HOMEWORK – 4

E a) What was the over-all purpose of this homework?

Ans a) The overall purpose of this homework is to learn how the filters applied to the images. I can easily apply the filter to the image using imfilter function, but by doing this homework I have learnt how we go through the entire image pixel by pixel, and use the given filter to take the average of all surrounding pixels using the filter value. This will help us to improve the image quality by smoothening it more.

We have two types of filters in general, 1) Smoothing 2) Differencity. The average filters we have applied in this homework are smoothing filters. While the other filters like Sobel is used to detect edges, and falls under second category.

The first function i.e. local_smear_routine helped me to understand how we choose parameters to iterate through image and at the same time iterate through the filter values (-1 to 1). It gave me the basic idea which I used while writing the values of R, S, T, Q and W in second function i.e. local_weighting_routine. Values I chose for the parameters are as follows:
   S=ceil(wt_dims(2)/2)-1;
   T=ceil(wt_dims(1)/2)-1;
   Q=im_dims(2) - S + 1;
   R=im_dims(1) - T + 1;
   W=length(wt_dims(:));

NOTE: I did not consider the borders of the image, as in I ignore the borders when I write the parameter value as above.

E b) Any problems you had writing the various functions and how you solved them.
   How did you handle edges on the image?
   Did you need to learn the mod( ) function in matlab?
   Where there any other issues?

Ans b) In the first function(local_smear_routine) I was not getting the output correctly. So, I put the code in debug and found that if we interchange the row with col in output image we will get the correct output. I also noticed that initially the output image has more exposure(white) so if I took the im2double of input image before applying the actual algorithm, and then after the algorithm completes we will get the correct output.
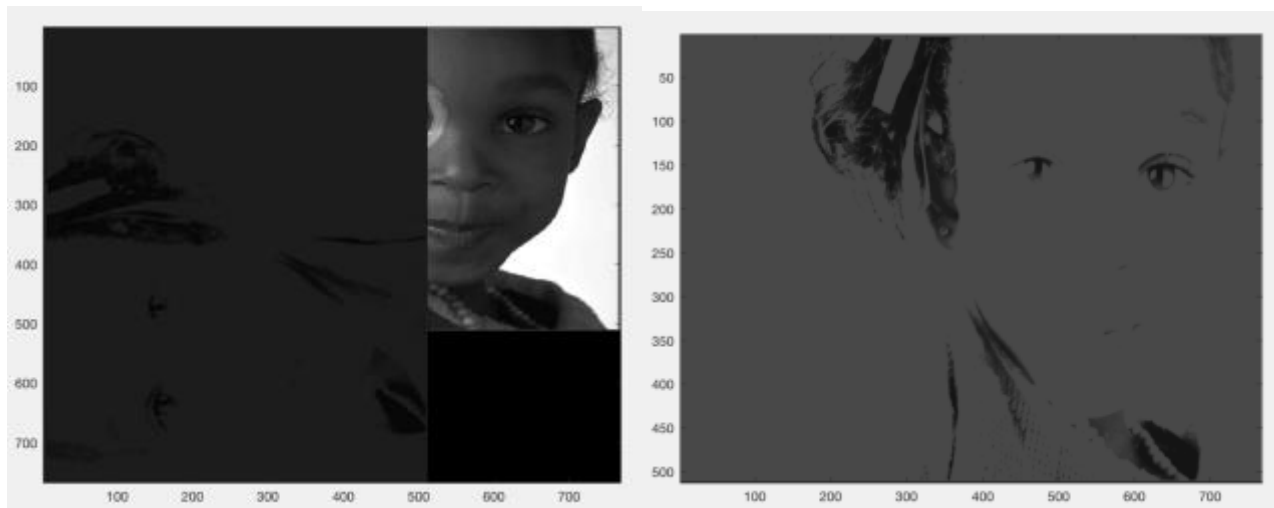

Fig a: Without interchanging row, col & without im2double(local_smear_routine)   Fig b: With interchanging row, col & without im2double(local_smear_routine)
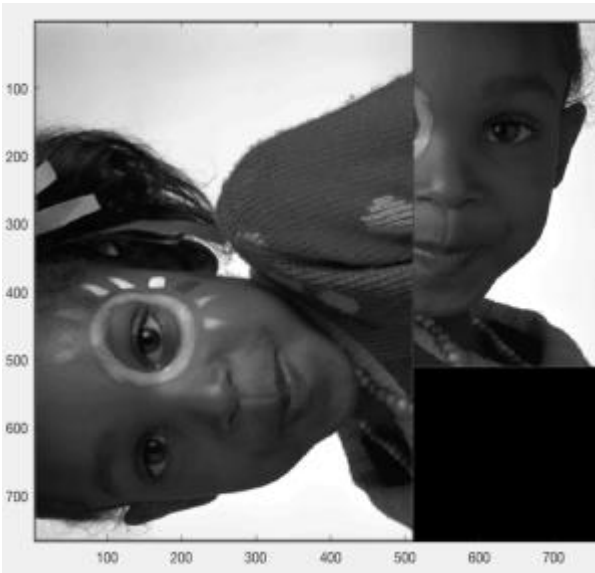
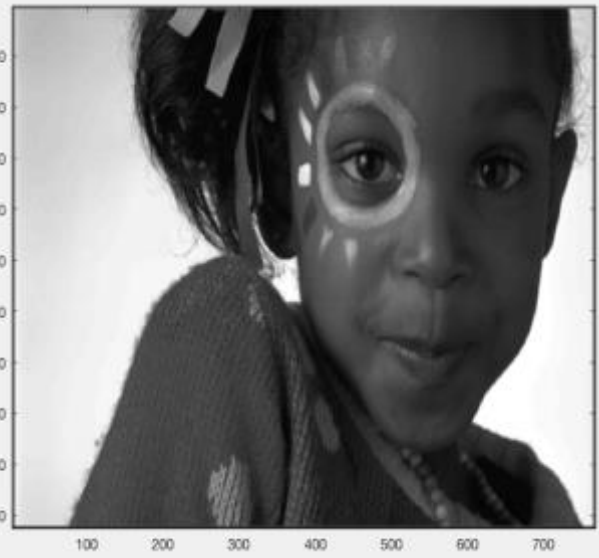Fig c: Without interchanging row, col & with im2double(local_smear_routine)   Fig d: With interchanging row, col & with im2double(local_smear_routine)

I tried it with various images like Nicki_Minaj, TBK_Kite, kod_ref_image_cheryl. But 'kod_kid.png' gives better results as it is easy to observe changes in that images.

I did not consider the border of the image as I started traversing through image from the point which is mid of weight. So, I have ignored the borders of image. We can also replicate borders if required. If we talk about edges of features in image, we are smoothing it by applying the filter to it.

I did not use mod function. I used the ceil() function to find the values of S and T. Even though after reading this question I searched for the mod function matlab using command *'help mod'.* Mod for values x and y returns x - floor(x./y).*y.

E c) A general discussion of what you learned here, including anything else you needed to learn along the way, such as modular arithmetic. What did you get out of this exercise, even if it is a review for you.

Ans c) In a nutshell, with this homework I learnt how imfilter applies the filters supplied to it. I learnt how pixels averaging operations are made for smoothing the images. Additionally, I have learnt how to use ceil and floor functions in MATLAB. I observed that the dimension of disk filter is 11*11 and we gave 7 as parameter while creating gauss filter, so dimension of gauss is 7*7. With this I learnt that if the size of filter is large, we need less iterations while applying the filter. But for small size of filter it requires more number of iterations