Problem Set 3 Exercise #27: Black and White Image

Reference: Lecture 9 notes

Learning objective: Two-dimensional array

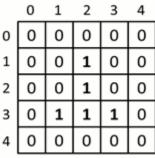
Estimated completion time: 60 minutes

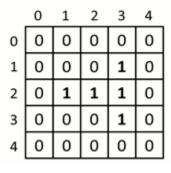
Problem statement:

[CS1010 AY2013/14 Semester 1 Exam, Q5]

A square black-and-white image can be represented as a matrix of 1s (black pixels) and 0s (white pixels). An image can be manipulated in many ways, two of which are *flip* and *rotate*. When an image is flipped, it becomes upside-down. When an image is rotated, it is rotated 90 degrees clockwise. Figure (a) below shows a sample 5*5 image while (b) and (c) show the resulting image of flipping and rotating the sample image respectively.

	0	1	2	3	4	
0	0	0	0	0	0	0
1	0	1	1	1	0	1
2	0	0	1	0	0	2
3	0	0	1	0	0	3
4	0	0	0	0	0	4





(a) Sample image

(b) Sample image flipped

(c) Sample image rotated

Write two functions:

and

to perform these two operations on the $\mathtt{size} \times \mathtt{size}$ image \mathtt{img} . Here \mathtt{N} is a symbolic constant (of value 10) that indicates the maximum possible size of the input image. The resulting image should be stored in \mathtt{img} .

Complete the skeleton program black and white.c for the above task.

Sample run #1:

```
Enter the size of image: 5
Enter image:
0 0 0 0
0 1 1 1 0
0 0 1 0 0
0 0 1 0 0
0 0 0 0 0
Enter choice:
(1) flip
(2) rotate
Original image:
0 0 0 0
0 1 1 1 0
0 0 1 0 0
0 0 1 0 0
0 0 0 0 0
Flipped image:
0 0 0 0
0 0 1 0 0
0 0 1 0 0
0 1 1 1 0
0 0 0 0
```

Sample run #2:

```
Enter the size of image: 5
Enter image:
0 0 0 0
0 1 1 1 0
0 0 1 0 0
0 0 1 0 0
0 0 0 0 0
Enter choice:
(1) flip
(2) rotate
2
Rotated image:
0 0 0 0 0
0 0 0 1 0
0 1 1 1 0
0 0 0 1 0
0 0 0 0
```