ITE4052 Computer Vision (Spring 2024)
Programming Assignment 1

- Deadline: April 18th 11:59 PM.

- Submit the Python code and a report summarizing the results (pdf or docx) on the LMS.

- You can use either English or Korean for the report.

- Late submission will get the half score.

- If you use ChatGPT, you can be caught for a plagiarism (immediate F). Don't use it.

* Please install OpenCV, Matplotlib, Numpy, skimage before start, with "pip install ~"
and import them
import cv2, skimage.data
import numpy as np
import matplotlib.pyplot as plt

* skimage module is just for sample image.
(do not use this module after loading the sample image)

1. Projective Image Transformation [1pt]
Load an image with the skimage.data.astronaut(). Implement the 2D projective transform given a 3X3 transformation matrix using cv2.warpAffine () and cv2.warpPerspective () functions. By making the transformation matrix with Numpy using np.array(), perform a (1) Scaling, (2) Rotation, (3) Similarity transform, (4) Affine transform, and (5) Projective transform with your own parameters. Use plt.show () function to show the results on your own image. Indicate what transformation matrices you used in your report. *Finally, for your own image, repeat the whole process again.*

2. Color Space [3pt]
For an example image from skimage.data.astronaut(), (1) display color components R, G, and B, respectively. Also, transform color coordinates RGB to YCbCr and HSI, respectively. Display each component of the (2) YCbCr coordinates, and each component of the (3) HSI coordinates, respectively. You can get RGB by using this codes: R, G, B = image[:, :, 0], image[:, :, 1], image[:, :, 2] . Instead of using Python functions, implement the color transformation by yourself using the formulations in the lecture slides (Also, refer to the formulations in [1, 2]). Display each component of the HSI coordinates, and each component of the YCbCr coordinates, respectively. From the displayed results, compare the characteristics of the coordinates HSI, YCbCr, and RGB. Moreover, show (4) the modified images in the RGB space by manipulating each component of the HSI coordinates. *Finally, for your own image, repeat the whole process again.*

[1] https://en.wikipedia.org/wiki/HSL_and_HSV
[2] https://en.wikipedia.org/wiki/YCbCr