Project Description

This project aimed to provide hands-on experience with C++ and OpenCV libraries, and to deepen understanding of image processing and filtering concepts. The ten tasks included in the assignment covered a range of topics, from reading and writing images to implementing filters using pixel manipulation and applying various effects, such as inverting images, to live video streams. The project became increasingly challenging as we worked with different data types for the Sobel filter and combined multiple tasks to achieve a cartoonization effect. In conclusion, this project was a comprehensive introduction to the basics of image processing.

Required Images :
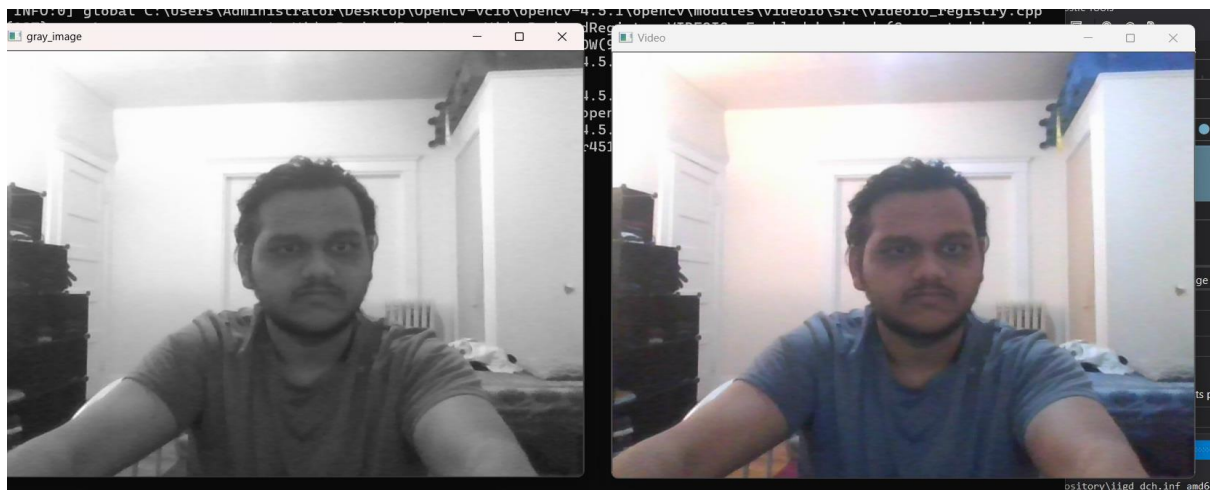
1.Grayscale using built-in function - cvtColor:

Figure 1 Live video converted to grayscale.

2.Alternative Grayscale:

This effect is accomplished by using the following relation between the pixels of a grayscale image and the BGR channel:

Gray = 0.11*Pixel of Blue Channel + 0.59*Pixel of Green Channel + 0.3*Pixel of Red Channel.

