

Question 3

3.1 Isotropic Gaussian Mask

We used a gaussian mask of $\sigma = 1.5$ to make the patches isotropic.

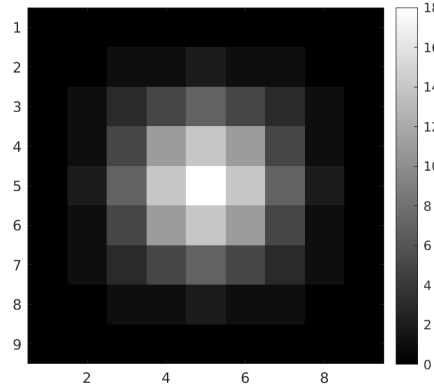


Figure 3.1: Gaussian Mask

3.2 Patch Based Filtering on barbara.png

The optimal filtering for barbara.png was attained at $\sigma_{barbara} = 0.8424$.
 The RMSD values are:

- $\text{RMSD}_{\sigma} = 2.614193$
- $\text{RMSD}_{0.9\sigma} = 2.636064$
- $\text{RMSD}_{1.1\sigma} = 2.669242$

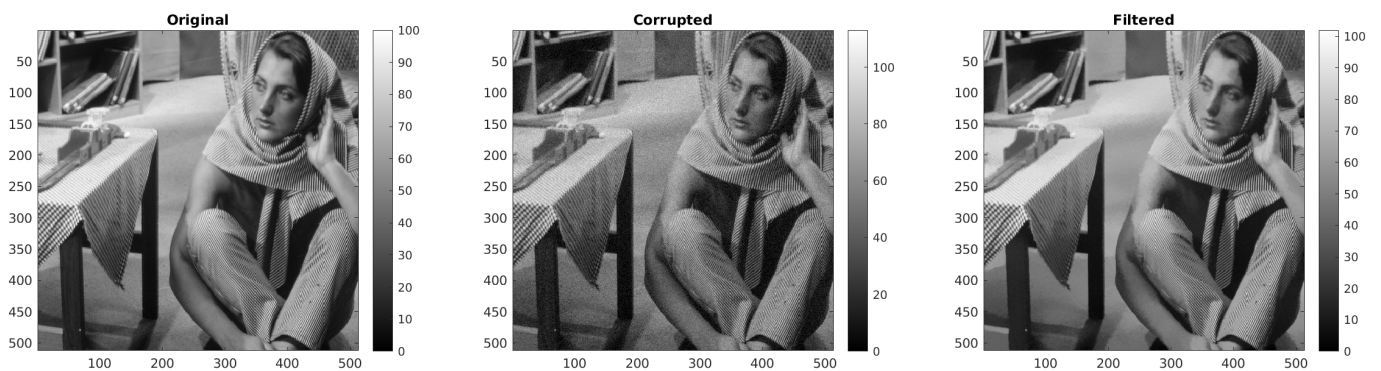


Figure 3.2(a): Original

Figure 3.2(b): Corrupted

Figure 3.2(c): Filtered

3.3 Patch Based Filtering on grass.png

The optimal filtering for barbara.png was attained at $\sigma_{grass} = 1.8527$.

The RMSD values are:

- $\text{RMSD}_{\sigma} = 7.336307$
- $\text{RMSD}_{0.9\sigma} = 7.471906$
- $\text{RMSD}_{1.1\sigma} = 7.474340$

