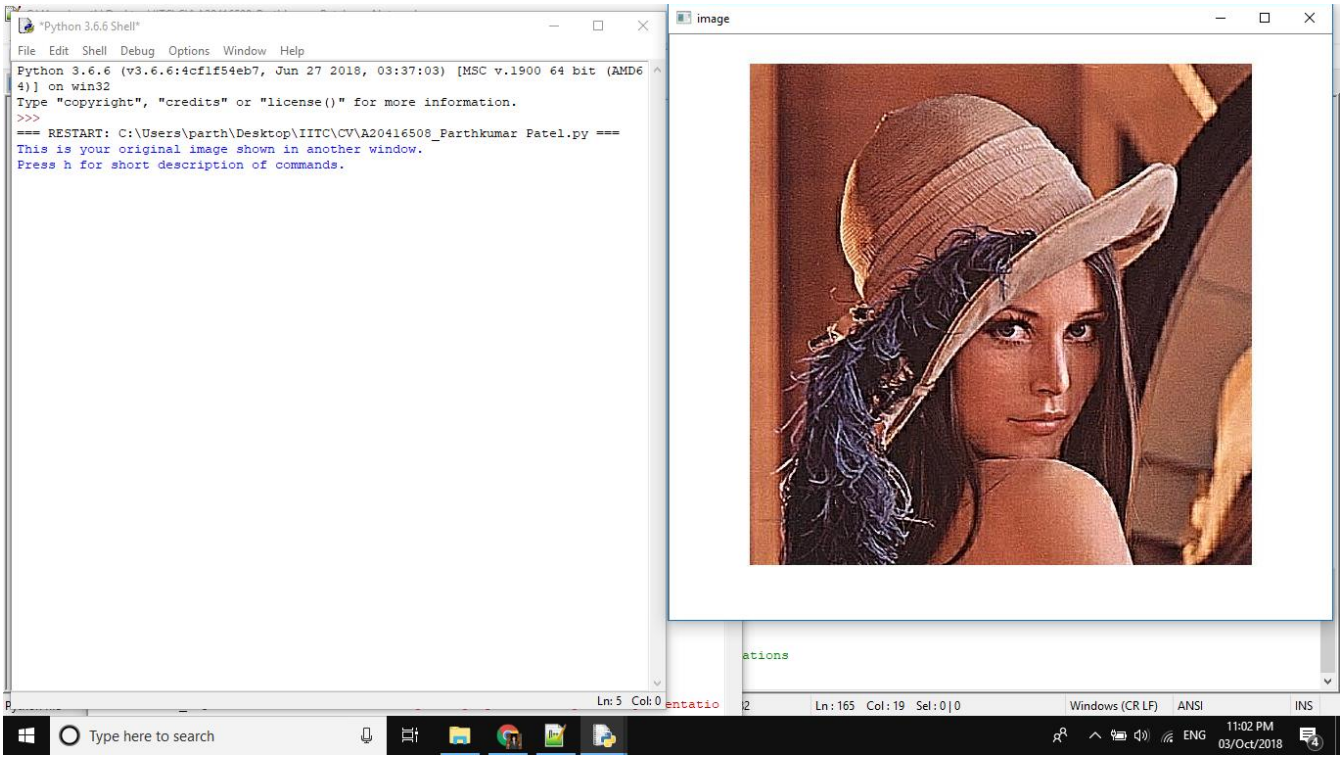

Figure 1 Loading an original image

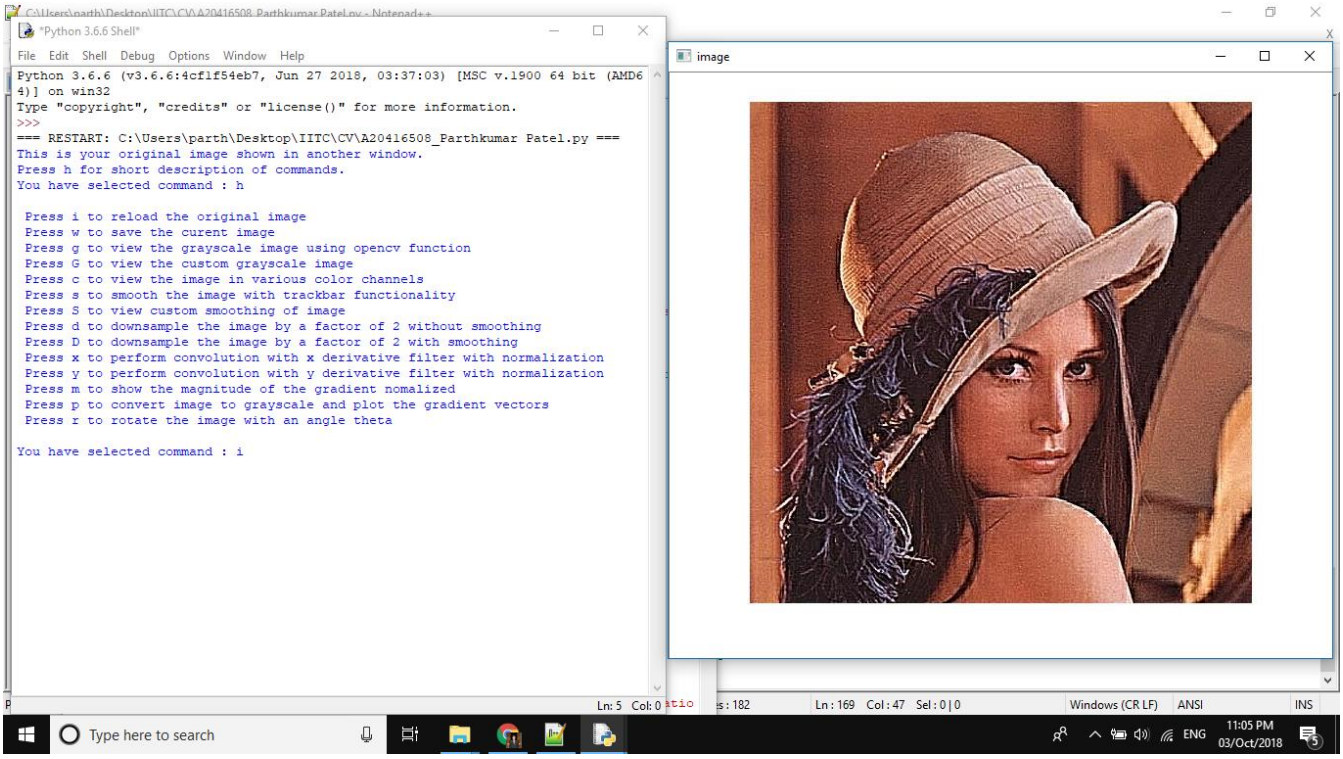

Figure 2 Showing Help Menu

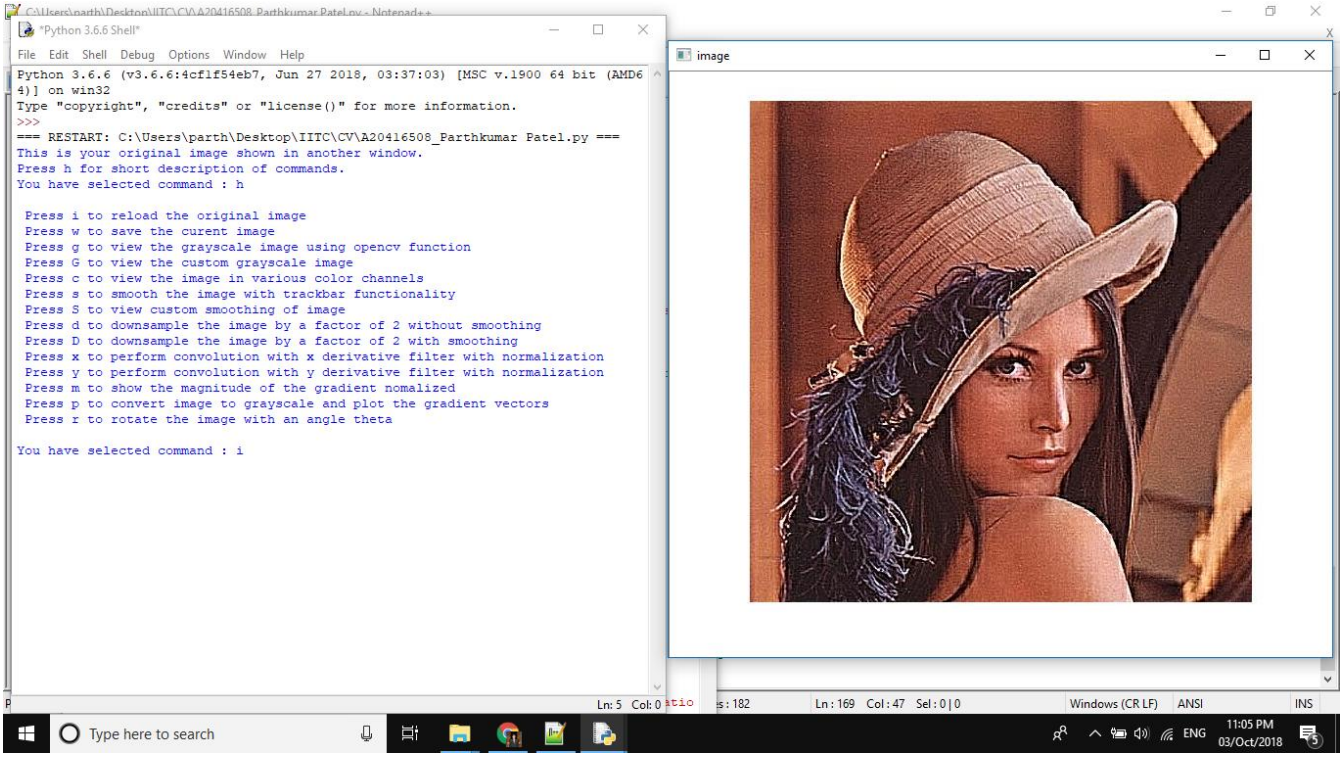

