1 Programming Assignment

1.1 Problem Definition

I study various image transformations in this project. I experiment with a few different ways to transform an color image into a greyscale image. I also show how to blur an image and produce an thresholded image. The image used in this exercise is one of my face.

1.2 Implementation

I use the python OpenCV API which can be install with

```bash
pip install opencv-python
```

or:

```bash
conda install -c menpo opencv
```

1.3 Methods

1. **Greyscale via Max** This method takes the max pixel value over the three color channels and uses that for the intensity value for the greyscale image.

2. **Greyscale via Green** This method takes the green color channel and uses those values for the intensity values of the greyscale image.

3. **Greyscale via Default** This method uses the default OpenCV greyscale conversion.

4. **Blur** This method averages over the eight pixel neighbors that each pixel has. It has to check for the various literal corner cases and edges, as these pixels will not have eight neighbors. For example, the pixel corresponding to the top left corner only has three neighbors (below, to the right, and diagonal to the right).

5. **Threshold** This method thresholds the image such that the foreground slightly stands out more from the background. I invert the image matrix and then divide by the mean. Then I just multiply 255 to get the pixel values back to a normal range. This makes most pixels above the mean white.

1.4 Results
1.4 Results

(a) original image  
(b) Greyscale via Max  
(c) Greyscale via Green

(d) Blur  
(e) OpenCV default  
(f) Thresholded