The values for RGB channels are selected after learning about the luminosity Grayscale.
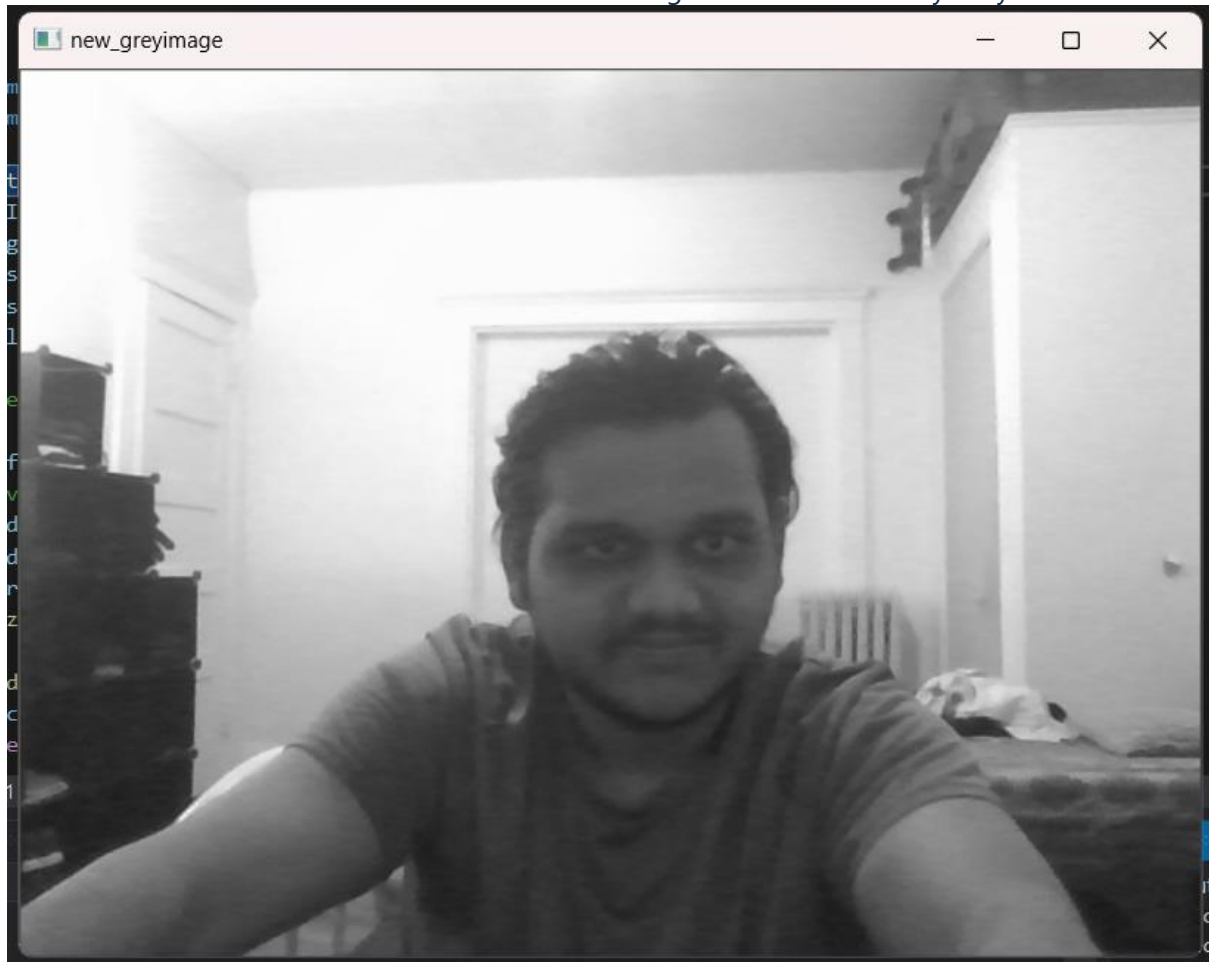

