Computer Vision I: Homework 1

Department: CSIE Student ID: d11922016 Name: Jia-Wei, Liao

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Figure 1: lena.bmp

```
image = imread('lena.bmp');
[m, n] = size(image);
```

Part 1. Write a program to do the following requirement.

(a) upside-down lena.bmp

```
upside_down_image = zeros(m, n);
for i = 1 : m
    for j = 1 : n
        upside_down_image(m-i+1, j) = image(i, j);
    end
end
upside_down_image  = uint8(upside_down_image);
```

Figure 2: upside-down lena.bmp

(b) right-side-left lena.bmp

```
right_side_left_image = zeros(m, n);
for i = 1 : m
    for j = 1 : n
        right_side_left_image(i, n-j+1) = image(i, j);
    end
end
right_side_left_image = uint8(right_side_left_image);
```

Figure 3: right-side-left lena.bmp

(c) diagonally flip lena.bmp

```
diagonally_flip_image = zeros(n, m);
for i = 1 : m
    for j = 1 : n
        diagonally_flip_image(j, i) = image(i, j);
    end
end
diagonally_flip_image = uint8(diagonally_flip_image);
```

Figure 4: diagonally flip lena.bmp

Part2. Write a program or use software to do the following requirement.

(d) rotate lena.bmp 45 degrees clockwise

```
rotate_image = imrotate(image, -45);
```

Figure 5: rotate 45 degrees lena.bmp

(e) shrink lena.bmp in half

```
shrink_in_half_image = imresize(image, [m/2, n/2]);
```

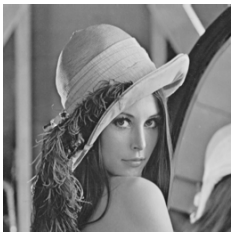

Figure 6: half lena.bmp

Notice that. The size of raw image is 512×512 and the size of shrink in half image is 256×256.

(f) binarize lena.bmp at 128 to get a binary image

$$I'(i,j) = \begin{cases} 255, & \text{if } I(i,j) > 128 \\ 0, & \text{if } I(i,j) \leq 128 \end{cases}$$

```
binary_image = uint8(image > 128) * 255;
```

Figure 7: binarize lena.bmp

Summary.

This homework aims to transform images like flip, rotate, and rescale. Given the lenna.bmp file, We use MATLAB for image processing. Since prohibiting vectorized computation in Part 1, we use for loop to deal with pixels individually.