Faculty of Computers and AI

Cairo University

Programming-1

Second Semester

Assignment 3

Submitted by:

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Submitted to:

Dr. Mohammad El-Ramly

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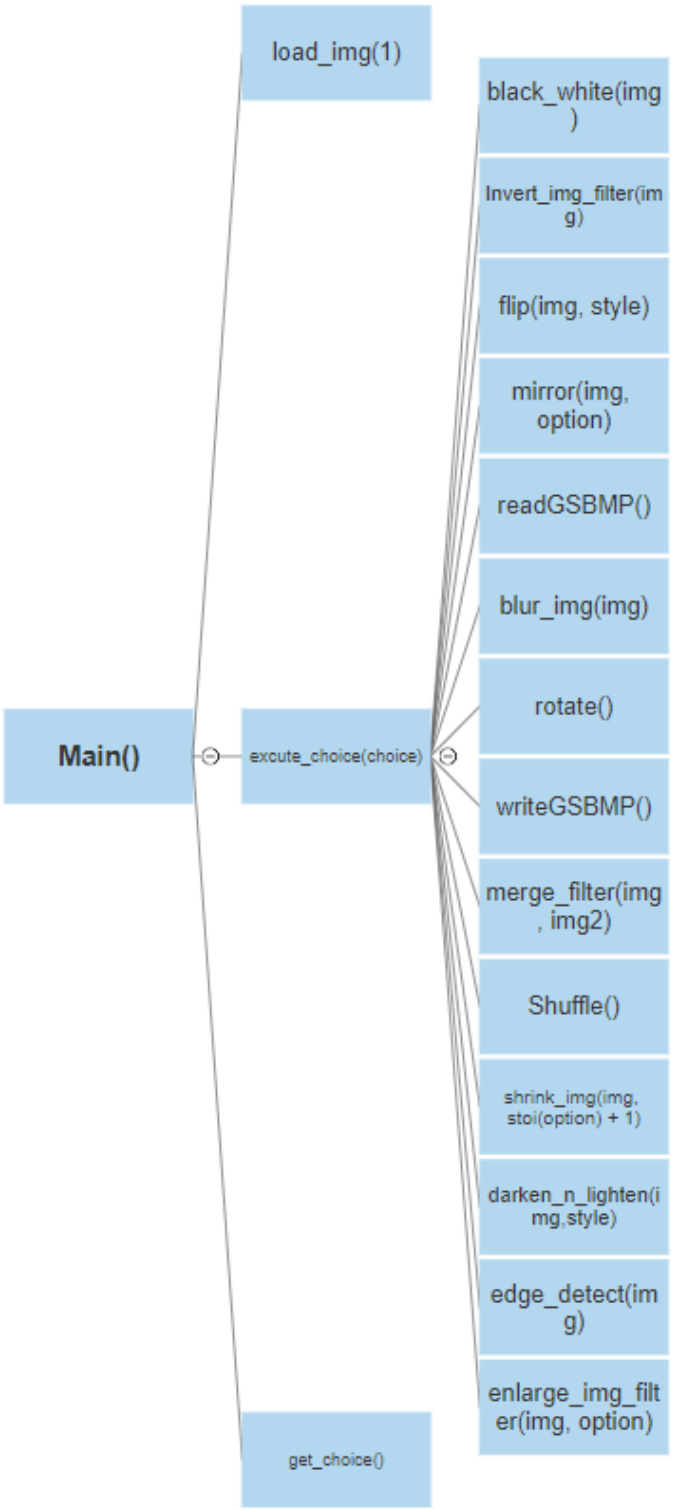
Date:

07-04-2022

System Diagram



Filter 1 Algorithm: Black and White Filter

Input image[SIZE][SIZE]

For pixel in image:

    If image[i][j] >= 128:

        Image[i][j] = 255

    Else:

        Image[i][j] = 0

Filter 2 Algorithm: Invert Filter

Input image[256][256]

