Question 2

Barbara Image

We use a window of size 7*7. Standard deviation for spatial filter(σ_s) is 1.5 while Standard deviation for intensity filter(σ_i) is 9.75. RMSD obtained was 3.2921.
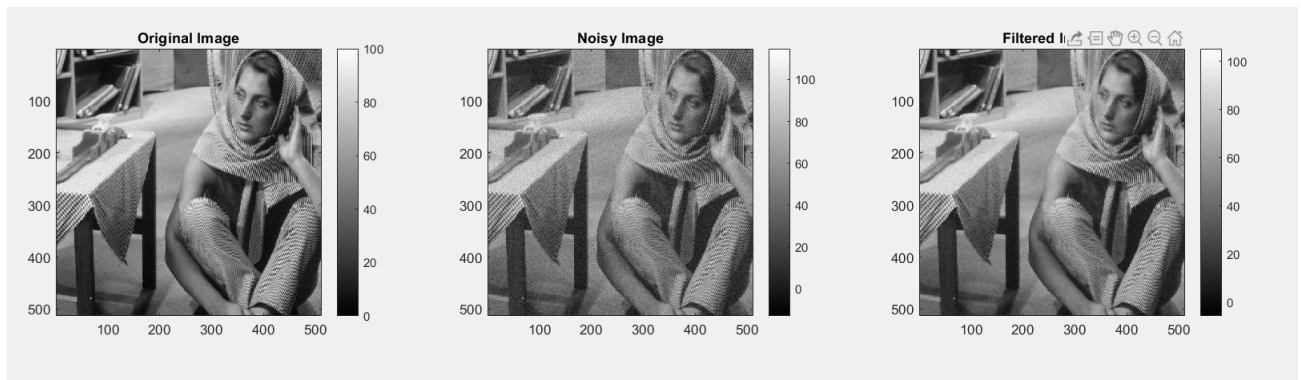
$$RMSD(0.9 * \sigma_s, \sigma_i) = 3.2950$$

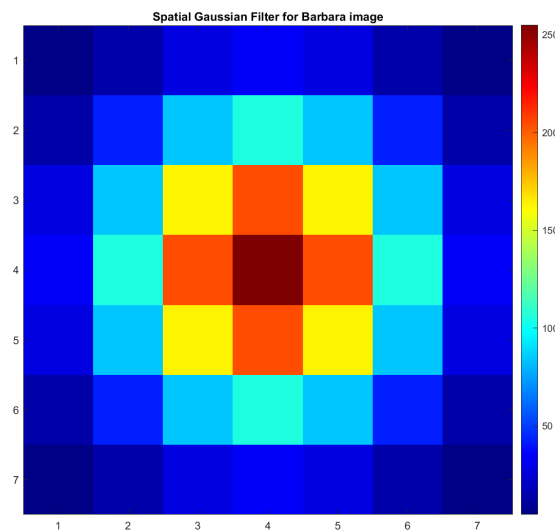$$RMSD(1.1 * \sigma_s, \sigma_i) = 3.2949$$

$$RMSD(\sigma_s, 0.9 * \sigma_i) = 3.3192$$

$$RMSD(\sigma_s, 1.1 * \sigma_i) = 3.3029$$

We observe that the parameters obtained produce the least RMSD. Original, Noisy and Filtered image are shown below along with the spatial Gaussian filter. We used color jet to represent it to get better visualization of the filter.

