This document includes original and processed images for homework assignment A1. Corresponding explanations of the algorithms are described below:

Figure 2 provides a **grayscale image** of the profile image by converting the color image with:

\[
\text{weight} = 0.3 \cdot R + 0.6 \cdot G + 0.1 \cdot B
\]

where it traverses all the pixels in the image and update the pixel value with the weighted value, equation can be found in lecture slides 3 from week 2: Programming with Images: Pitfalls

Figure 3 provides a **blurred image** of the grayscale image that was previously processed. With initializing a blurred image for output, a padding image is first generated to extend the boundary by 2 pixel by the row and column, creating a new image (paddingImage) with 2 rows and 2 columns greater than the size of the original image (demonstration please refer to figure 4). Then we will traverse the pixels of the padding image, starting with index 1. For the \(i\)th row and \(j\)th column in the padding image, denoted as pixel \(p\), the corresponding pixel in the blurred image will be \(i - 1\) and \(j - 1\). Then we will use the average of the pixel value of \(p\) and its 8 neighbors: \((i - 1, j - 1), (i - 1, j), (i - 1, j + 1), (i, j - 1), (i, j + 1), (i + 1, j - 1), (i + 1, j), (i + 1, j + 1)\), to determine the pixel value for the corresponding pixel for the blurred image, which gives:

\[
\begin{align*}
\bar{R} &= \frac{1}{9} \cdot (R_1 + R_2 + \ldots + R_8 + R_9) \\
\bar{G} &= \frac{1}{9} \cdot (G_1 + G_2 + \ldots + G_8 + G_9) \\
\bar{B} &= \frac{1}{9} \cdot (B_1 + B_2 + \ldots + B_8 + B_9)
\end{align*}
\]

where \(R_k, G_k, B_k\) refer to the pixel value of the 9 pixels (including \((i, j)\)) respectively. Assigning the color value to the corresponding pixel for the blurred image, we then can obtain a processed image with blurring effect. As suggested, the function was operated 10 times for result shown below (figure 3). Blurred color face, along with these presented examples, are provided in the homework folder.

For the source code and images, please refer to the folder: "/hw1-Han/part2"

Personal webpage for this course has also been created, please refer to: [https://cs-people.bu.edu/xjhan/](https://cs-people.bu.edu/xjhan/)
Figure 1: Original Image  
Figure 2: Gray scale Image  
Figure 3: Blurred Image  
Figure 4: Padding image is generated for further processing