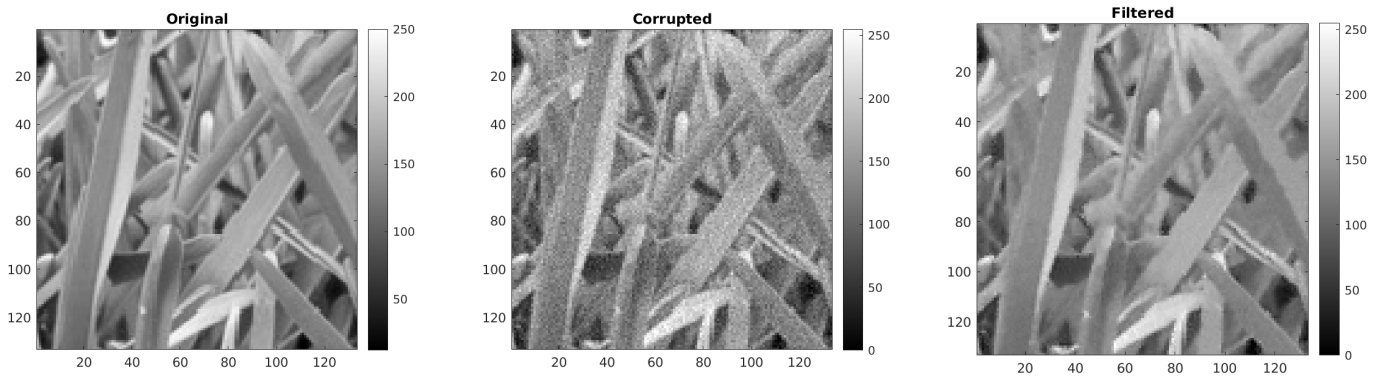


Figure 3.3(a): Original

Figure 3.3(b): Corrupted

Figure 3.3(c): Filtered

3.4 Patch Based Filtering on beehive.png

The optimal filtering for barbara.png was attained at $\sigma_{beehive} = 2.0842$.

The RMSD values are:

- $\text{RMSD}_{\sigma} = 7.424229$
- $\text{RMSD}_{0.9\sigma} = 7.545112$
- $\text{RMSD}_{1.1\sigma} = 7.557518$

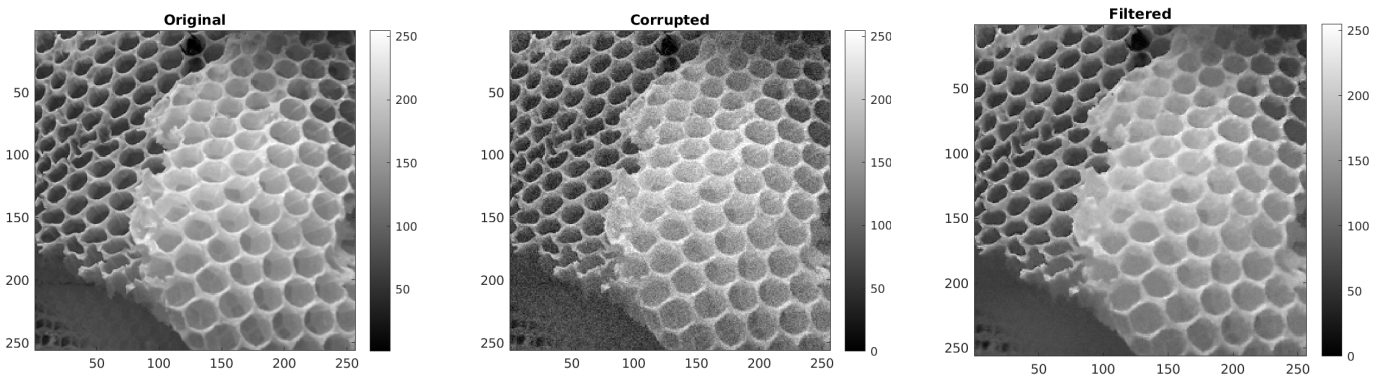


Figure 3.4(a): Original

Figure 3.4(b): Corrupted

Figure 3.4(c): Filtered

3.4 Usage of code

- Running the **myMainScript.m** file will plot the original, corrupted and filtered images for all three test cases. This takes less than 5 minutes and hence wait bar is not shown.
- By default, the 0.9σ and 1.1σ RMSD values will not be printed. In order to print these values, uncomment line 33 to 38 in **workOnImage.m**. Note that this will take 3 times the time required to run just for the optimal values and will exceed 5 minutes.
- I have not scaled each image to $[0,1]$ but simply converted the original pixel values to double and applied patch based filtering. This method is equivalent to scaling the image to $[0,1]$, applying patch based filtering, and then rescaling to plot it. The quality of the filtered image will be the same. Just the σ values and RMSD values will be scaled appropriately.

TL;DR: The RMSD values obtained by us will appear higher in magnitude as compared to those who have scaled the image to $[0,1]$ but on scaling, the RMSD values are in the same range [let's hope better :)], and the filtered image quality is also the same [again, let's hope better :)]