Figure 3 Reloading an original Image

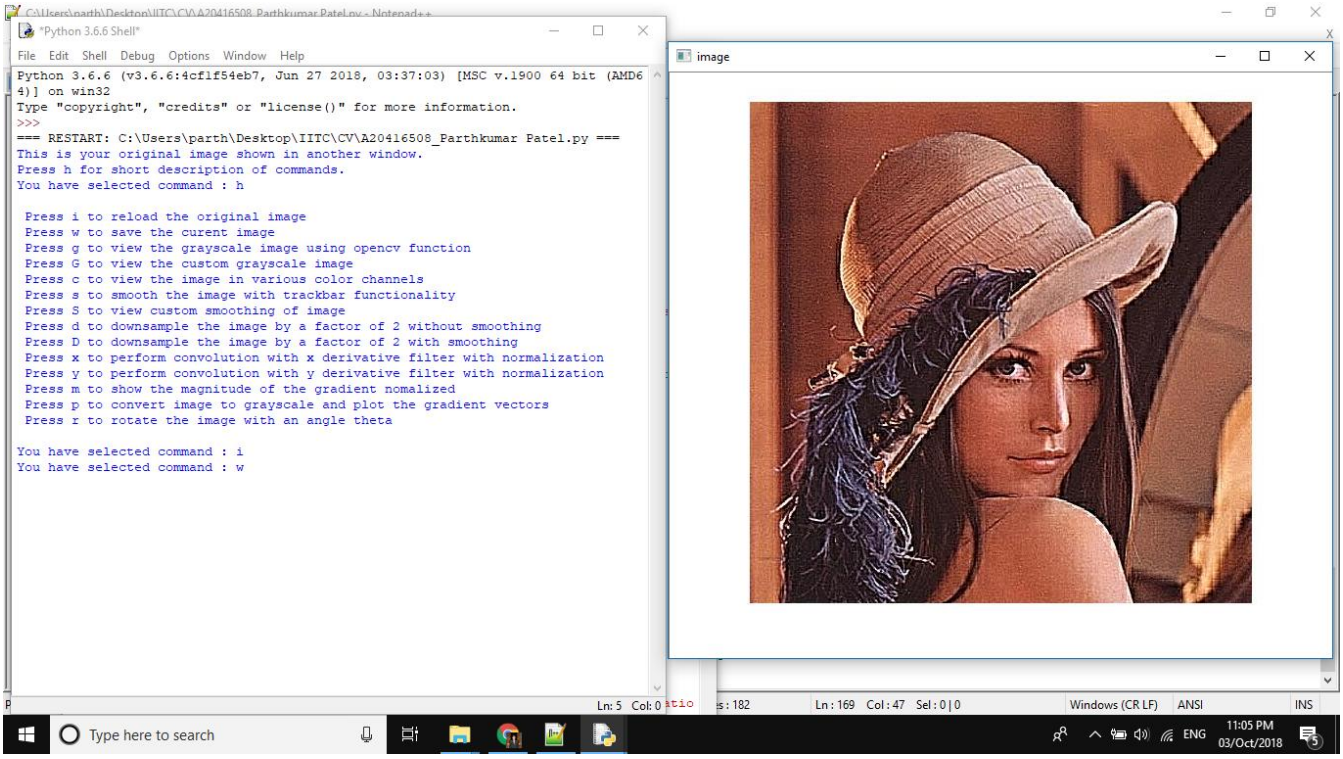

Figure 4 Saving Current Image

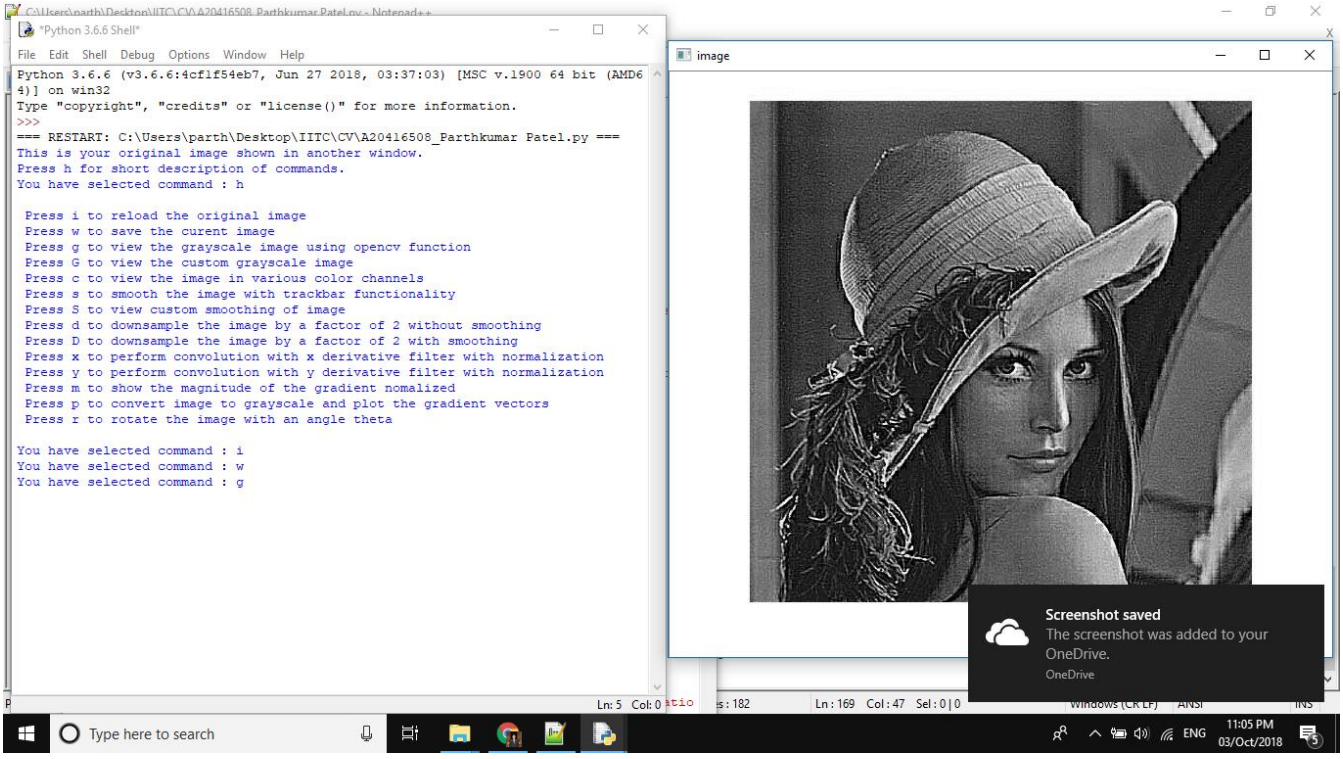

Figure 5 Grayscale Image

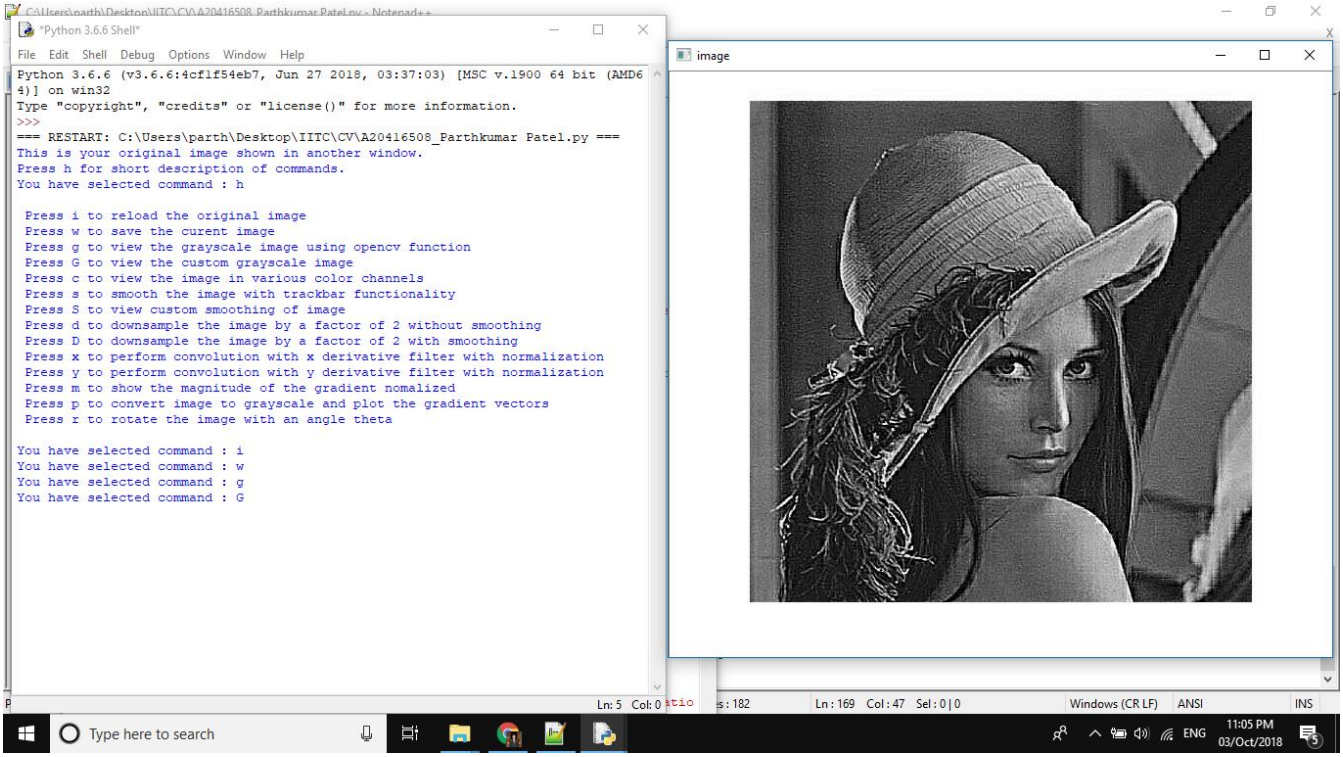