Figure 2 Grayscale Luminosity

3. A 5x5 Gaussian filter as separable 1x5 filters: The 1x5 filter is applied horizontally and the 5x1 filter is applied vertically.
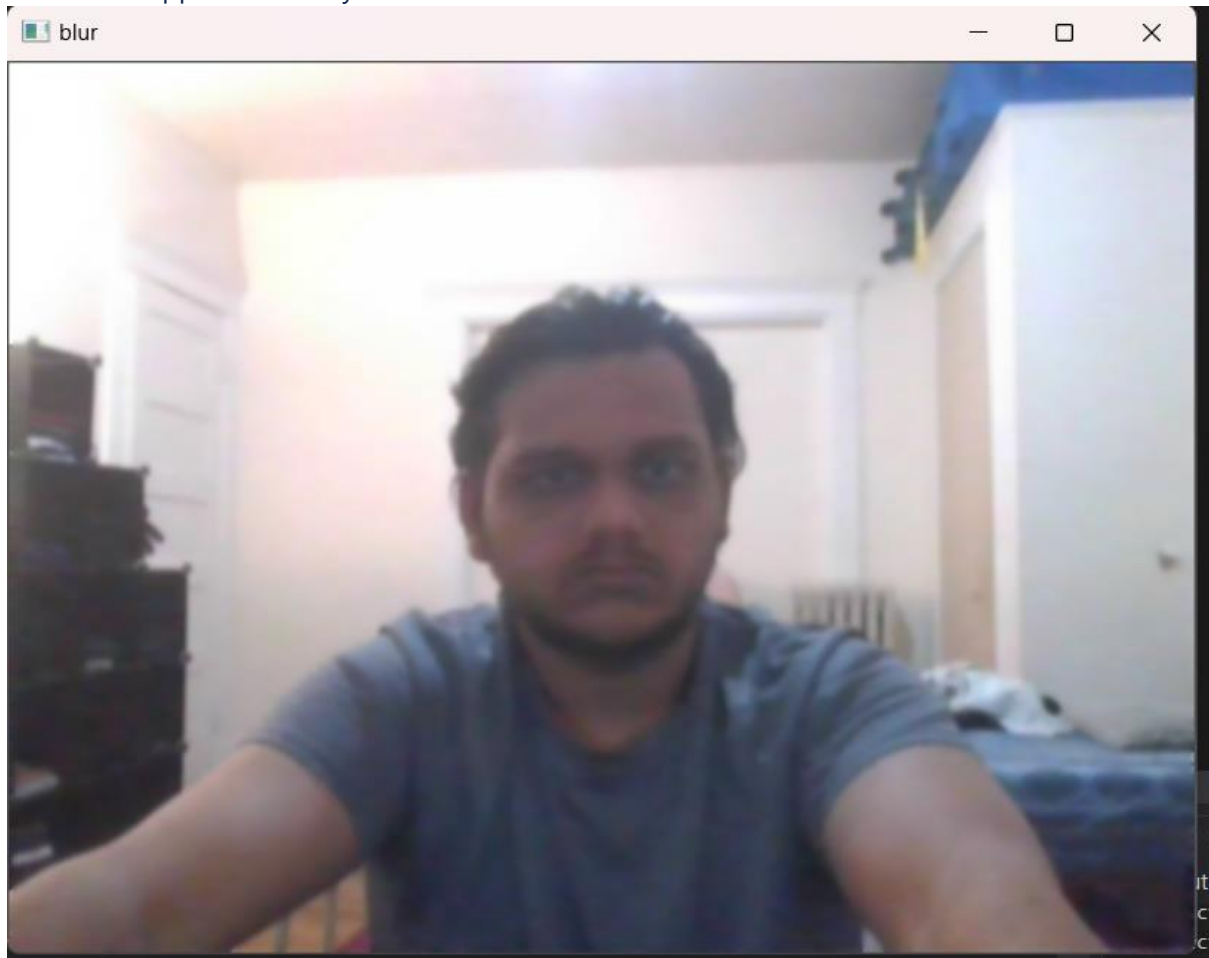

