Assignment 1

Submitted By: 2019PCS0003 - Alokedu Mazumder
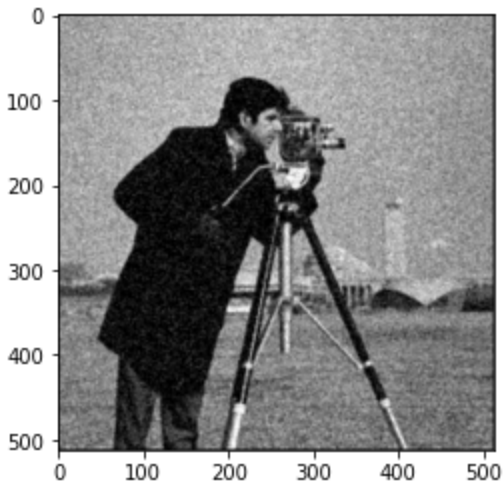
Platform used: Google Colab
Library used: numpy, scikit-learn, PIL, math, sys, pandas, inequality, matplotlib
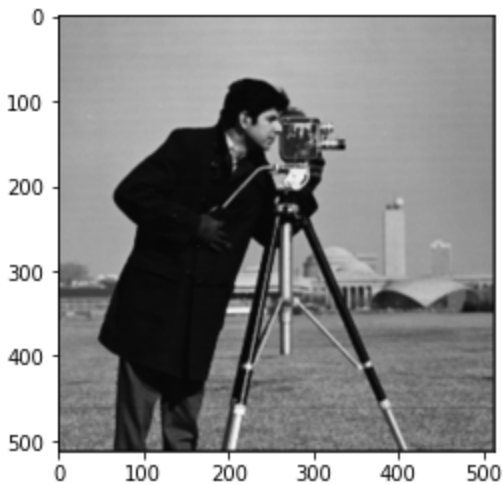
Q.1

Median Filtering:

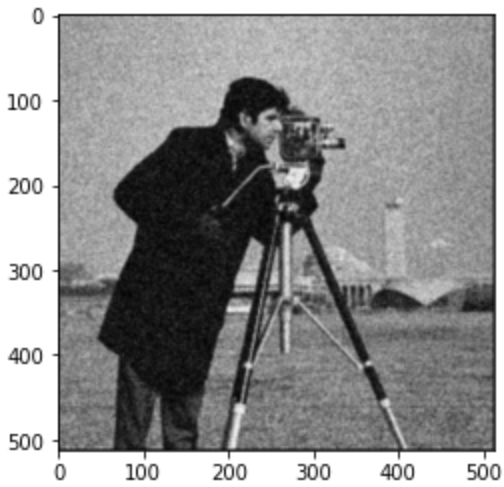Output of filtered image (Gaussian Noise original and Median filter)

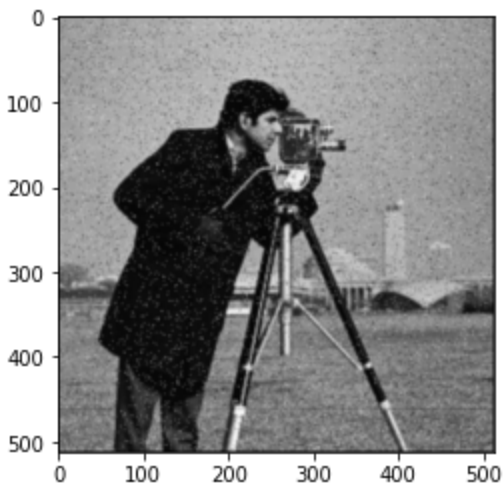Output of filtered image (Pepper & Salt Noise original and Median filter)

Mean Filtering:

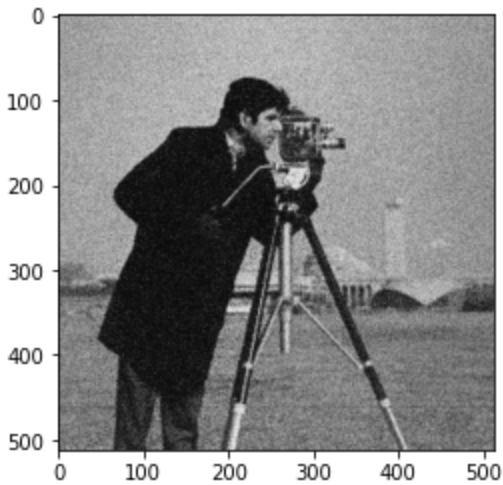Output of filtered image (Gaussian Noise original and Mean filter)

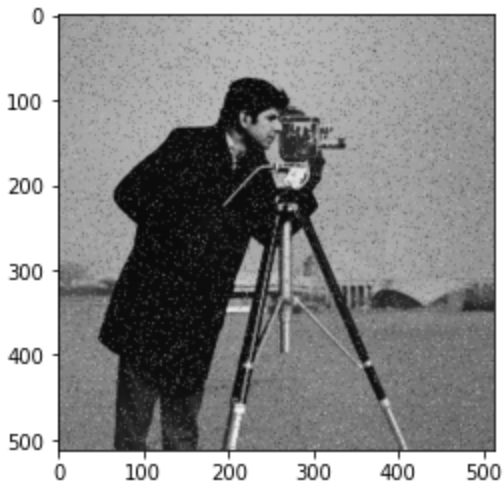Output of filtered image (Pepper & Salt Noise original and Mean filter)

Bilateral Filtering:

Output of filtered image (Gaussian Noise original and Bilateral filter)

Output of filtered image (Pepper & Salt Noise original and Bilateral filter)


Parameter Tuning & Selection:

1. As the window size increases, the L2 norm between the Original and Filtered Image increases in case when Median Filter is applied to Salt & Pepper Noise. Hence for best result, 3x3 window is chosen.