For pixel in image:

    Image [i] [j] = 255 - image [i] [j]

Filter 3 Algorithm: Merge Filter

takes two images as input (by referece)

every pixel in the new image must be the average of the corresponding pixel values of both of the two pictures

(its like making both of them 50% opacity)

Filter 4 Algorithm: Invert Filter

Input image[SIZE][SIZE]

Input style

If style == “horizontal”:

For row/2 in image:

For column in image:

temp = image[i][j]

image[i][j] = image[255-i][j]

image[255-i][j] = temp

else If style == “vertical”:

For row in image:

For column/2 in image:

temp = image[i][j]

image[i][j] = image[i][255-j]

image[i][255-j] = temp

Filter 6 Algorithm: Darken_n_lighten Filter

takes a bool to determine darken or lighten as well as an image 2d array by reference

the ratio of value edit is 1.5 if the mode is lighten

else ratio = 0.5

for every pixel in the image:

multiply the pixel value by the ratio and save it in new_value integer

if the new_value is larger than 255 (out of range) then make it equal to 255

(note : new_value will never be less than zero anyway)

pixel in image = new_value

Filter 7 Algorithm: Edge Detect Filter

Input image[SIZE][SIZE]

char new_image[SIZE][SIZE]

int average = 0

For i < 256:

    For j < 256:

        new_image[i][j] = 255 //filling new image with white

        average += imge[i][j]

average = average/(256*256) //calculating the average color

int value = average/4

For i < 255:

    For j < 255:

        If pixels around – image[i][j] > value

            new_image[i][j] = 0

For i < 256:

For j < 256:

Imge[i][j] = new_image[i][j] //coping into the original image

Filter 8 Algorithm: Enlarge Filter

Input image[256][256]

Input “the quarter the user want to Enlarge”

For pixel in image:

image [i] [j] = Image [(i/2)+ Num 1] [(j/2) + Num 2]

//value of Num1 and Num2 change according to the chosen quarter.

Filter 9 Algorithm: Shrink image Filter

take an integer deno to determine the shirnk coefficient
deneumerator and a 2d array representation of the img (by reference)

create a new imge by the same size

for every pixel in the original image:

copy pixel to the new photo with a proper index

skip pixels by a factor of deno

(that is because the shrinked img will have some of the pixels in the original img but will also skip some pixels to be able to reduce resolution)

copy every pixel in the small image to the corresponding pixel in the original image

if the pixel is out of reach in the small image then make the corresponding pixel in the original image white.

Filter a Algorithm: Mirror Filter

Input image[SIZE][SIZE]

Input style

If style == “lower”:

    For row/2 in image:

        For column in image:

            image[i][j] = image[255-i][j]

else If style == “upper”:

    For row/2 in image:

        For column in image:

            image[255-i][j] = image[i][j]

else If style == “right”:

    For row in image:

        For column/2 in image:

            image[i][j] = image[i][255-j]

else If style == “left”:

For row in image:

For column/2 in image:

image[i][255-j] = image[i][j]

Filter c Algorithm: Blur Filter

based on the guassian blur method

make a copy of the image

loop over every pixel in the original photo:

add the value of the pixel itself as well as all surrounding 8 pixels in all directions (if possible) to the sum

the pixel value in the new image is equal to the sum divided by the number of pixels you have added to the sum (average of the 3*3 pixel grid with a center equal to the pixel in the original picture)

copy the new image to the old image to print it in the main menu (since we are working with arrays by reference)

Main Algorithm

while(choice of user doesn't equal 0):

ask user for input

validate user input

excute user choice

print a success message

find function:

takes a vector of strings and search about a target (Linear search since data is not sorted)

returns the index if the target was found

else : returns -1

getchoice function:

takes a vector of allowed strings (inputs) and keep asking user to enter a valid input from them

excute choice function:

according to the user choice, it excutes the filter wanted as well as sub-menus for the filters