Figure 6 Implemented Grayscale Image

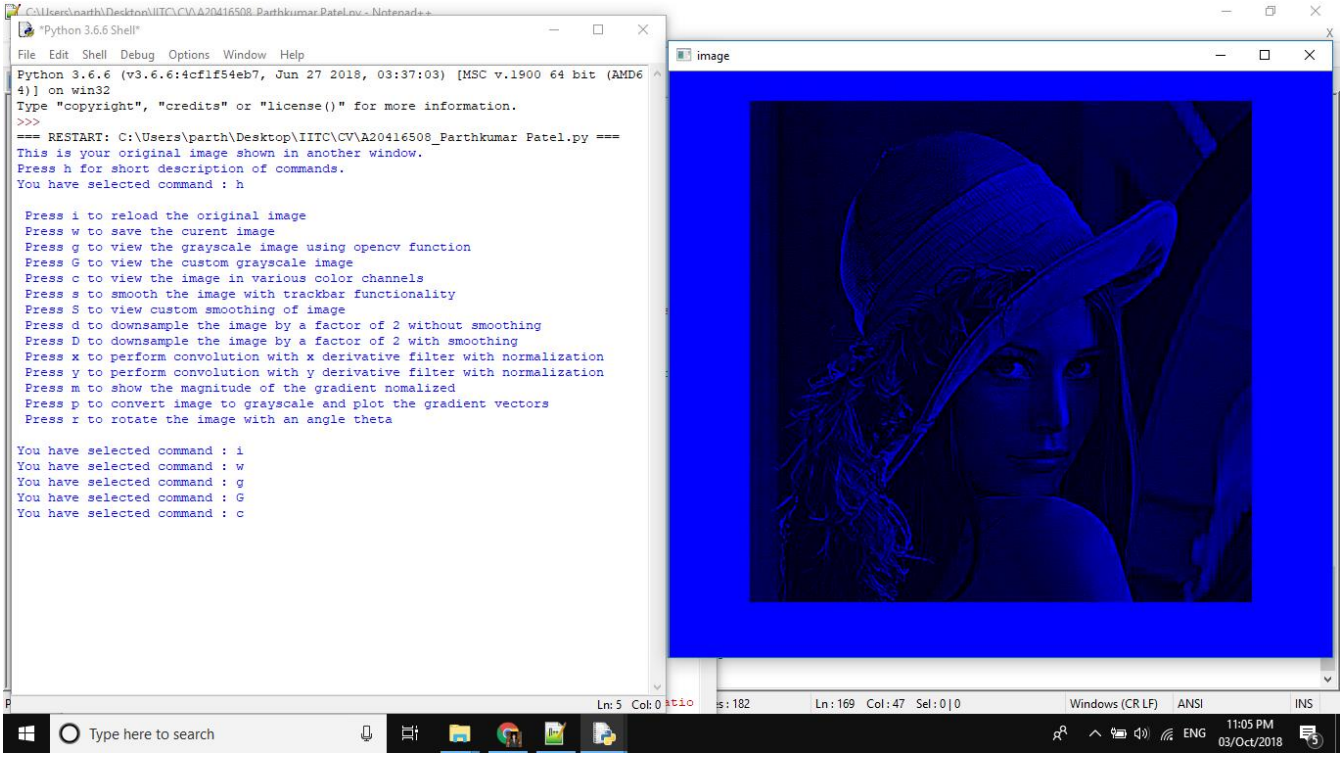

Figure 7 Blue color channel Image

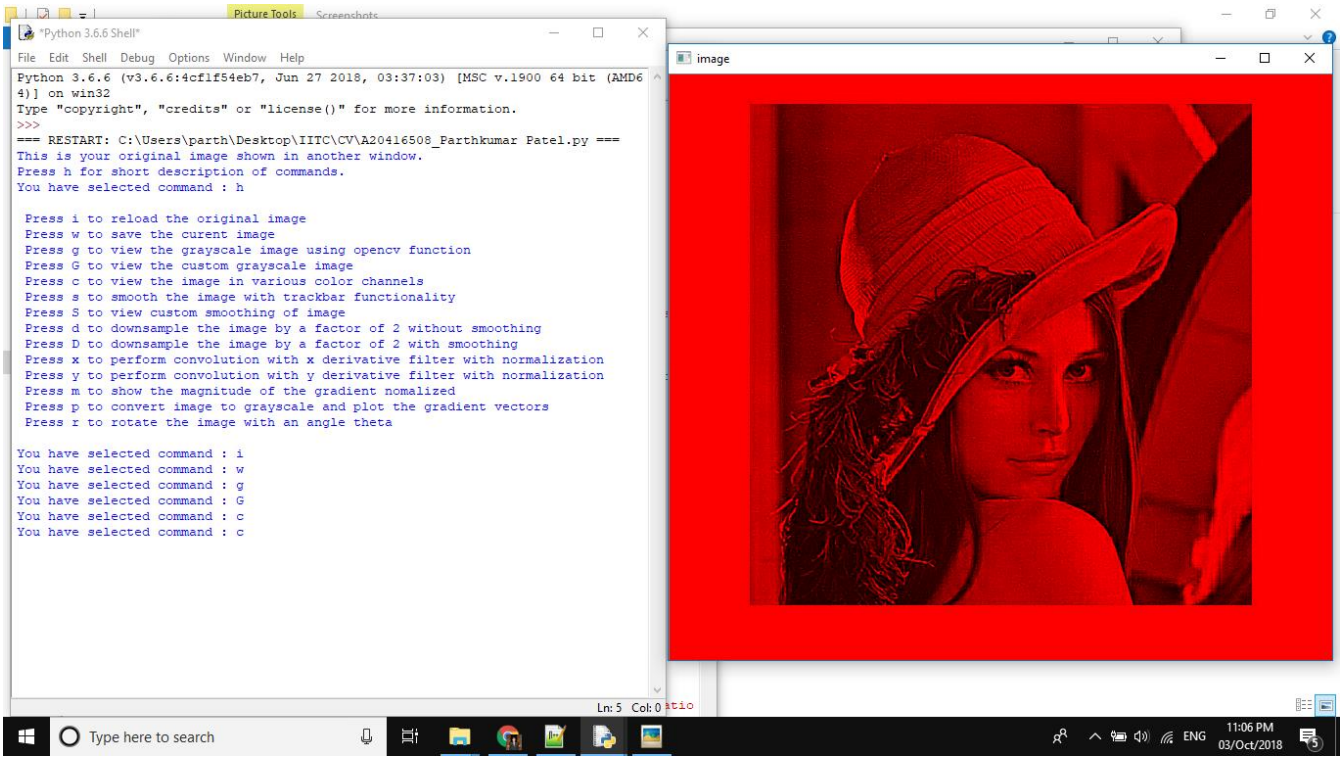

Figure 8 Red Color Channel Image

