CS101 Homework #3

#Selfie

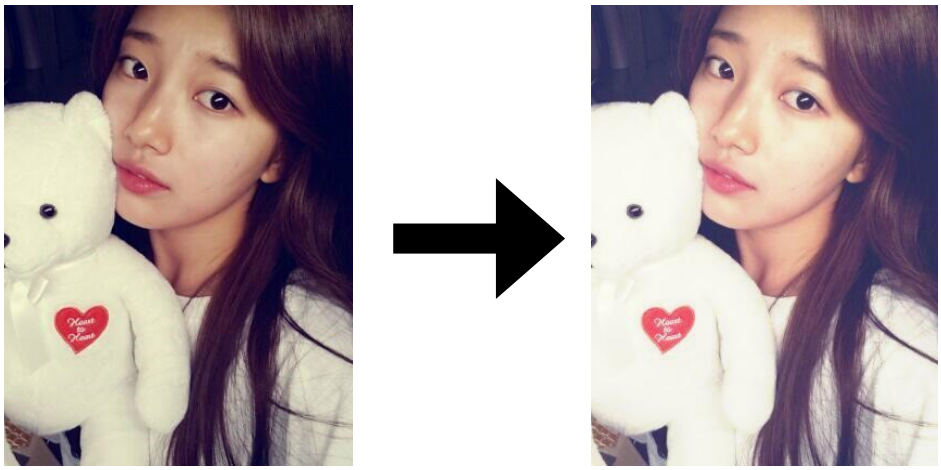
Due Date: Friday, May 15th (Until 23:59)

Delayed Due Date: Sunday, May 17th (Until 23:59)

Read the description VERY carefully, and make sure you understand every requirement for this homework assignment. This homework assignment is an individual task. You may discuss any issues with your friends, but you CANNOT write the solution together. You will fail the entire course if caught for any plagiarism, and we mean it.

Task

Suzy has taken a selfie, but she decides that she needs to add some filters (i.e. effects) to her selfie before posting it on her SNS. Your task is to make those filters for her, so she feels pretty.



(Before) (After)

Goal

1) Practice using Default Parameters and Named Parameters in function calls
2) Learn pixel-wise operations for simple image processing

IMPORTANT!! You will need to install the PIL Library if you haven't yet. Instructions are on the CS101 Homepage. Refer to this article: *http://cs101.kaist.ac.kr/2015_spring/xe/index.php?document_srl=223*

VERY IMPORTANT!! You cannot use *Image.eval* function or *ImageFilter* module for this homework assignment. You will get 0 points if you use any one of them. You MUST access pixel by pixel for any modification.

Requirements

You will need to implement the following five functions and write a detailed report. Details on the steps for each function are outlined in the provided skeleton code. You must use Named Parameters for all function calls, except for the offset value in the Brighten function.

1) **Show (5pts)**
   Receives a name of an image file, opens it and displays it on the screen
2) **Brighten (10pts)**
   Receives a name of an image file, opens it and ① *brightens the whole image* and ② saves the brightened image to a new file.
   NOTE Use 64 as a default parameter for the offset value.
3) **Blur (15pts)**
   Receives a name of an image file, opens it and ① *box blurs the image* and ② saves the blurred image to a new file
4) **Merge (10pts)**
   Receives TWO names of two image files, opens them, and ① *merges them* and ② saves the new merged image to a new file
5) **Main (10pts)**
   A simple command line user interface to call different functions you've implemented
6) **Report (10pts)**
   Should contain
   i) the summary of the algorithm
   ii) three screenshots showing results of each brighten, blur, merge functions
   iii) a detailed description of what you learned, and what you would like to improve or add to the functionality of this program.

Hints

1) You probably want to use nested for-loops to access each pixel
2) Remember each pixel is a tuple of RGB values, i.e. (R,G,B)
3) Brighten Function
   You can simply brighten a pixel by adding a fixed value (use 64 in this homework) to all of its RGB values
4) Blur Function

i) We will use the simplest form of blurring called Box Blur. Box Blur can simply be attained by averaging the RGB values of the surrounding pixels. You will need to average the 8 surrounding pixels and average them.

1	2	3
4	5	6
7	8	9

For example, Red value of the pixel 5 = 1/9 * (Red values of the pixels 1 + Red values of the pixel 2 + Red values of the pixel 3 + Red values of the pixel 4 + Red values of the pixel 5 + Red values of the pixel 6 + Red values of the pixel 7 + Red values of the pixel 8 + Red values of the pixel 9)

The same mechanism applies across all three RGB values and for all 9 pixels.

ii) If you encounter out-of-range error, think carefully about border pixels.

Submission

You will need to submit the following two files:

1) Your source code specifically named "HW3_studentID.py"
(i.e.) HW3_20145265.py

2) Your report file specifically named "HW3_studentID.doc" or "HW3_studentID.docx" or "HW3_studentID.pdf"
(i.e.) HW3_20145265.pdf

As usual, you MUST archive the two files into "HW3_studentID.zip", and submit the zip file through the homework submission page on our CS101 homepage.

IMPORTANT!! If you do not follow the submission instructions (i.e. Naming, archiving, etc.), you will be penalized.

VERY IMPORTANT!! It is necessarily required that you download the zip file you've uploaded to double-check whether you've uploaded everything correctly after the submission. For your homework evaluation, there is no way to claim back your scores when you get zero or very low points due to wrong submission.