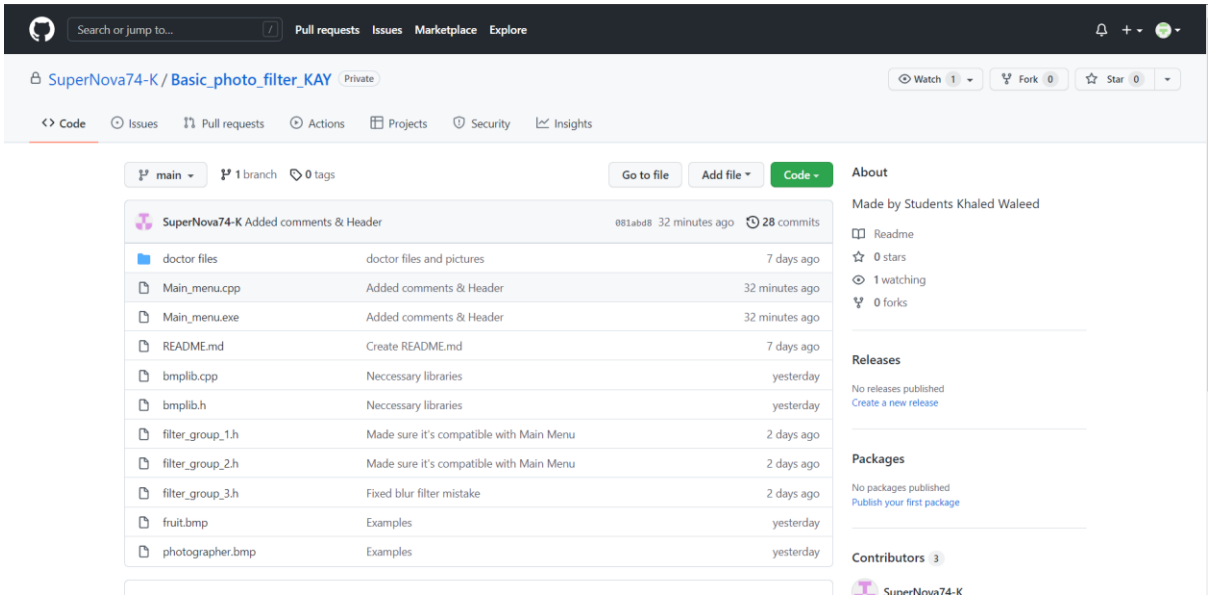
load img function:

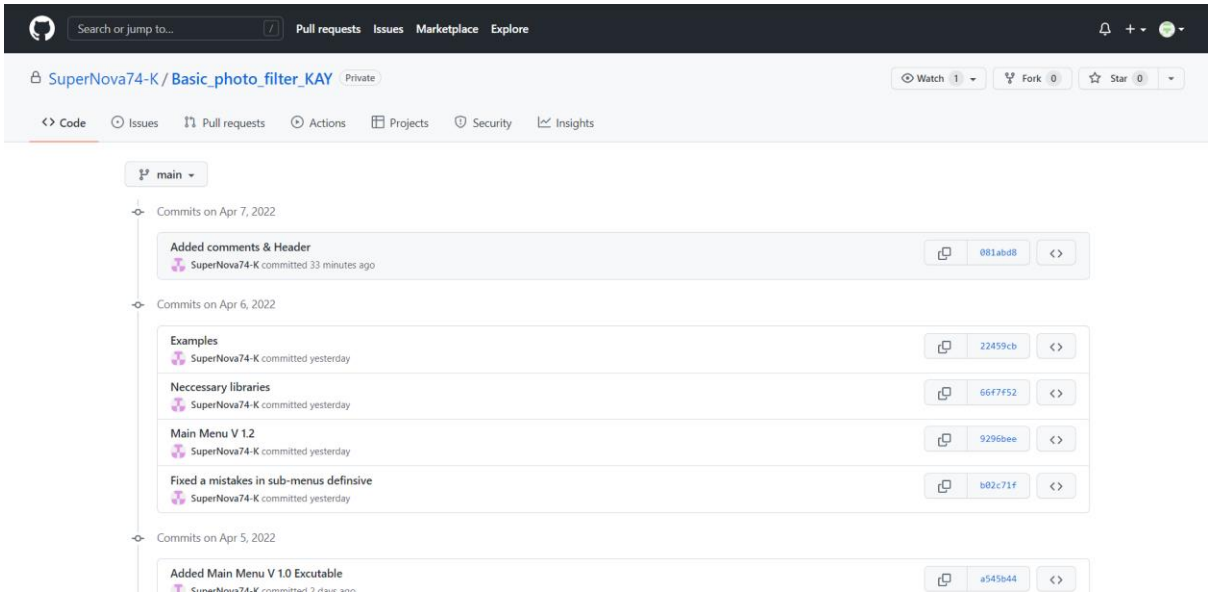
asks the user for a valid picture to load with defensive programming included