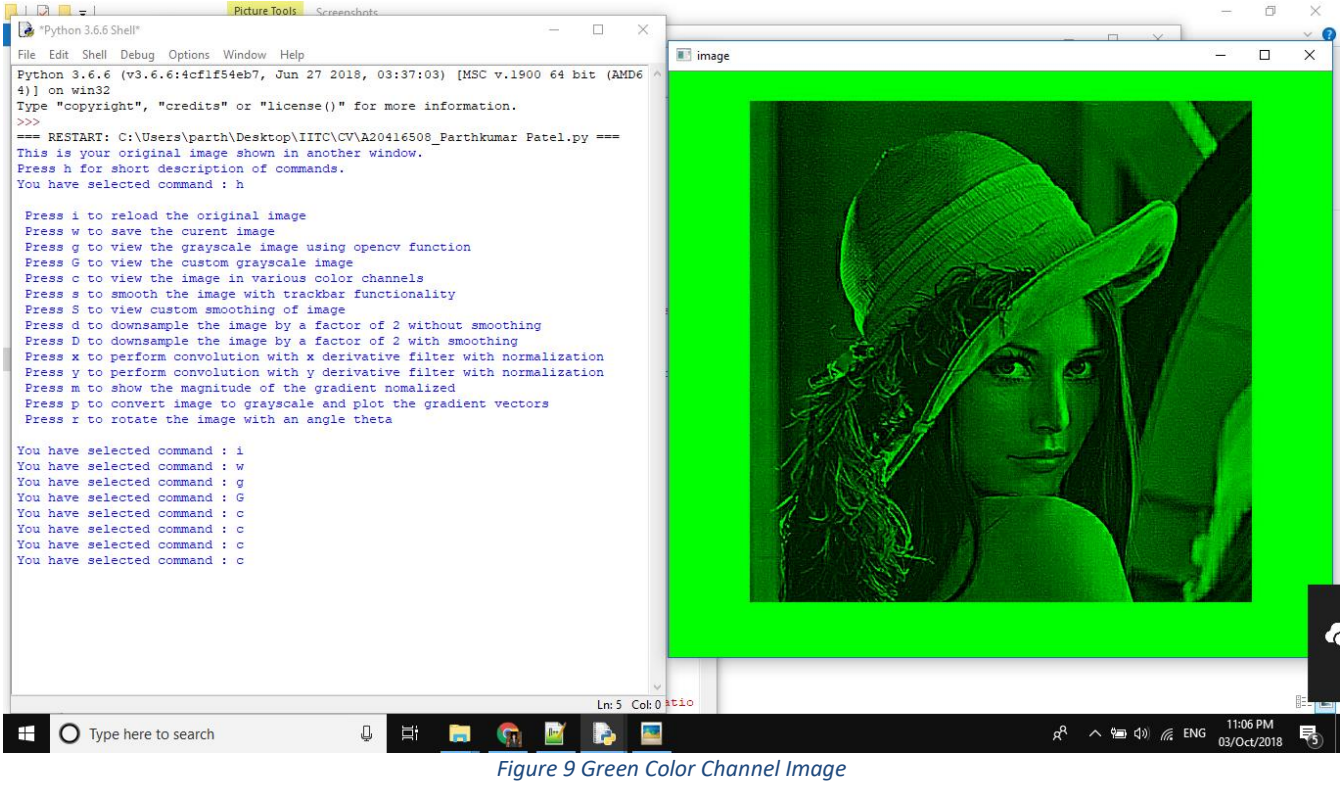

Figure 9 Green Color Channel Image

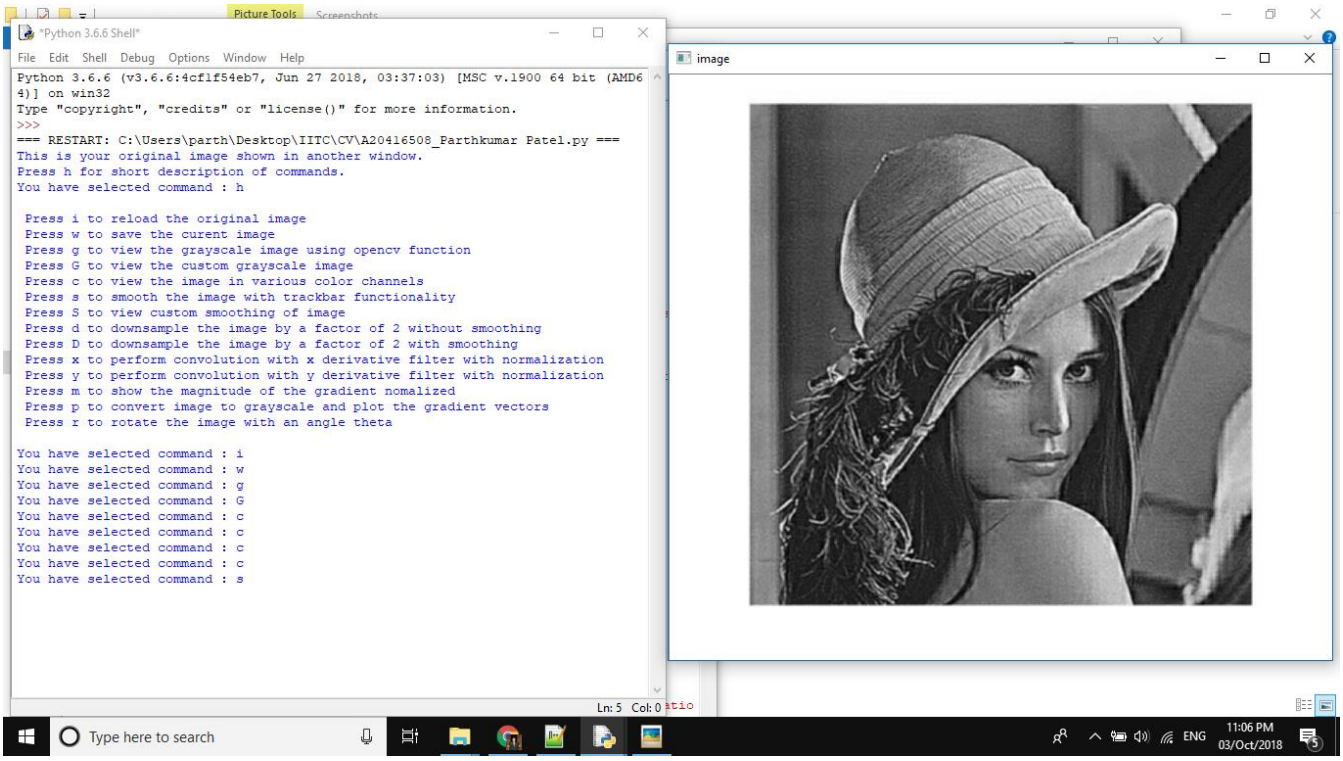

Figure 10 Smoothing with opencv function