Figure 3 Gaussian Filter 1x5

4 A gradient magnitude image from the X and Y Sobel images: The Gradient Magnitude Image generated with the help of 3x3 SobelX and SobelY separable filters.
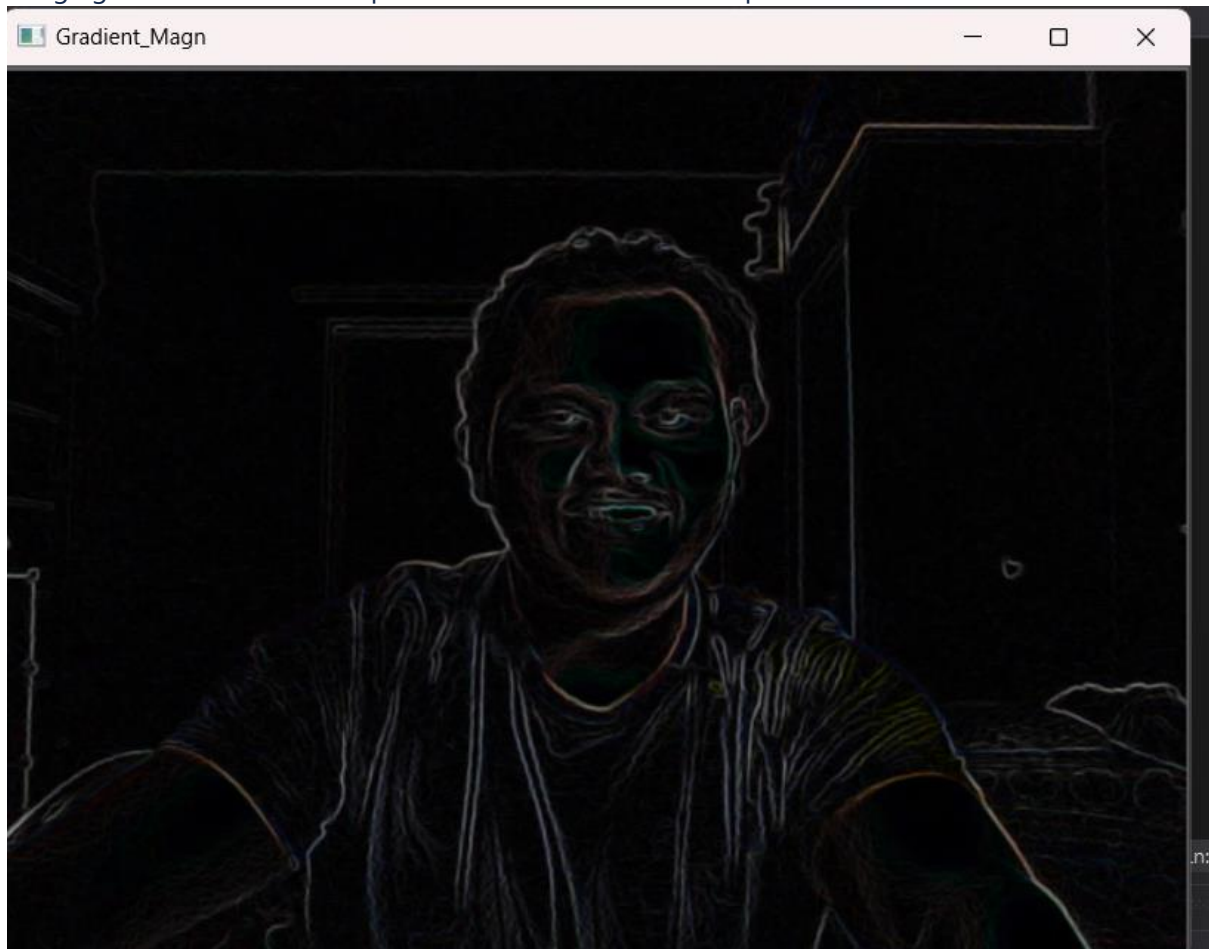