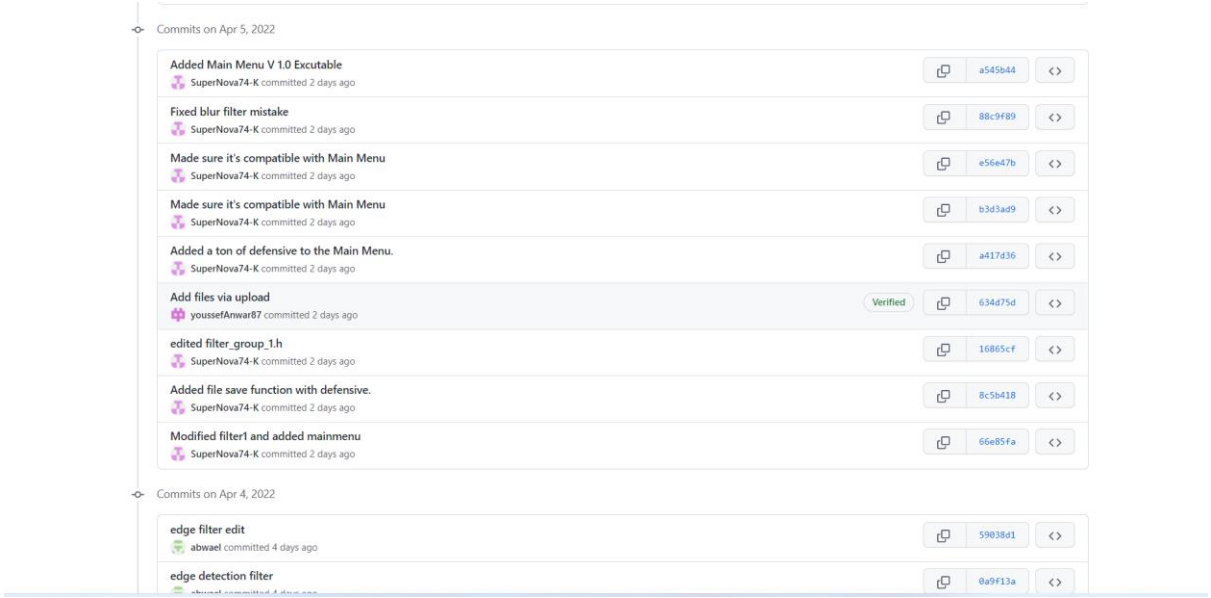
print a message to thank the user

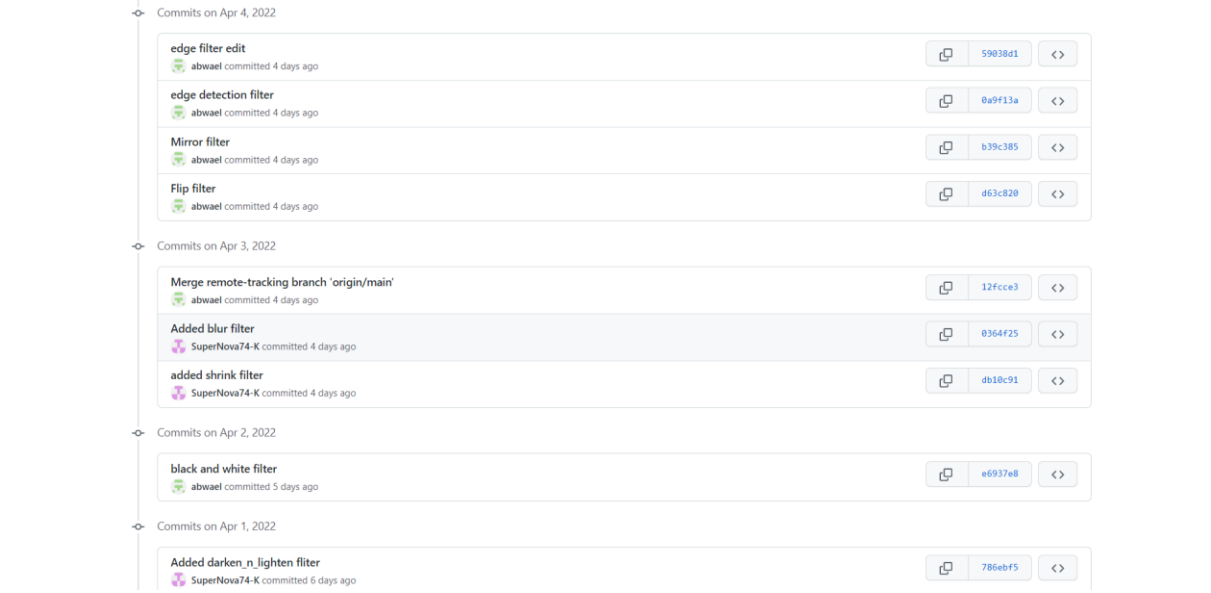
exit program

GitHub commits






Commits on Apr 5, 2022
Added Main Menu V 1.0 Excutable
SuperNova74-K committed 2 days ago
a545b44
Fixed blur filter mistake
SuperNova74-K committed 2 days ago
88c9f89
Made sure it's compatible with Main Menu
SuperNova74-K committed 2 days ago
e56e47b
Made sure it's compatible with Main Menu
SuperNova74-K committed 2 days ago
b3d3ad9
Added a ton of defensive to the Main Menu.
SuperNova74-K committed 2 days ago
a417d36
Add files via upload
youssefAnwar87 committed 2 days ago
Verified
634d75d
edited filter_group_1.h
SuperNova74-K committed 2 days ago
16865cf
Added file save function with defensive.
SuperNova74-K committed 2 days ago
8c5b418
Modified filter1 and added mainmenu
SuperNova74-K committed 2 days ago
66e85fa
Commits on Apr 4, 2022
edge filter edit
abwael committed 4 days ago
59038d1
edge detection filter
0a9f13a


Commits on Apr 4, 2022
edge filter edit
abwael committed 4 days ago
59038d1
edge detection filter
abwael committed 4 days ago
0a9f13a
Mirror filter
abwael committed 4 days ago
b39c385
Flip filter
abwael committed 4 days ago
d63c820
Commits on Apr 3, 2022
Merge remote-tracking branch 'origin/main'
abwael committed 4 days ago
12fcce3
Added blur filter
SuperNova74-K committed 4 days ago
0364f25
added shrink filter
SuperNova74-K committed 4 days ago
db10c91
Commits on Apr 2, 2022
black and white filter
abwael committed 5 days ago
e6937e8
Commits on Apr 1, 2022
Added darken_n_lighten fliter
SuperNova74-K committed 6 days ago
786ebf5