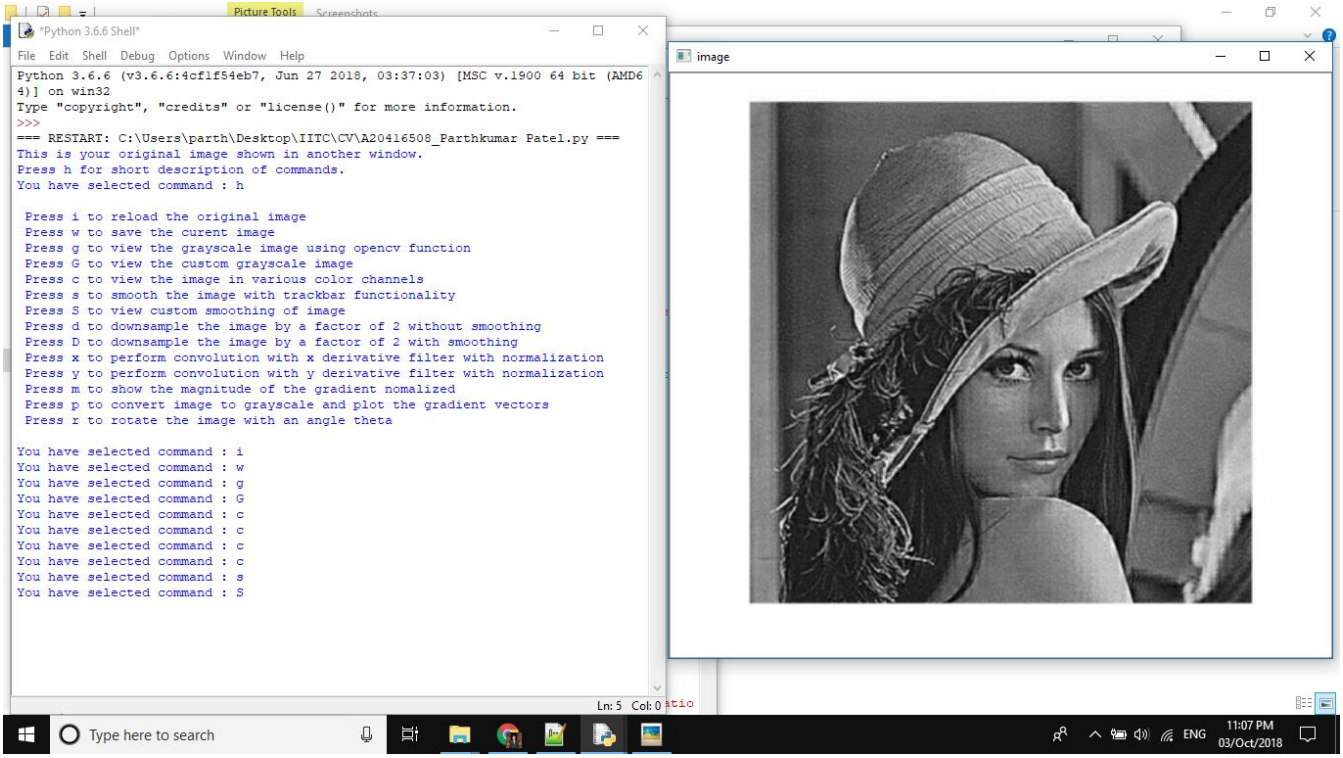

Figure 11 Smoothing with implemented function

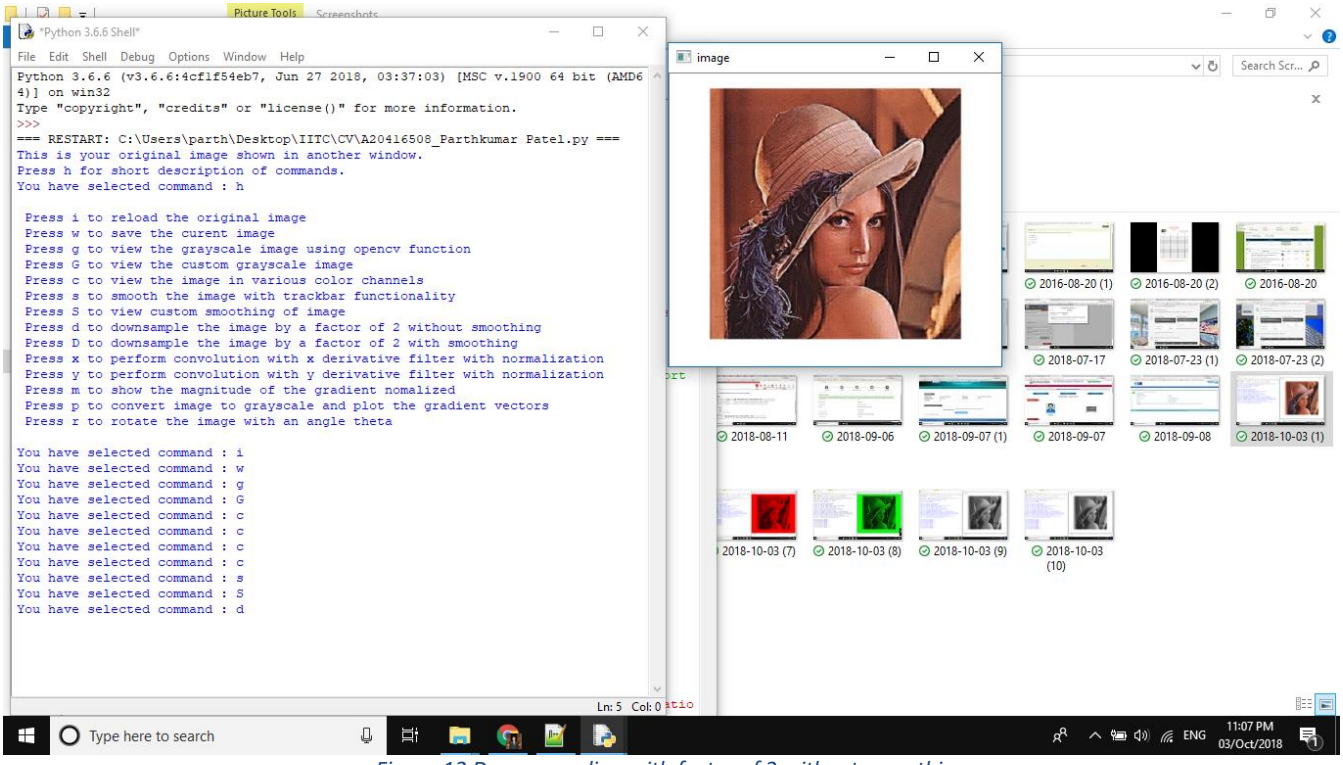

Figure 12 Down sampling with factor of 2 without smoothing

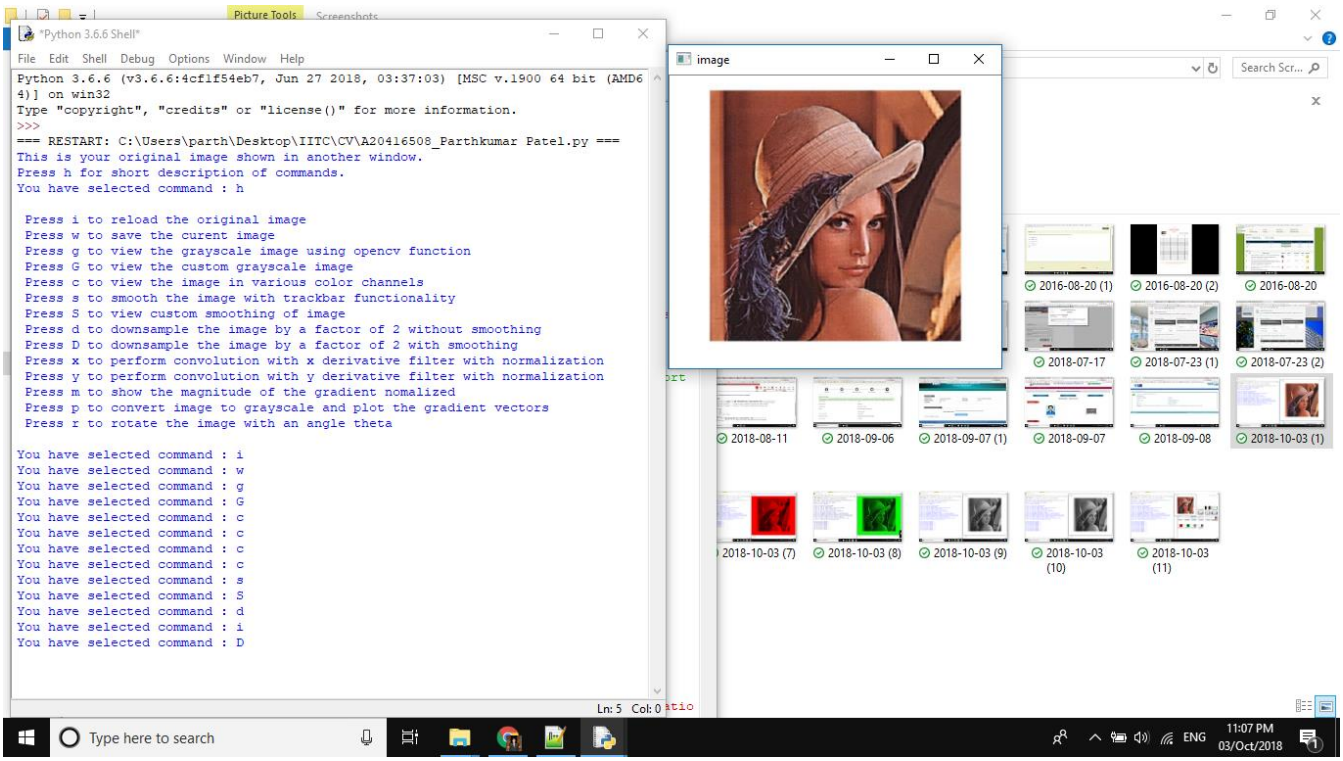