2. As the window size increases, the L2 norm between the Original and FIltered Image increases, but at a very slow rate in case when Median Filter is applied to Gaussian Noise. Hence for best result, 3x3 window is chosen.
3. When Salt & Pepper noise is being denoised using Mean filter, the L2 norm remains constant as the window size increases, hence I chose 3x3 for final output.

4. When Gaussian noise is being denoised using Mean filter, the L2 norm drastically reduces as the window size increases but it smoothes the image very much and makes it blurry, hence to maintain balance between error and visual perception,I chose 3x3 for final output.

5. The bilateral filter on the other hand, smoothens the image and also preserve the edges, if we take the variances very high, it will act as LPF and if we take the variances very low it will highlight edges more prominently, hence I chose the variance value at an intermediate level, where sigma_r is 30 and sigma_s 25 for better result on both the noise corrupted image.

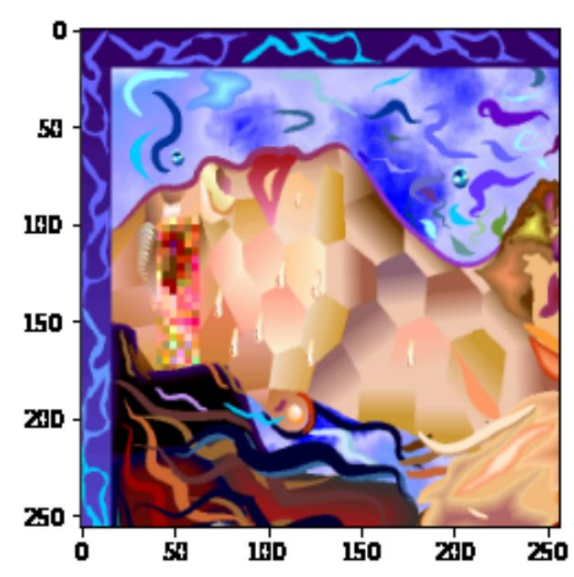6. Same parameters are applied in Q.2 also.

Note: The L2 norm is used for parameter tuning to find which set of parameters best fits the original image, it has nothing to do with the further processing in assignment.
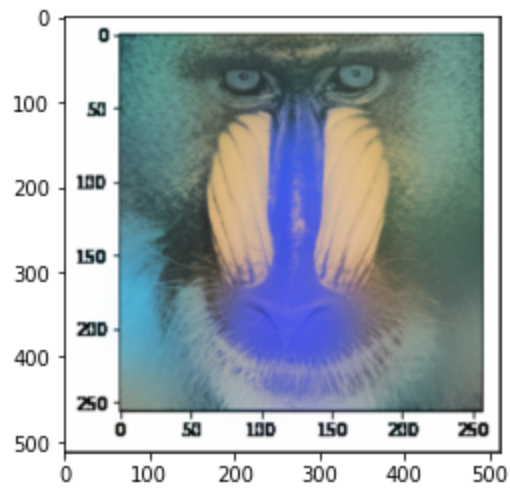
Q.2

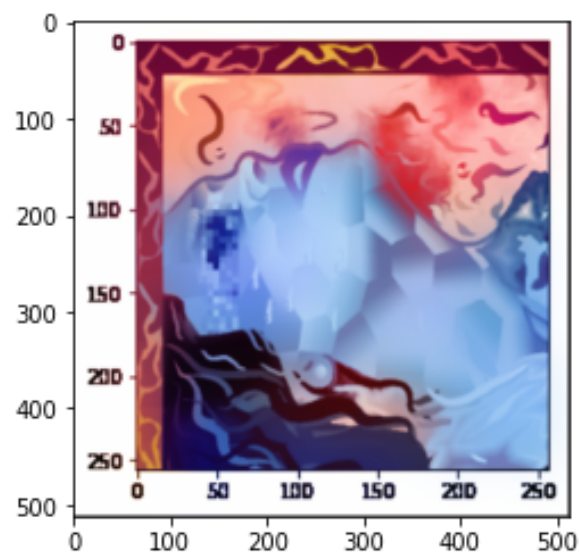1. Baboon Interpolated Image:
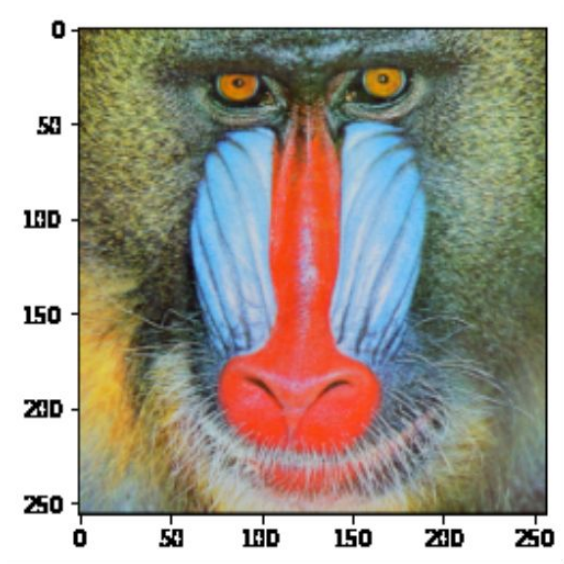
2. Serrano Interpolated Image:

I interpolated Serrano to 629x629, then to get back to its original size(794x629), I added the last row recursively to the interpolated matrix to fulfil the deficiency.

3. Baboon Interpolation + Bilateral Filter

4. Serrano + Bilateral Filter

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