Figure 1: Barbara Images

Figure 2: Spatial Gaussian Filter

Grass Image

We use a window of size 3*3. Standard deviation for spatial filter(σ_s) is 0.95 while Standard deviation for intensity filter(σ_i) is 42. RMSD obtained was 7.5410.
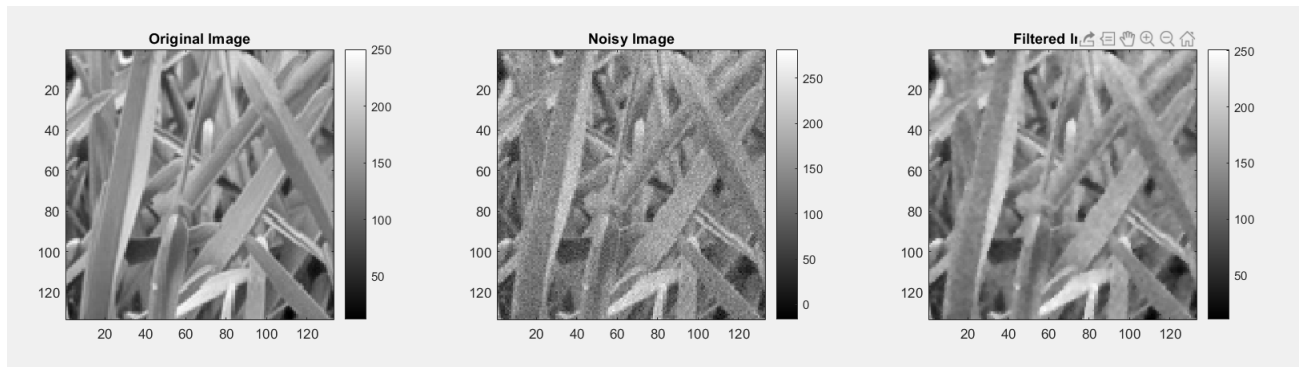
$$RMSD(0.9 * \sigma_s, \sigma_i) = 7.5593$$
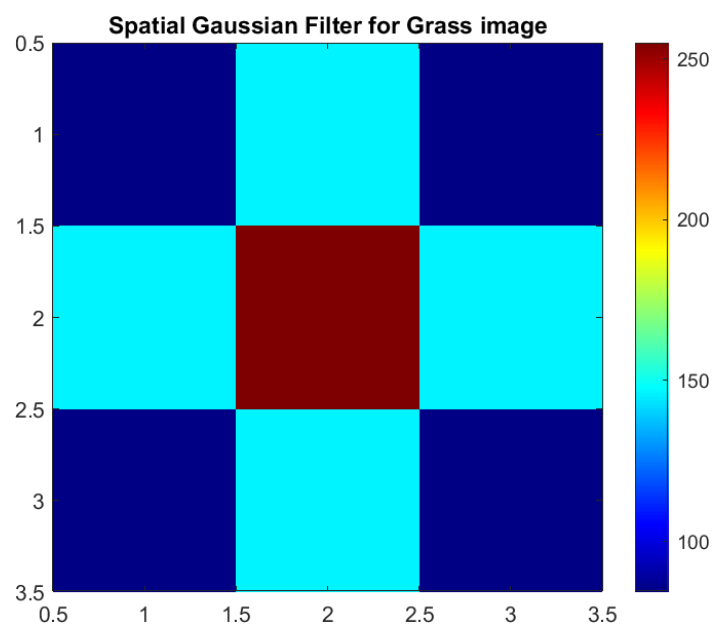
$$RMSD(1.1 * \sigma_s, \sigma_i) = 7.5499$$

$$RMSD(\sigma_s, 0.9 * \sigma_i) = 7.5641$$

$$RMSD(\sigma_s, 1.1 * \sigma_i) = 7.5573$$

We observe that the parameters obtained produce the least RMSD. Original, Noisy and Filtered image are shown below along with the spatial Gaussian filter. We used color jet to represent it to get better visualization of the filter.

Figure 3: Grass Images

Figure 4: Spatial Gaussian Filter

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CS-663 Assignment-2 : Question 2