Figure 13 Down sampling with the factor of 2 with smoothing

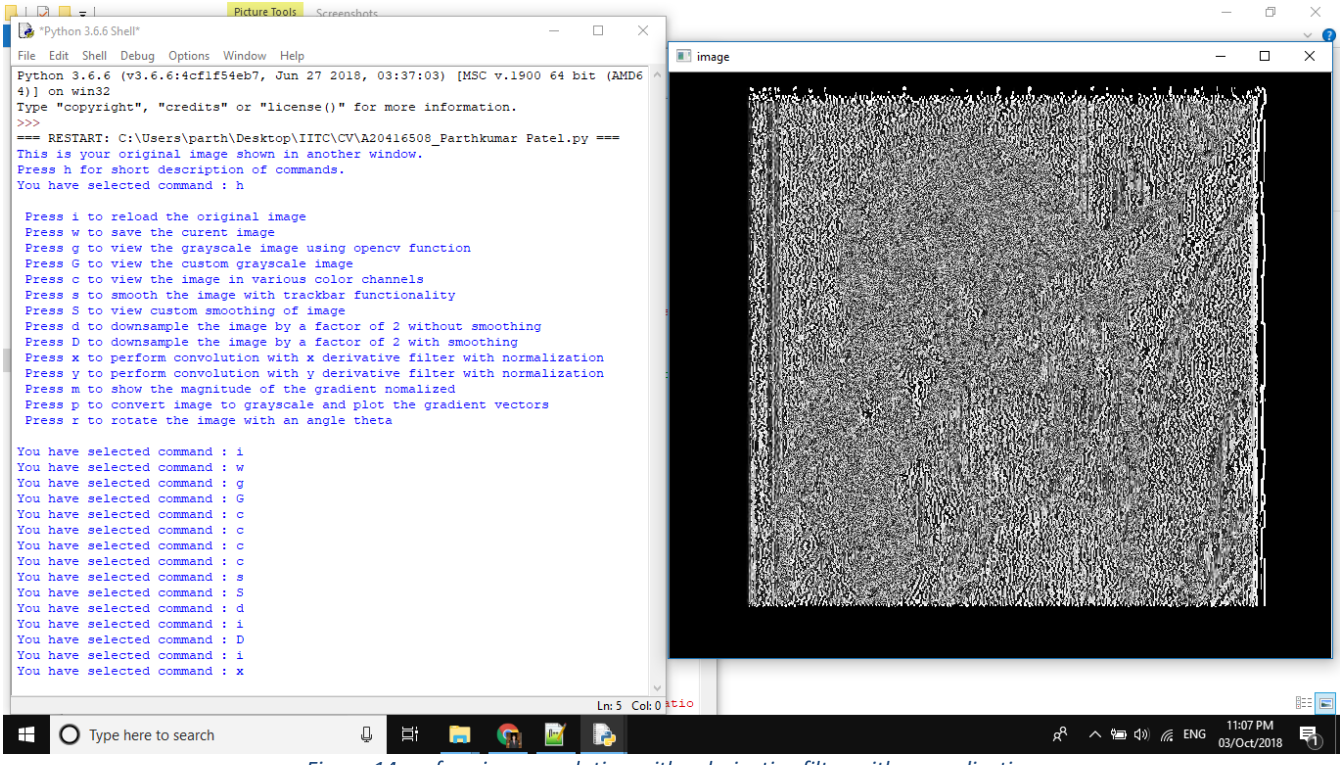

Figure 14 performing convolution with x derivative filter with normalization

