CS7GV1 Computer Vision

Mid-term Project 2022/23

**Part 1: Photo effects**

For each of the following photo filters, many of the processing steps are similar, such as splitting the image into its 3 channels (RGB), clipping the values between 0 and 255 and converting them to integers.

For each of these tasks I created functions that are called where needed in each filter.

The **split** function takes the img array as an input and returns three 1D arrays of the R, G and B channels.

The **clipping** function takes an array as input and uses the numpy clip function to limit the array to values between 0 and 255.

The **convert\_to\_int** function takes an array as input that is typically filled with float values and returns the array converted to integers.

1. **Exposure Filter**

My implementation of the exposure filter is to multiply every value in each channel by the parameterized amount. To do this the

1. **Contrast Filter**

To adjust the contrast I created a function that takes the image and a value between –5 and 5.

The forumla I used for image contrast was to fi

1. Saturation Filter
2. Temperature Filter

To adjust the temperature I created a function that takes the image and an amount as a parameter.

The Input parameter can range from -100 to 100. Positive values will make the image look warmer and negative values will make the image look cooler.

To make the image warmer the input amount is added to each pixel in the red channel and subtracted from the blue channel. When a negative value is used as a parameter the inverse operation is performed. The blue channel is increased and red decreases.

This is typically the method used in photoshop to adjust the colour balance of an image.

1. Solarization (White Clipping)
2. Binary Image filter

The function I used to create a binary image takes the image and an integer between 0 and 255 as input.

It first converts the image to greyscale using the filter described above. It then loops through each pixel in the image and checks if the value of the pixel is above or below the input value.

If it is below, the value of the pixel is changed to black and if it is equal or higher it is set to 255.

1. Solarization

My interpretation is that the solarization filter is where in photography the image is recorded on a negative or on a photographic print is wholly or partially reversed in tone. Dark areas appear light or light areas appear dark.

Part 2: Sharpening, blur, and noise removal

1. Softening
2. Gaussian Sharpening
3. Median Sharpening
4. Bilateral
5. Non-Linear Diffustion

Part 3: High-quality image resampling