Cairo University

Faculty of Computers and Artificial Intelligence

CS112

Structured Programming Assignment #3 Report

2022

Supervise by: Dr. Mohammed El-Ramly

m.elramly@fci-cu.edu.eg

**IDs:**

# Seif Elden Mahmoud Helmy --> 20210169

Mina Albert Saeed --> 202120417

Ziad Ahmed Mohamed --> 20210143

**E-mails:**

Mina → mina.albert33@gmail.com

Ziad → ziadeliwa93@gmail.com

Seif → seifhelmy777@gmail.com

**Algorithms:**

**Ziad’s Algorithm:**

for filter black and white i put a variable avg this variable improve the quality of the filter , first for loop is for rows in the matrix , the second is for columns the avg will increase by the matrix , the next assign for the avg is to make avg more efficient if statements is to check the limit for black and white since black and white is from 0 to 255 .

for filter Mirror .

first in the Mirror filter is the up Mirror I made a for loop that check the rows from the size and ends to 0 because i want to do Up filter.

the second for loop is to check from the 0 to size for the image , then the image will increase by the size - rows and size of columns .

The left Mirror filter i made the same for loops from the Up filter the changes here is the image will be size of rows and size of (size-columns) .

The right Mirror filter first for loop is to check the rows from 0 to size second is to check size in columns from size to 0 and will decrement,

The image will be Mirrored right because the image will be image for size in rows and in columns will be (size - columns).

The down Mirror filter same for loops for Right Mirror filter the difference is the image will be for rows will be ( size - rows ) and for columns will be the columns only. the remainder from the code is to know from the user what does he want .

if he wants Mirror up will press 1 if he wants Mirror down will press 2 if he wants Mirror right will press 3 if he wants Mirror left will press 4

if he inputs any other numbers the Mirror filter will not be executed.

**Seif’s Algorithm:**

1- merge filter

* adding 2d array to move in every pixel in the image

* to merge we need to get the average pixels in the images

* so new image = (image1 pixels + image2 pixels)/2

2- lighten and darken filter

* let the user to choose what he want (darken or lighten)

* if the user choosed 1 he will dark the image

* adding 2d array to move in every pixel in the image and dividing by 2 to dark the image

* if the user choosed 2 he will ligh the image

* adding 2d array to move in every pixel in the image and get the image to be equals 200

* to let every pixel = 200 (white gray)

* and then merge the the (white gray) image with the orignal image

**Mina’s Algorithm:**

1-Invert Filter:

Make a function that loops through the image 2d- array and do a bitwise NOT (~) operation on every element to get its opposite

2- Rotate Filter:

Make a function that do the following:

First, we will transpose our image 2-d array (matrix) by swapping the rows by columns using this for loop:

for(int i = 0; i < SIZE; i++) for(int j = i; j < SIZE; j++) swap(image[i][j], image[j][i])

Second, we will swap the columns using two pointers approach using this for loop:

For (int i = 0; i<size of the array; i++)

For(int j = 0; j < (size of the array/2); j++)

Swap(image[i][j], image[i][size of the array - i -j]

This filter rotate image by 90 degrees if we want to rotate the image by 180: we will call this function twice. If we want to rotate the image by 270: we will call this function three times.

**The Diagram of the Functions:**