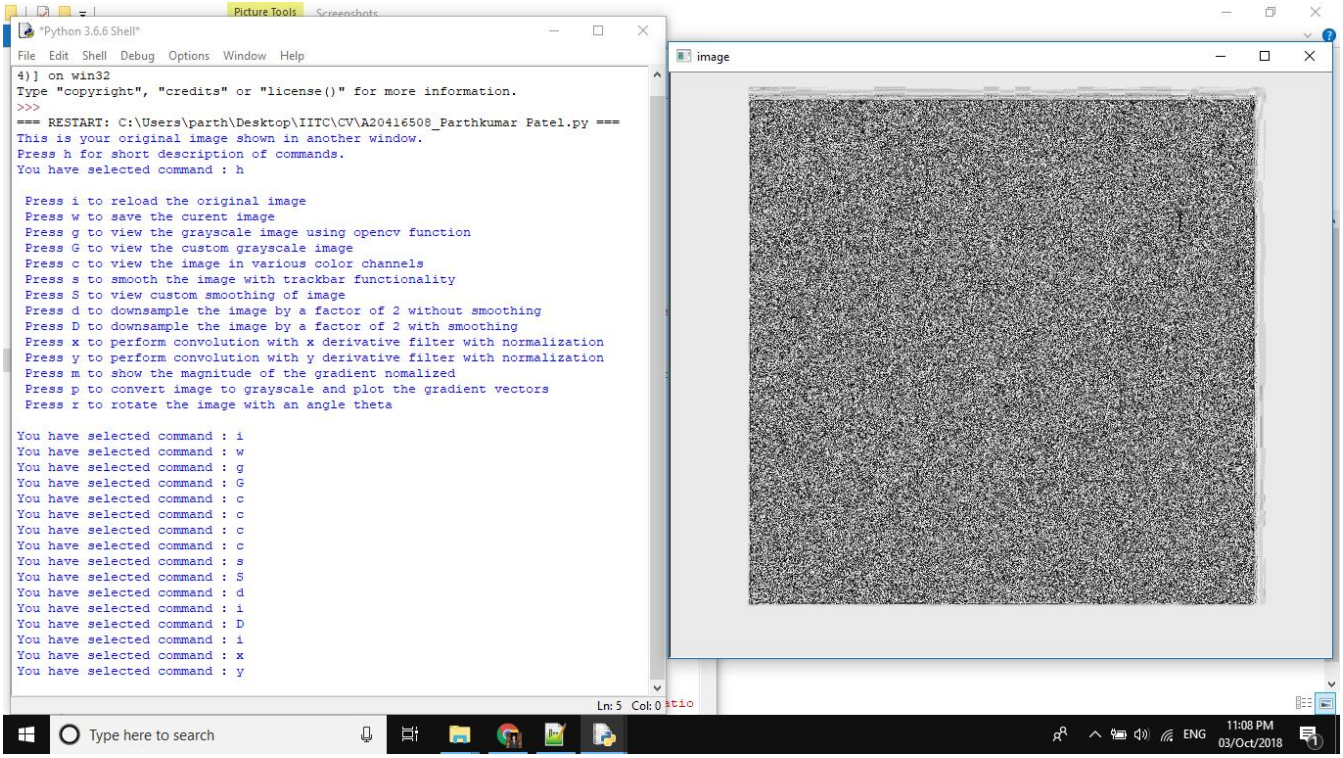

Figure 15 performing convolution with y derivative filter with normalization

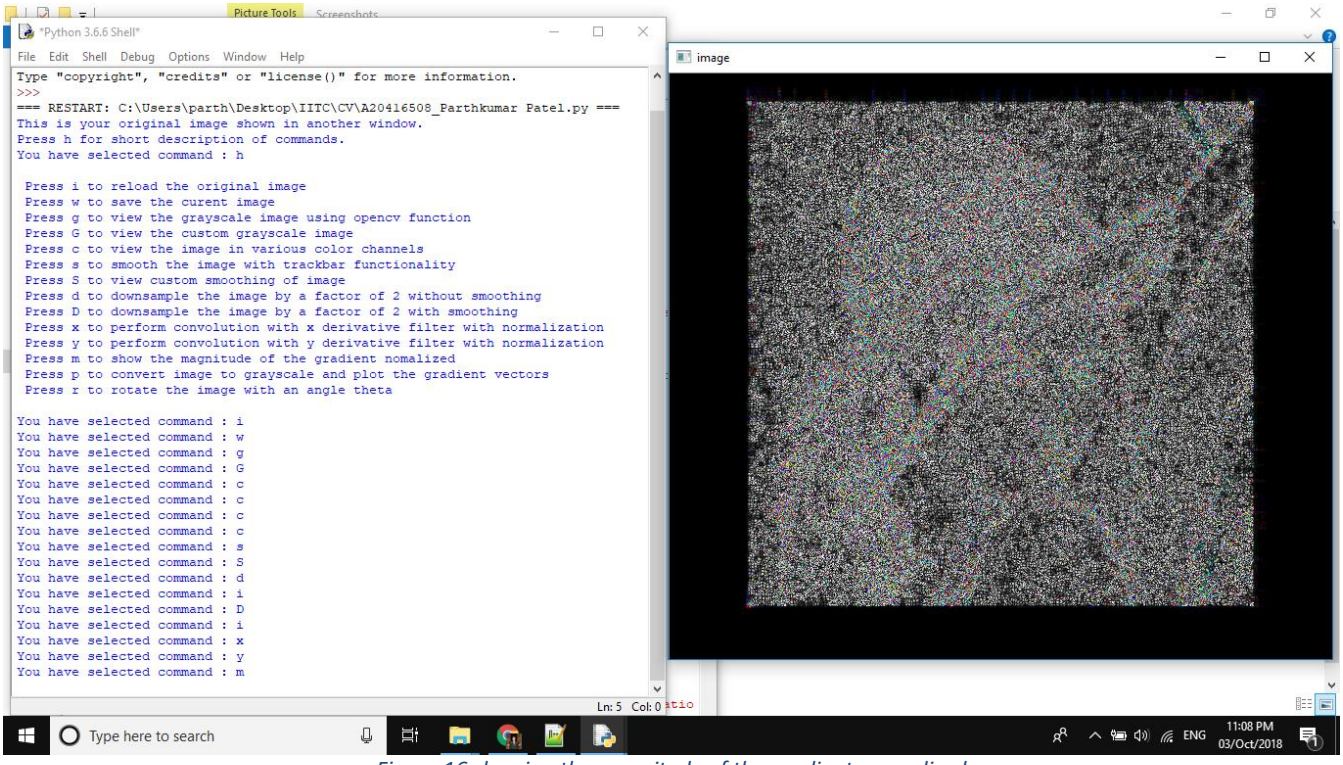

Figure 16 showing the magnitude of the gradient normalized

