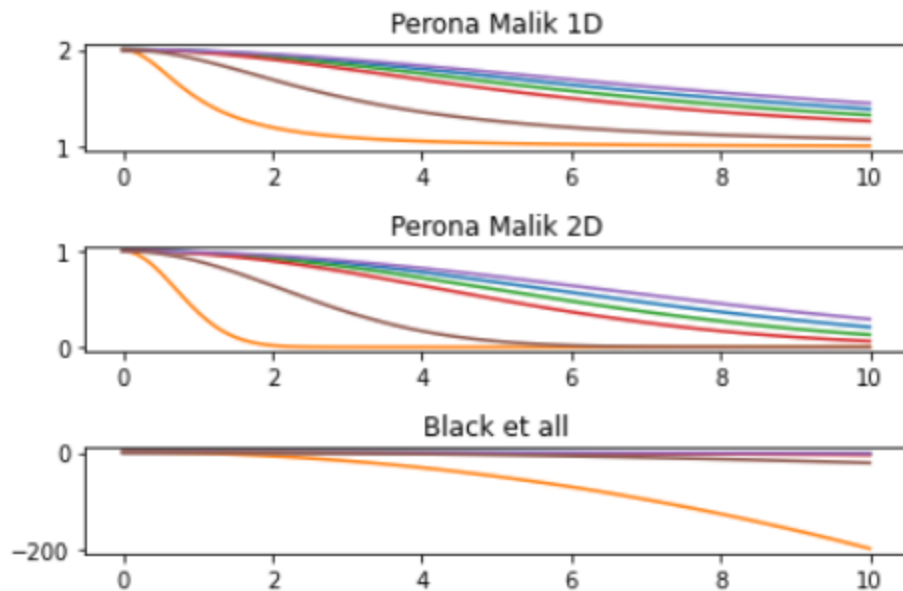


Assignment 4

QUESTION 1A



- Here is the plot that we got for the three algorithms that have been given in the question
- The Perona Malik paper gives two different equations, one for the single dimension case, and the other for the multiple dimensions case.
- The Black paper, even though, it was built on top of the Perona Malik paper, has a different graph (with the same destinations) as the Perona Malik one.

CONCLUSIONS/ OBSERVATIONS:

- The graphs of the two algorithms have slopes of different signs throughout. This is because, while in Perona Malik , the gradient term is in the denominator, in the Black paper , it occupies the numerator. This results in different slopes

- In case of Perona Malik , the values go to 0 with increasing gradient values , but in case of Black , the final value goes down to $-\infty$ with increasing gradients.
- The slope of this decline, varies with the value of K. This reflects how , the constant K , acts as a tuning parameter and reflects how the function is going to behave

QUESTION 1B

[leaving it due to shortage of time]

QUESTION 2

```
>> ques2
PSNR ERRORS
-24.2415 -26.3154 -20.5668
-29.0123 -30.9127 -25.8645
-34.1819 -36.0906 -32.2910

MSE ERRORS
265.5539 428.0916 113.9416

1.0e+03 *
0.7966 1.2339 0.3859

1.0e+03 *
2.6193 4.0650 1.6947
```

Following are the differences we got from the Original images and the ONLM ANLM , and the regular NLM.

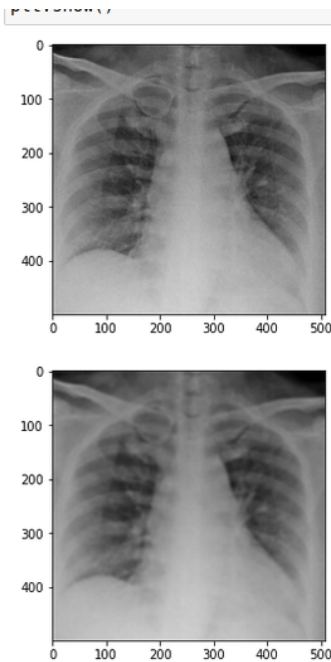
We see how the differences are varying across images.

- The first colm is the difference between the original image and the ANLM corrected image
- The second colm is the difference between the original image and the ONLM corrected image
- The third colm is the difference between the original image and the NLM corrected image.

CONCLUSIONS\ OBSERVATIONS :

We see how the magnitude of difference varies between the MSE Errors and the PSNR Errors. This could both be a factor of the images and the method of computation as well. But majorly we see that the magnitudes of PSNR are in general less than the MSE Errors.

QUESTION 3 :



```
[34]: # Finding the diff between the two images
# here we shall print the abs difference between the images
abs_difference = np.sum(np.abs(denoise2_fast - image))

print("The absolute difference in magnitude between the two images is " , round(abs_difference, 3))

The absolute difference in magnitude between the two images is 97556493.897
```

- Here , we see that , even though , the images appear visually very very similar, we see that the magnitude of difference between the two image (manhattan difference, in this case) is quite large.

CONCLUSIONS \ OBSERVATIONS :

- From here, we can derive that visuals can be deceptive. And noise, most of the times , is quite well hidden in the image.
- Even visually here, we can see some form of darkening of the final image. It shows how some form of white noise has been removed. These kinds of changes may not affect an everyday observer, but can mean a world of difference to the medical practitioners

