CSCI 6527 – Introduction to Computer Vision

Semester: Spring 2022
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Assignment 1. Image sensing and digital image.

Total points: 30

Tasks:

1. Capture an image of the same object (example: a teddy bear) on a white background (white, light gray, etc.) in these conditions:
    a. Daylight - during the day (morning or noon) and evening (with less light around 6pm, considering the Winter season) – 2 points for each photo
    b. Fluorescent – 2 shots (dim and bright lighting) – 2 points for each photo
    Total: up to 8 points (2x2 + 2x2).

Examples (of using a teddy bear as an object):

2. Write a report (PDF file) about your device (optics, sensors, resolutions, encoding, etc.). Investigate about the format of the file saved (byte order, encoding, name generation). Add your images captured in the previous task with the description (daylight at 10:00, fluorescent dim and so on).
    Depending on the level of details, up to 5 points.

3. Write a code that converts the images into a grayscale – 2 points.
    For this and later tasks, you need to save the result as a separate file.

4. Write a code that performs discretization of the gray levels. Try to keep the minimum number of steps where the object and its textures are still noticeable – 2 points.

5. Write a code that converts the grayscale image from “task 3” to black and white, with keeping your object’s shape – 2 points.

6. Write a code that changes the hue, saturation, and brightness of the original image – 5 points.

7. Write a code that finds all close colors (by CIEDE2000 color closeness formula) to the given pixel:
    a. On your object (like a pixel on a teddy bear)
    b. On the background.
    6 points.

    Experiment with the DeltaE to find the value that corresponds to human observer's closeness.

Notes on the programming part:

1. Use Python programming language
2. You can use any library you want (like opencv, skimage or something else). No need to implement conversion formulas manually.
3. All the images and source codes shall be submitted to the GitHub repo: https://classroom.github.com/a/99_KaBWZ
4. Keep images in a separate folder (one folder for original and separate folders for the output of each task).
5. Write a good Readme file that guides the user (instructor).