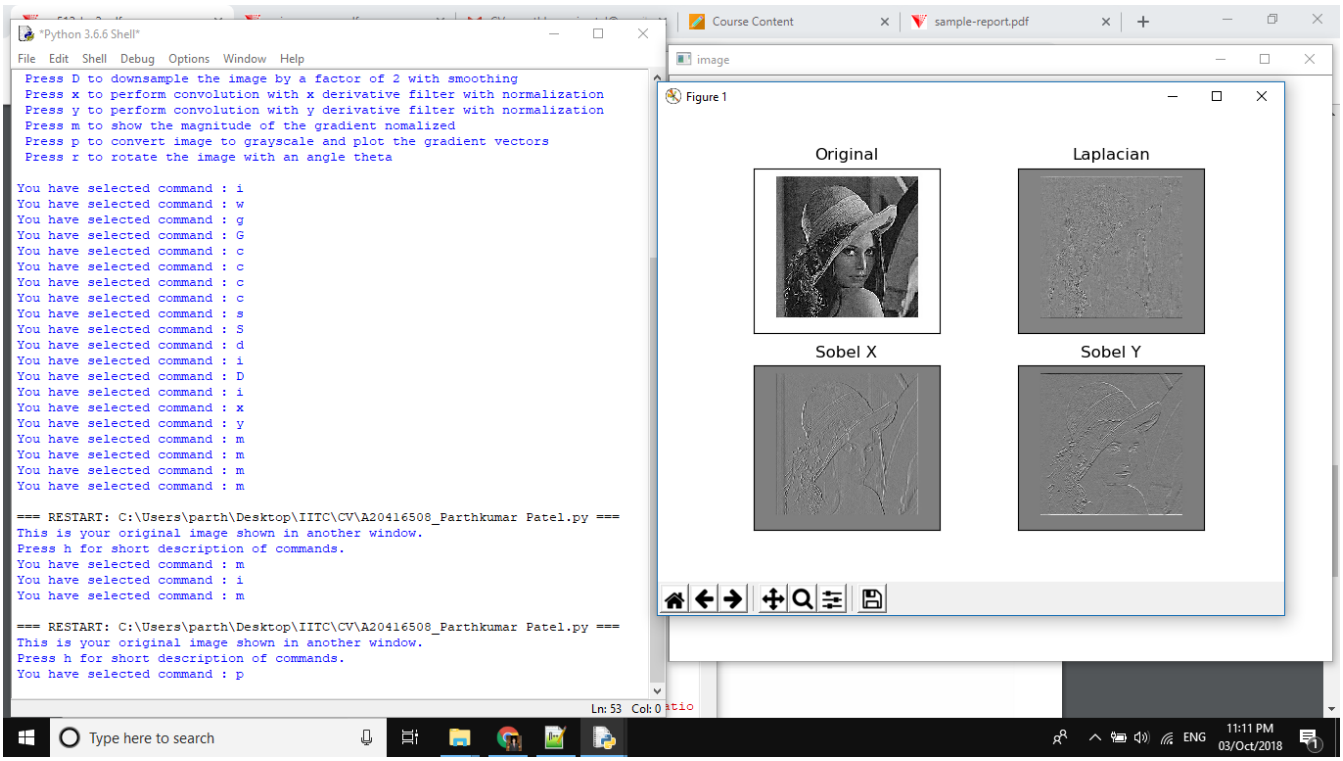

Figure 17 Converting an image to grayscale and plot the gradient vectors

Figure 18 rotating an image with an angle of 78 degree