Computer Vision Homework #1

Student-ID: r10944020; Name: 林顥倫; Department: GINM

PartI Write a program to do the following requirement.

(a) Upside-down lena.bmp

(b) Right-side-left lena.bmp

(c) Diagonally mirror lena.bmp

PartII Write a program or use software to do the following requirement.

(d) Rotate 45 degrees clockwise

(e) Shrink lena.bmp in half

(f) Binarize at 128 to get a binary

Code Segments:

```python
from PIL import Image

def upside_down(img):
    imageW, imageH = img.width, img.height # img.size[0], img.size[1]
    new_img = img.copy()
    new_img_pixel = new_img.load()
    for x in range(imageW):
        for y in range(int(imageH/2)):
            new_img_pixel[x, y], new_img_pixel[x, imageH-1-y] \
            = new_img_pixel[x, imageH-1-y], new_img_pixel[x, y]
    new_img.save('./upside-down_lena.bmp')

def right_side_left(img):
    imageW, imageH = img.width, img.height # img.size[0], img.size[1]
    new_img = img.copy()
    new_img_pixel = new_img.load()
    for y in range(imageH):
        for x in range(int(imageW/2)):
            new_img_pixel[x, y], new_img_pixel[imageW-1-x, y] \
            = new_img_pixel[imageW-1-x, y], new_img_pixel[x, y]
    new_img.save('./right-side-left_lena.bmp')

def diagonally_mirror(img):
    imageW, imageH = img.width, img.height # img.size[0], img.size[1]
    new_img = img.copy()
    new_img_pixel = new_img.load()
    for x in range(int(imageW)):
        for y in range(x+1, int(imageH)):
            new_img_pixel[x, y], new_img_pixel[y, x] = img.getpixel((y, x)), img.getpixel((x, y))
    new_img.save('./diagonally-mirror_lena.bmp')
def rotate_45_degree(img):
    new_img = img.rotate(360-45)
    new_img.save('./rotate-45-degree_lena.bmp')

def shrink(img):
    new_img = img.resize((256,256))
    new_img.save('./shrink_lena.bmp')

def binarize(img):
    imageW, imageH = img.width, img.height # img.size[0], img.size[1]
    new_img = img.copy()
    new_img_pixel = new_img.load()
    for x in range(imageW):
        for y in range(imageH):
            new_img_pixel[x, y] = 255 if img.getpixel((x,y)) >= 128 else 0
    new_img.save('./binarize_lena.bmp')
```

本次HW1，我都是使用Python來實作，並使用PIL套件中的Image來協助處理。

Part1-(a) upside_down 實作方式為將上下的pixel值對調，即可完成上下顛倒。

Part1-(b) right_side_left 實作方式為將左右的pixel值對調，即可完成左右顛倒。

Part1-(c) diagonally_mirror 實作方式為沿著對角線，將pixel值對調，即可完成。

Part2-(d) rotate 45 degree clockwise 實作方式是透過rotate函式，但要注意韓式本身會逆時針旋轉，所以我們要填入的數值應該是360-45。

Part2-(e) shrink 實作方式為使用PIL的resize套件即可完成。

Part2-(f) binarize 實作方式就是去看你現在的pixel值是否大於你所設定的閥值128。