

1. In this project I created two programs, the first opens an image and can apply filters to the image and save them, the second starts a stream from your computer and can apply filters to the stream and save individual frames or videos from the stream. For both the image and stream program I implemented the following filters: a CTV BRG to grayscale conversion filter, an alternative BRG to grayscale conversion filter, a (separable) 5X5 gaussian blur filter, (separable) 3X3 sobel X and Y filters, a gradient magnitude filter, a blur and quantize filter, a cartoon filter, a negative filter, and a CTV BRG to HSV conversion filter.
2. Here are all the required images:

Required images #1

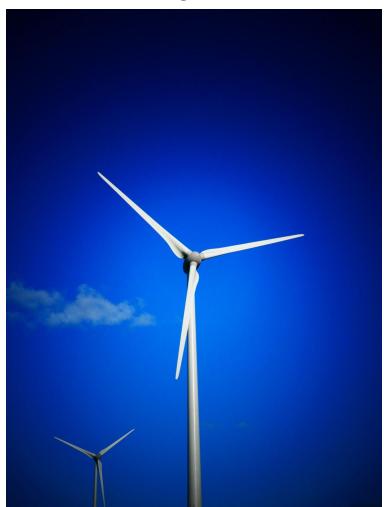


Original image



CTV grayscale image

Required images #2



Original image



my alternative grayscale image

Required images #3

It was the best of times, it was the worst of times, it was the age of wisdom, it was the age of foolishness...

Original image

It was the best of times, it was the worst of times, it was the age of wisdom, it was the age of foolishness...

Blurred Image

Required images #4

It was the best of times, it was the worst of times, it was the age of wisdom, it was the age of foolishness...

Original image

It was the best of times, it was the worst of times, it was the age of wisdom, it was the age of foolishness...

Gradient Magnitude Image

Required images #5



Original image



Blurred and Quantized Image

Required images #6



Original image

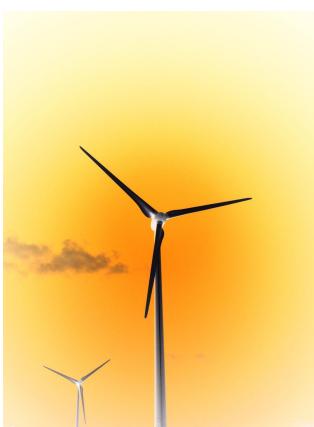


Cartoon Image

Required images #7

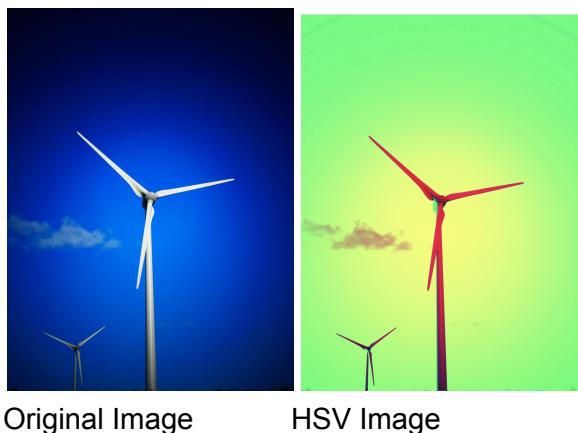


Original image



Negative Image

3. I choose to do three extensions:
 - a. I implemented all my effects for still images and allow the user to save the modified images, which is what I used to modify/save all the pictures in this report
 - b. I let users save videos with any special effects. Here is a google drive with a video that I saved using my program where I use every special effect I implemented:
https://drive.google.com/drive/folders/1C2QmRAXzIzA_LSHPyUBoM-mn2BXljyxK?usp=sharing
 - c. I used cvtColor to implement a filter that converts BRG images to HSV (in both the imgDisplay and vidDisplay):



Original Image

HSV Image

4. Throughout this assignment I focused on learning how to write in C++ and how to use the OpenCV C++ library. It had been a very long time since I had used C++ so I had to review and struggle through a lot of low level problems to learn how I can properly utilize this language. I had never used OpenCV at all, my only experience with handling images in code was with pillow in python, so I spent a lot of time learning about OpenCV data types and languages.
5. I went to Office Hours a couple of times where Gopa Krishnal, Santosh Vasa, and Guanang Su helped me.