E9 241: Digital Image Processing

Assignment 4

Q2 a. Impulsive noise is characterized by distinct gray levels which are often not similar to image pixel values. Median filter works much better than Gaussian filter for such noise. Median filter forces the distinct gray levels of noise to take the median pixel value of the neighborhood and hence eliminating impulsive noise. While the Gaussian kernel weights each pixel value in computing the resultant. As the gray levels of impulsive noise is distinctive compared to the neighborhood, its resultant is not a good estimate for true image.

Q2 b. Using the bilateral/non-local means filter for denoising gaussian noise gives better results as it preserves the edges better while also eliminating noise while gaussian smoothing filter results in a blurred image.

Q3. By decimating the image 'barbara.tif' by a factor 2, we can observe that the striped pattern in the original image is corrupted. It appears almost like a checker board pattern. This is because of the aliasing effect. As these striped regions correspond to high frequencies, without using a low pass filter, the high frequencies alias with the low frequencies which leads to the loss of high frequency detail. It is necessary to first smoothen the image with a lowpass filter and then perform decimation. Using a Gaussian low pass filter followed by decimation significantly reduces these aliasing artefacts.