CSE152 – Introduction to Computer Vision – Homework 1
Instructor: Ben Ochoa
Due : Wednesday, April 12, 2017, 11:59 PM

Instructions:

- Review the academic integrity and collaboration policies on the course website.

- This assignment must be completed individually.

- Submit your PDF report on gradescope. You must prepare a report describing the problems, your solutions, and results. The report must contain enough information for a reader to understand the problems and replicate your work without also having the assignment. Make sure you include the source code with comments under Appendix listing at the end of your report.

- Programming aspects of the assignments should be completed using MATLAB or Python.

- Submit your zipped code folder electronically by email to lmelvix@eng.ucsd.edu, jsc078@eng.ucsd.edu, and dperoni@eng.ucsd.edu with the subject line **CSE152 Homework 1**. Make sure to include the **exact** subject line. The email should have one file attached. Name this file: CSE152_hw1_lastname_studentid.zip.

- All your source code should be in code folder with README.txt file explaining your code. For example, if you have **rotate_img.m**, your README.txt should have a detailed description: rotate_img.m: A function that takes an image matrix and degree as input and outputs the image rotated by the degree.

- The code is thus attached *both* as text in the appendix of the report and as m-files/py-files in the compressed archive.

- No physical hand-in for this assignment.

Piazza

Visit the cse152 discussion board and sign up at http://www.piazzza.com (search for University of California, San Diego → CSE 152). This will be used to answer questions regarding the course. If you are unable to join piazza because you do not have a UCSD email, email one of the TAs.

Tutorials

If you are using Matlab, read the following tutorials found at:

- `http://cseweb.ucsd.edu/classes/wi13/cse152-a/hw0/matlab_intro.m`

- `http://www.math.utah.edu/lab/ms/matlab/matlab.html`.

If you are using Python, read the following tutorials found at:

- `http://cs231n.github.io/python-numpy-tutorial/`

- `http://scikit-image.org/docs/dev/user_guide/numpy_images.html`.

Play with colors [3 Points]

Using your new found Matlab or Python skills, write a program that does the following:

- Read in a color image.

- Resize the image to 256 x 256 pixels using bilinear interpolation.

- Tile the image to form 4 quadrants where

    - The top left quadrant is the original image
    - The top right is the green channel of the original image (other channels set to zero)
    - The bottom left is the red channel (other channels set to zero)
    - The bottom right is the blue channel (other channels set to zero)

Test your program with the given image cleese.JPG. Expected output for this task is given in Figure 1. Then, write a short paragraph explaining your results. Does your program produce the correct output?

Figure 1: Output for cleese image

Image Rotation [2 Points]

Consider an image I. Write a function to rotate the I by θ radians anticlockwise, $\theta \in \{0, \frac{\pi}{2}, \pi, \frac{3\pi}{2}\}$. Your function need not handle other angles. Do NOT use built-in functions such as **imrotate** in MATLAB / **warpAffine** in Python (OpenCV), or any other library function to rotate I. Include four images in the report: I and three rotated images like in Fig 2. You should run your function on the **ucsd_logo.png** image provided on the website and provide results only for that.

Figure 2: The four images