CS112-Structured Programming

Second semester 2021-2022

Group: A

S5

TA: Hagar Ali

Assignment #3

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Algorithms used to make the filters:

For black and white: We check if the pixel is near to the white color or near to the black color by checking if its value is above 128 or under 128 and change it to to black or white which is 255 or 0.

For merge: We iterate over a pixel in the first image to change its value with the value of the corresponding pixel in the other image and skip a pixel to keep its value and we change the starting point in each row according to the reminder of dividing the row number by 2.

For rotate: If we made a simple table and started changing the cells position according to how we want to rotate the table we will notice that in the 90 and 270 the cell's row and column swaps, in the 90 rotation also the column shift by the size of the table, and in the 270 rotation the row shift by the size of the table. In the 180 rotation the row and column does not swap by they both shift by the size of the table. So we apply that to the image (and we store the original data in another array so we don't lose any data while rotating).

For invert function: First by making two for loops which goes through a 2D array , this 2D array consists of a row and a column , those are the pixels in a row or a column. Second, by subtracting 255 from image pixels, it'll change it to the corresponding value of it, that means if it's dark it'll change to light.

For flipping image: initializing a temporary integer and asking the user to enter the flip the he wants. If he chose Vertically, by making a 2D array for rows and columns , the column is divided to two because it switches the first and last column together in one step, so if it's not divided it'll return as it is. Saving the image in the temporary value "to avoid losing the value of the first value" then changing the columns with each other then returning back the second variable to the temporary. The same algorithm goes if he chose Horizontally but instead it changes rows not columns.

For darken and lighten: making a 2D array for rows and columns, if the user chose to Lighten the image , 64 pixels is added to each pixel in the image. But if it'll exceed 255 , that means the whole image will turn to a white photo, in this case the pixel turns to 255 "white". If he chose to Darken the image , 64 pixel is subtracted from each pixel in the image. If it'll be less than zero , the pixel changes to 0 "black".

Diagram showing the order of calling the functions: