Computer vision
Homework1
Basic Image Manipulation

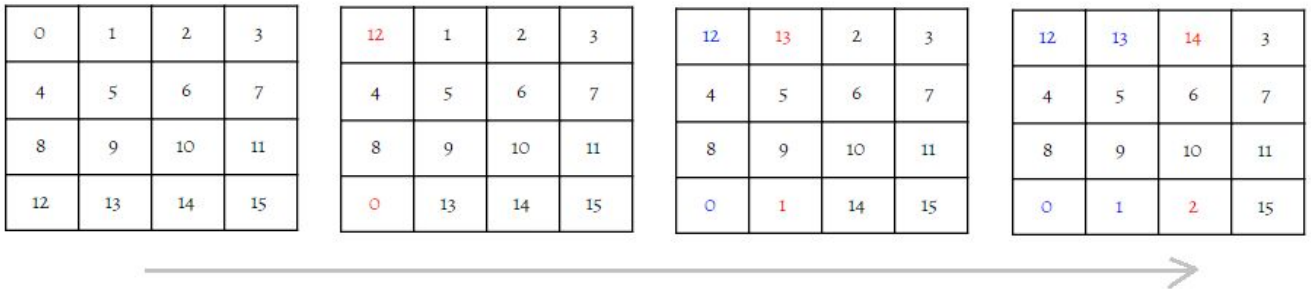
B06902091 資工四 羅寶瑩

Description

Part1. Write a program to do the following requirement.

(a) upside-down lena.bmp

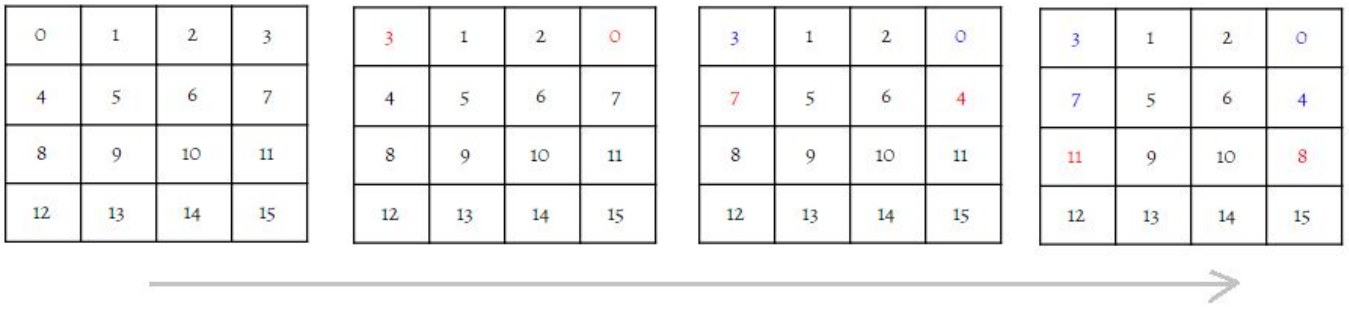
Swap the information of the pixel a to pixel b in the way below.




```
//1a upside
for (int i = 0; i < img.rows/2; i++) {
    for (int j = 0; j < img.cols; j++) {
        a = A.at<Vec3b>(i, j);
        b = A.at<Vec3b>(img.rows - i - 1, j);
        A.at<Vec3b>(i, j) = b;
        A.at<Vec3b>(img.rows - i - 1, j) = a;
    }
}
```

(b) right-side-left lena.bmp

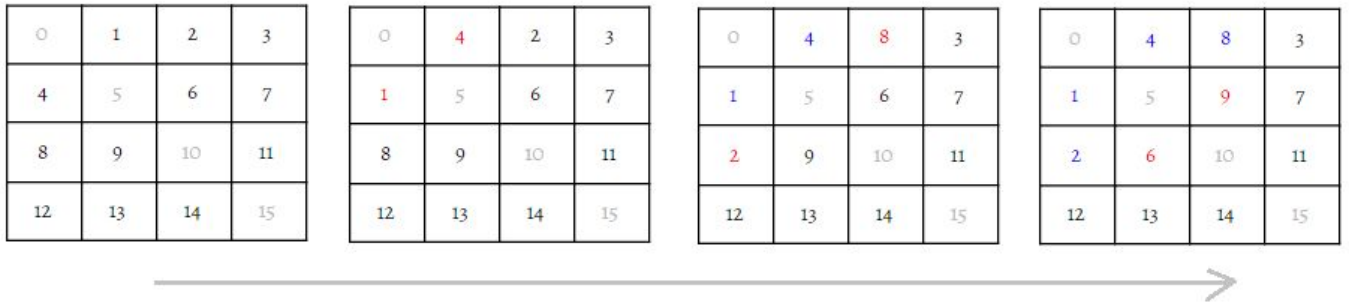
Swap the information of the pixel a to pixel b in the way below.




```
//1b leftright
for (int j = 0; j < img.cols / 2; j++) {
    for (int i = 0; i < img.rows; i++) {
        a = B.at<Vec3b>(i, j);
        b = B.at<Vec3b>(i, img.cols - j - 1);
        B.at<Vec3b>(i, j) = b;
        B.at<Vec3b>(i, img.cols - j - 1) = a;
    }
}
```

(c) diagonally flip lena.bmp

Swap the information of the pixel a to pixel b in the way below.




```
//1c mirror
for (int i = 0; i < img.rows; i++) {
    for (int j = 0; j < i; j++) {
        if (i == j) {
            continue;
        }
        a = C.at<Vec3b>(i, j);
        b = C.at<Vec3b>(j, i);
        C.at<Vec3b>(i, j) = b;
        C.at<Vec3b>(j, i) = a;
    }
}
```

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

(d) rotate lena.bmp 45 degrees clockwise

Use the function “getRotationMatrix2D” to calculate an affine matrix of 2D rotation and use the function “warpAffine” to apply the affine transformation to the image.

```
//2a rotate
Point2f center(img.rows / 2, img.cols / 2);
Mat rot = getRotationMatrix2D(center, -45, 1.0);
warpAffine(img, D, rot, img.size());
```

(e) shrink lena.bmp in half

Use the function “resize” to shrink the image into 256x256.

```
//2b shrink
resize(E, E, Size(img.rows*0.5, img.cols*0.5), 0, 0, CV_INTER_LINEAR);
```

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

Use the function “threshold” to binarize the image.

```
//2c binarize
threshold(F, F, 128, 255, THRESH_BINARY);
```

Result

Part 1

(a) upside-down lena.bmp

(b) right-side-left lena.bmp

(c) diagonally flip lena.bmp

Part 2

(d) rotate in 45 degrees clockwise

(e) shrink lena.bmp in half

(f) binarize lena.bmp

Reference:

1. https://docs.opencv.org/2.4/