Figure 4 sobelX+sobelY

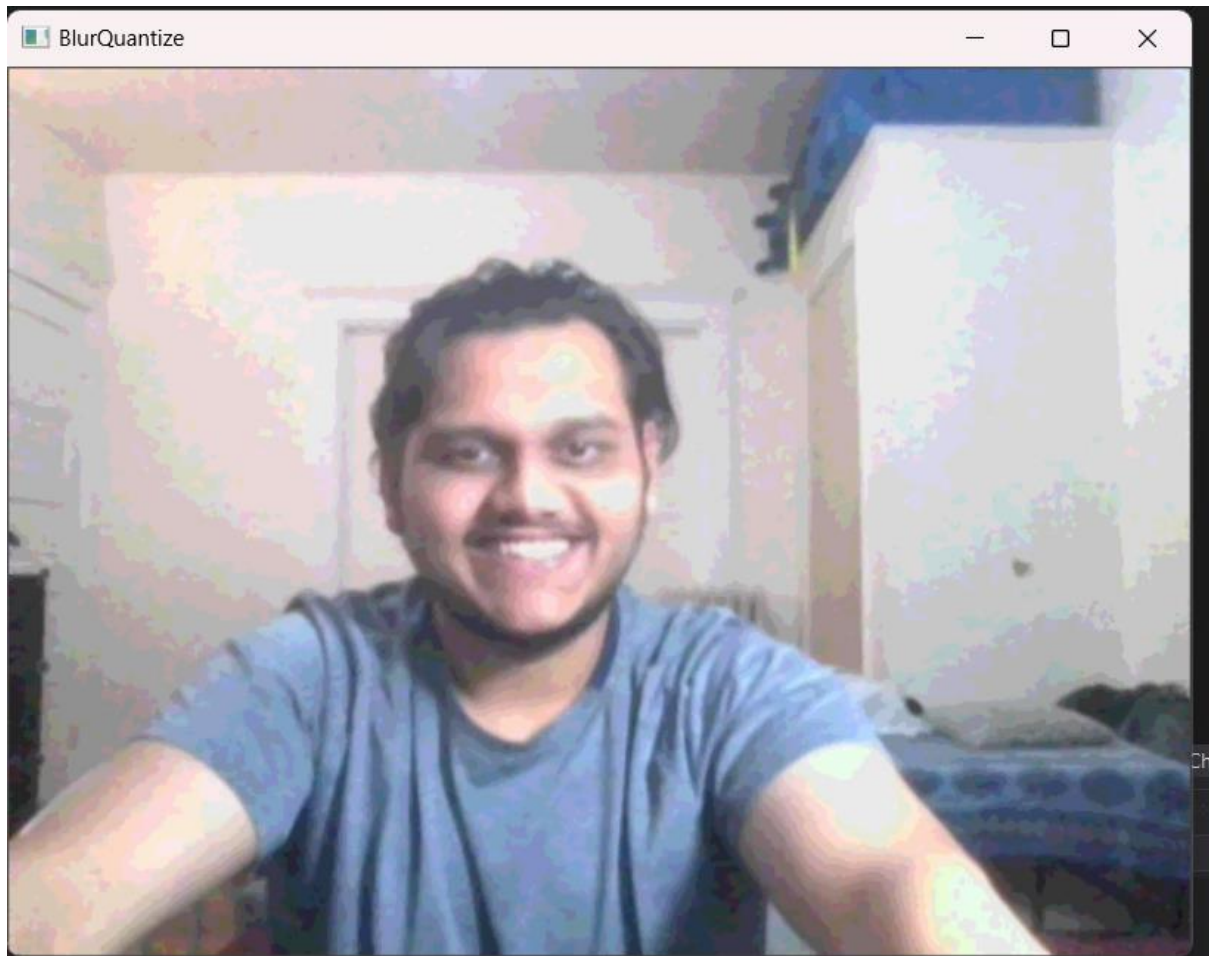**5 blurs and quantize color image:** Levels=10

Figure 5 Blurred & Quantized
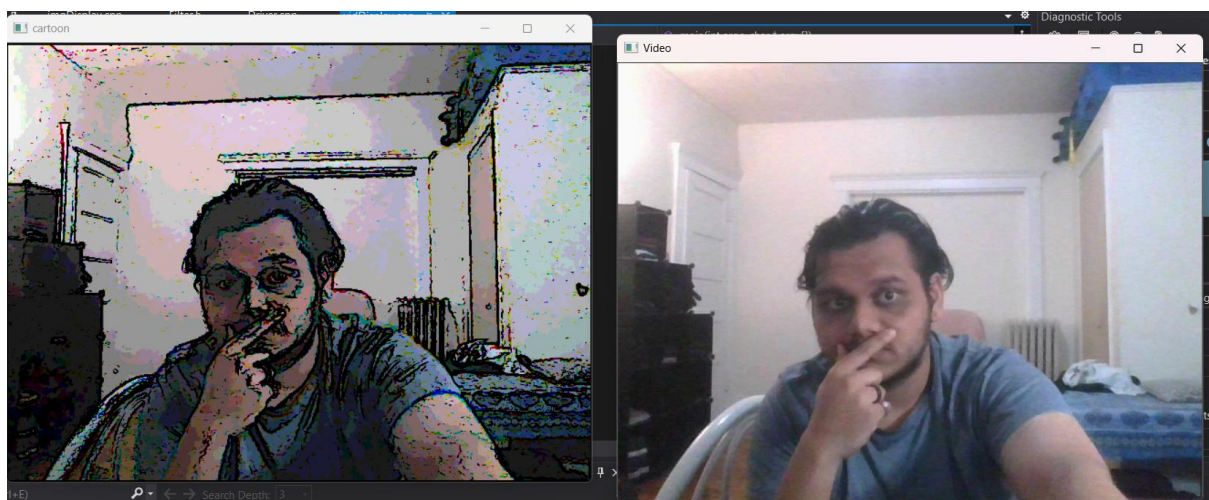
6. Cartoonization :

