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COMP 408 – Assignment #1

PART I

In this part, we were expected to implement a simple filterin function for 2D images with 3 color channels and 2D filters. As asserted in the manual we were supposed to do filtering with convolution. In my_imfilter() function, I basically implemented the steps below:

- Flipped the filter in both directions.
- Padded the image with zeros in order to make input and output images' sizes equal.
- With two for loops I visit every pixel of the image, do '.*' operation, sum all elements of the resulting matrix, lastly put the summation value into corresponding place in output image.

I chose to use for loops to implement convolution as it is easy to impletement. Therefore, my_imfilter() is pretty slower than imfilter() which MATLAB's predefined function. If I were to make some performance enhancements, I would have started with getting rid of for loops if possible.

I tested my function with the given test file. Original and resulting images can be seen below:

Original

Identity

Small Blur (high frequencies removed)

Large Blur (Gaussian)

Here, when we use 25x25 Gaussian filter it takes ~27 seconds.

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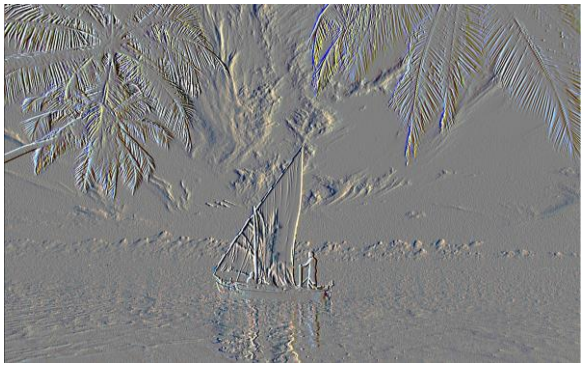
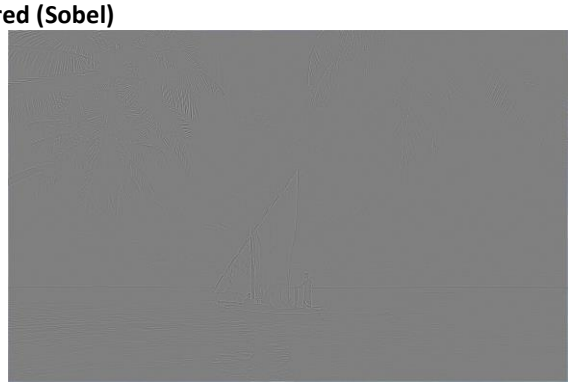


Oriented filetered (Sobel)

Laplacian (High Pass)



Alternative High Pass (By taking difference)

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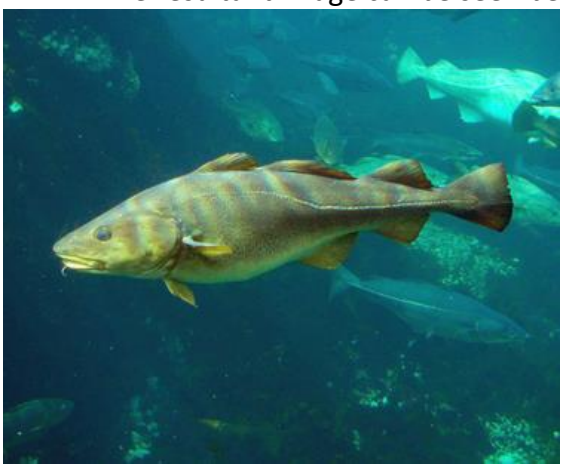
PART II

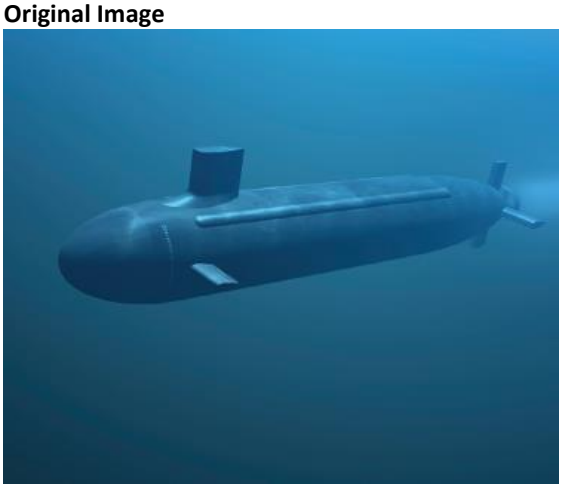
For this part we were supposed to do some filter operations on given two images. For the first image, we needed blurred version which is equal to removing high frequencies from the image. I did this by simply using my_imfilter() and given Gaussian filter. Then, I needed to remove low frequencies from a given image. For this, first I removed high frequencies from the image as I did for the first image. Then, I substracted resulting image from the original one. Result was what I needed. For combination, I simple added low frequency and high frequency images.

The resultant image can be seen below:



Original Image

High Pass Filtered Image



Original Image

Low Pass Filtered Image

Hybrid Image

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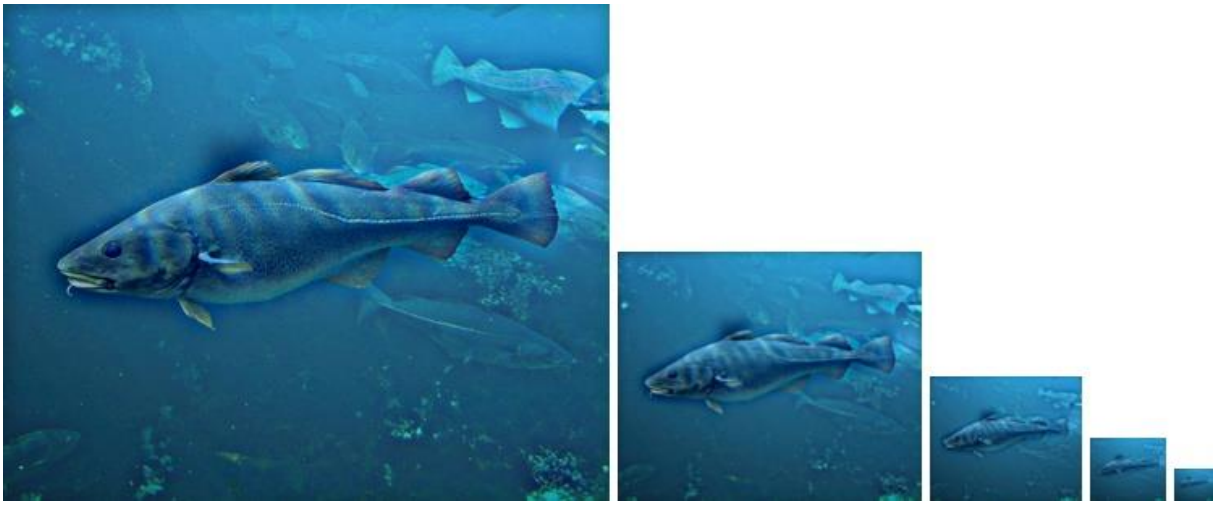

CONCLUSION

It was informative and fun assignment at the end. I am glad that now I know how many image manipulation works.