ELE 490 - Fundamentals of Image Processing - Fall 2024-2025
Homework 1 - Assigned September 29 16:00, Deadline October 13 12:30
Submit your homework through the STAR system

1. Take a picture of yourself using a mobile camera. Record it to your computer. Read that image in Python in the float32 data type as a 2D array for each R-G-B channels. The array content should be 8-bit integer. That is, the 2D array content will take integers between 0 and 255. Include your code in your report.

2. Display your image in Python both in colors and RGB channels separately as gray-scale levels. That is, you will show a colored image and three gray-scale images for each RGB channels. Include your codes and the displayed images in your report.

3. Now you will apply **min-thresholding** to each of RGB channels. That is, you will display dark-gray regions as completely black. You can decide the threshold level on your own by looking at the gray-scale images of RGB channels. For example, you may decide that if integer content of the R-channel is smaller than 50, you will make them 0 and display it. You can choose different numbers for each RGB channel. At the end, display three min-thresholded gray-scale images for each RGB channel and one colored image which is formed by the min-thresholded RGB channels. Include your codes and the displayed images in your report. Explain how you chose the threshold value. Explain the effect of different threshold values on the displayed images.

4. Do the same as **max-thresholding**. That is, you will display light-gray regions as completely white. The rest of this questions is exactly the same as the previous question with an adaptation to **max-thresholding** scheme.

Note: You are allowed to use ChatGPT or other AI tools for coding/programming. If you do so, you should run your code in your own computer. You are required to understand the function of each line of the code and convince the instructor you actually did. You may want to include your own comments on code pieces or explain them with your own sentences. The instructor may want to meet you in person and ask questions for you to explain the codes. Your code should also work efficiently: Avoid unnecessary for/while loops and use matrix operations as much as possible, avoid high-level functions and be simple as much as possible.