Figure 6 Cartoonization

7. Negative :

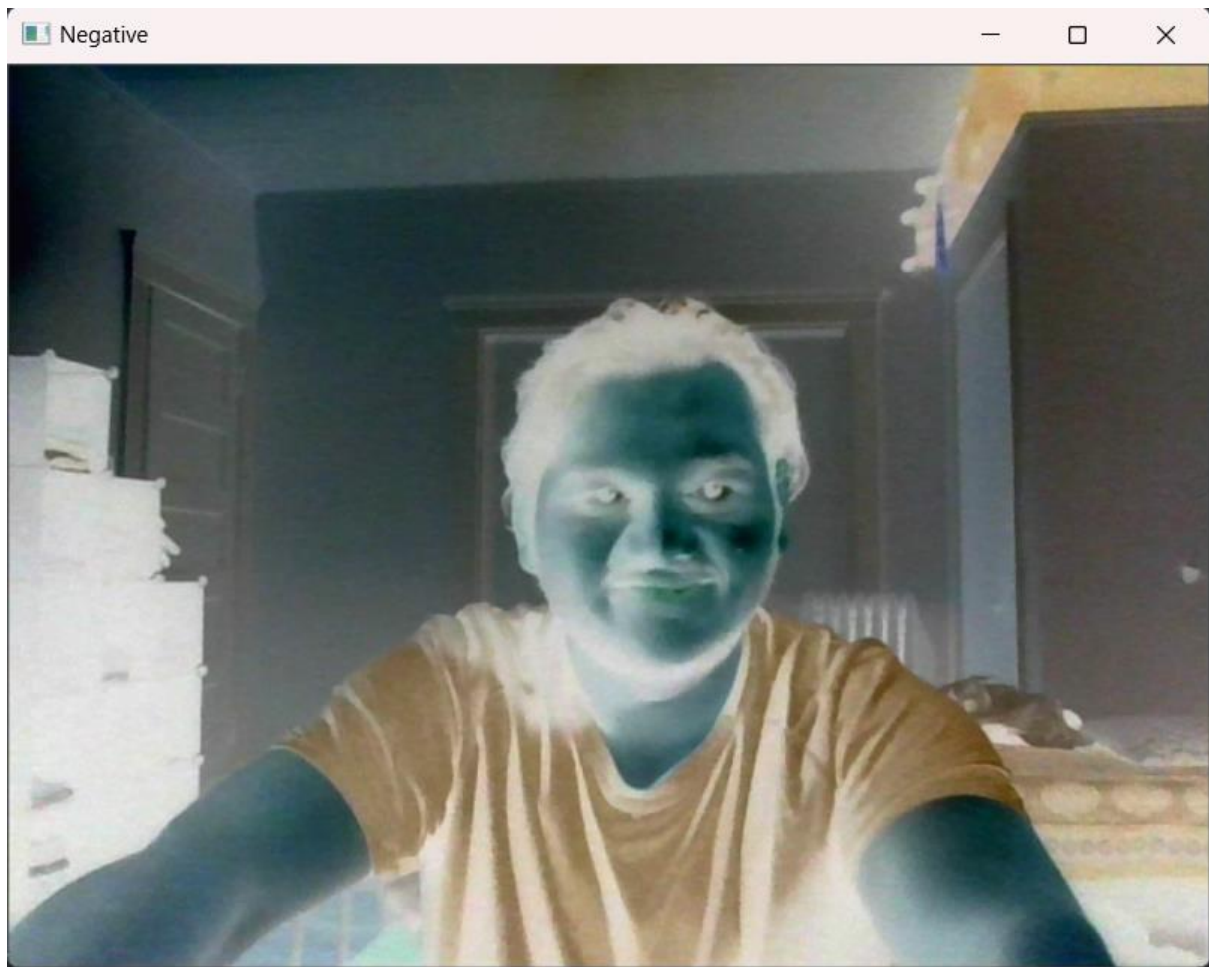Implemented by subtracting each pixel value from 255.

Figure 7 Negative

Reflection:

As a Python user, this OpenCV and C++ project was a new and challenging experience for me. I had to carefully consider the data types of variables used in the project, something that I hadn't given much thought to before. This project taught me to be mindful of how variables are stored in OpenCV and to prioritize computational efficiency in order to achieve faster results.