19AIE303 - Signal and Image Processing

Assignment 2

1. Depict how different levels of quantization for the grayscale image of 'Lenna.png' would look. Reduce the default 256 levels to 32, 16, 8, 4 **and 2**. Save each of the output images.
   Note: Reducing to two levels is thresholding, resulting in a binary image - black and white.

2. Add the two images 'aimg1.jpg' and 'aimg2.jpg' in the following ways.
   a. Use pixel by pixel operation.
   b. Use the opencv call cv2.add()
   c. cv2.addWeighted()
Note: For this question alone, work with color image. Observe how b and c differ. Result image would be similar to:

3. Subtract images 'simg1.png' from 'simg2.png' to extract the additional hand in the frame. Then apply **thresholding** to convert to a binary image to enhance the difference and view (cv2.threshold() can be used and select the appropriate threshold)

4. In the image 'teeth.jpg' has two teeth with fillings. We want to isolate these teeth alone. For this we have a mask image 'mask.jpg' which defines the 'region of interest' in the image. Use multiplication operations to obtain the resulting image with only the teeth with fillings. (*note*: we intend to multiply the pixel intensities with 0 or 1 depending on the mask)

5. The chessboard pattern image 'ChessBoardGrad.png' has an undesired shading effect over it. The shading pattern itself is given in 'shading.png'. Obtain a corrected image without the shading by dividing the faulty image by the shading pattern.

Points to note:
1. Work with grayscale images for all except in Q2.
2. Q3 to Q5 - use any way to perform the operations.
3. The resulting pixel values should span the range [0,255]

What to submit:
1. **A single python file** containing **code and comments** for all the questions. Demarcate both questions using comments
2. **Output images** pasted in a document (word or pdf)