CS 5330 Project 1: Real-time filtering Report

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1.Short Description of overall project

In this project, I learned to configure opencv in C++ environment and implemented it in vscode IDE. Then completed tasks1-10 according to the project assignment. Wrote several C++ code files of filters.cpp, filters.hpp, imgDisplay.cpp, vidDisplay.cpp

The following functions are implemented according to the requirements of the task, and the function of the corresponding button is implemented in vidDisplay.cpp.

```cpp
int blur5x5( cv::Mat &src, cv::Mat &dst );
int sobelX3x3( cv::Mat &src, cv::Mat &dst );
int sobelY3x3( cv::Mat &src, cv::Mat &dst );
int magnitude( cv::Mat &sx, cv::Mat &sy, cv::Mat &dst );
int blurQuantize( cv::Mat &src, cv::Mat &dst, int levels );
int cartoon( cv::Mat &src, cv::Mat&dst, int levels, int magThreshold );
int upbrightness( cv::Mat &src, cv::Mat &dst );
int downbrightness( cv::Mat &src, cv::Mat &dst );
int savevideo( cv::Mat &src, cv::Mat &dst );
int greyscale( cv::Mat &src, cv::Mat &dst );
```

2.Task and Required Image

Task 3:

Original version image

cvtColor greyscale image (image 1)

Task 4

The way I generate the alternative greyscale image is that I copied green color channel value to red and blue channel.

Alternative greyscale image (image 2)
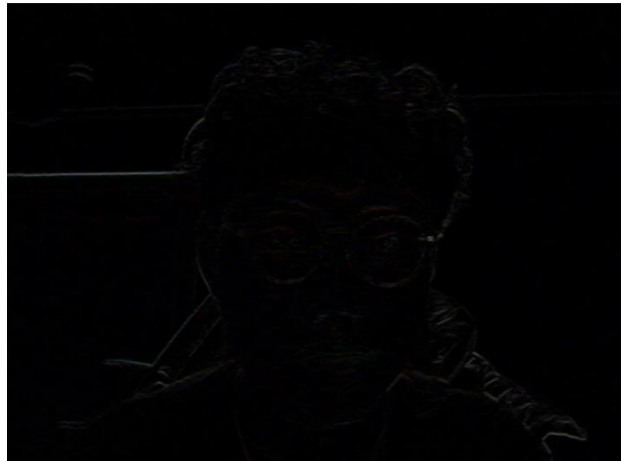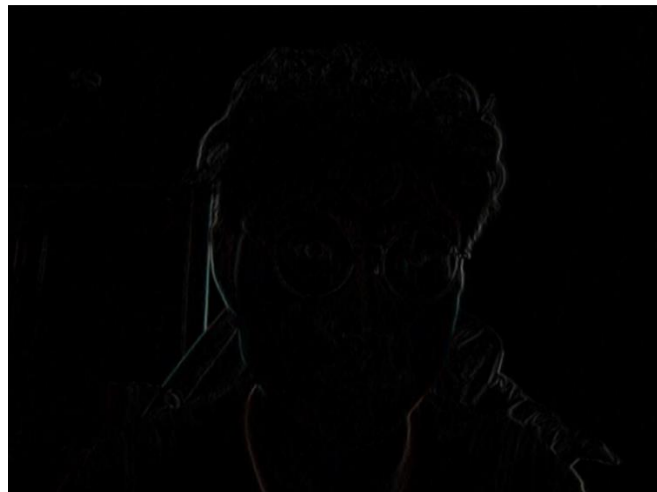
Task 5

Original version image

Gaussian filter blurred image (image 3)
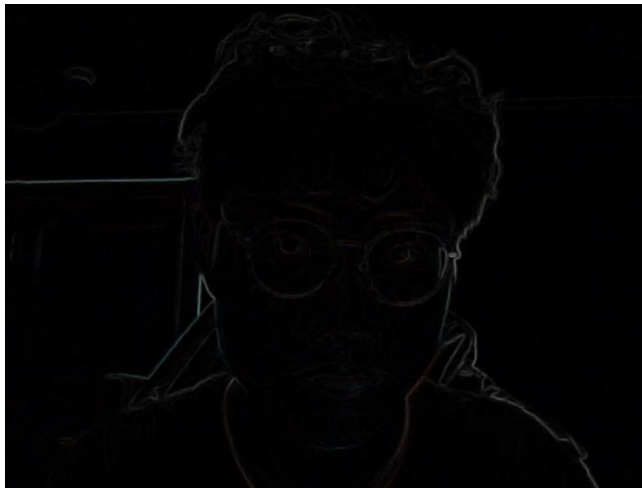
Task 6

X Sobel image

Y Sobel image

Task 7

Original version image

Gradient magnitude image (image 4)

Task 8

Original version image

Blurred and quantized image (image 5)

Task 9

Original version image

Cartoonized image (image 6)

Task 10
My implemented function is allowing the user to adjust brightness up and down.

Original version image

Higher brightness

Lower brightness (image7)

Extensions
My extension task is I implemented a function in vidDisplay.cpp which can let the user save short video sequences with the special effects, so that if the user types 'p' it will start recording video, and if the user types 'p' again it will stop recording video.

For example, I saved a video 'savevideo.avi' with gradient magnitude effect.
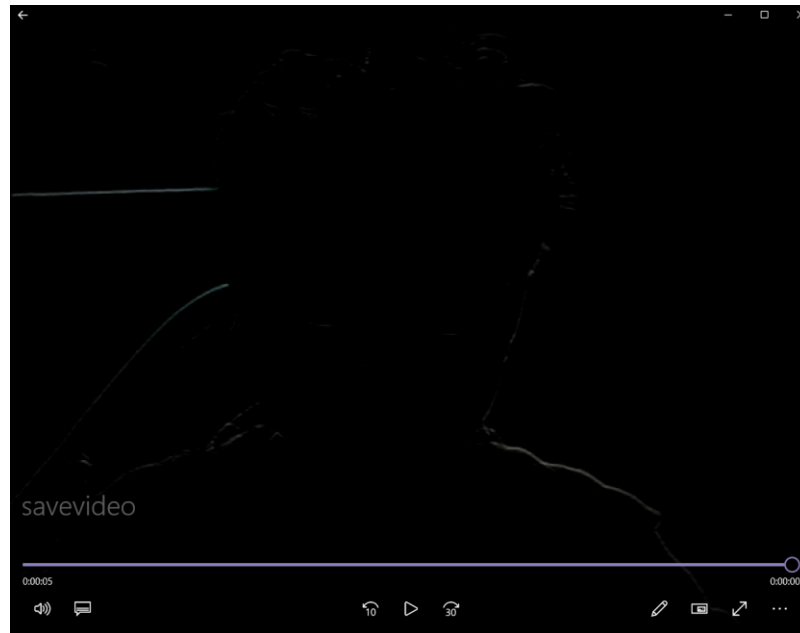
3.Conclusion
I have to say that this project1 is very challenging, especially for a person who is new to opencv. I encountered many difficulties from the installation of opencv, but also learned a lot. In the past, when using image processing, filter and other related knowledge, it was done by directly calling the python package, but essentially did not understand the corresponding implementation process. Through this project, I learned the implementation process of these filters.

4.Reference Material
[1]https://www.opencv-srf.com/2018/01/save-images-and-videos-to-file.html
[2]https://docs.opencv.org/3.4/d2/de8/group__core__array.html
[3]https://github.com/amitvmulay?tab=repositories