Honey Comb Image

We use a window of size 3*3. Standard deviation for spatial filter(σ_s) is 1.25 while Standard deviation for intensity filter(σ_i) is 40. RMSD obtained was 7.3021.
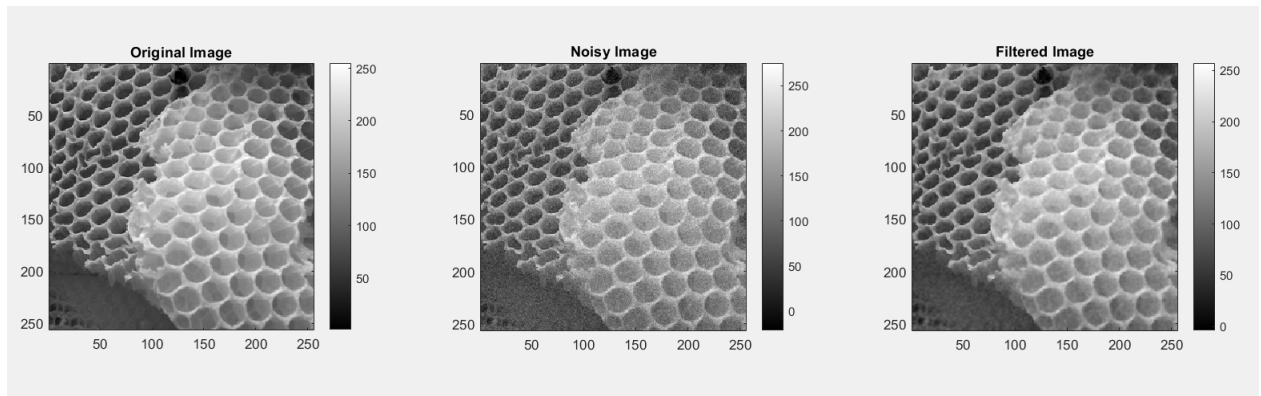
$$RMSD(0.9 * \sigma_s, \sigma_i) = 7.3077$$
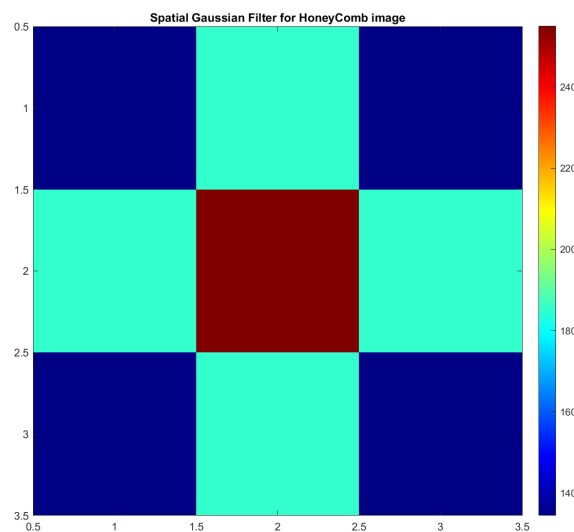
$$RMSD(1.1 * \sigma_s, \sigma_i) = 7.3047$$

$$RMSD(\sigma_s, 0.9 * \sigma_i) = 7.3246$$

$$RMSD(\sigma_s, 1.1 * \sigma_i) = 7.3299$$

We observe that the parameters obtained produce the least RMSD. Original, Noisy and Filtered image are shown below along with the spatial Gaussian filter. We used color jet to represent it to get better visualization of the filter.

Figure 5: Grass Images

Figure 6: Spatial Gaussian Filter

Code Usage

The main file myMainScript.m is divided into 4 parts.

- Part A (Barbara Image)- This part processes the filtered image for the noisy Barbara Image. We have used a seed to have a constant RMSD every time we run the code. To generate the filtered image the code uses the function myBilateralFiltering which takes the pixel p, window around that pixel, σ_s(spatial standard deviation) and σ_i(intensity standard deviation). It returns the filtered intensity at that point.

- Part B (Grass Image)- This part processes the filtered image for the noisy Grass Image. We have used a seed to have a constant RMSD every time we run the code. To generate the filtered image the code uses the function myBilateralFiltering which takes the pixel p, window around that pixel, σ_s(spatial standard deviation) and σ_i(intensity standard deviation). It returns the filtered intensity at that point.

- Part C (Honey Comb Image)- This part processes the filtered image for the noisy Honey Comb Image. We have used a seed to have a constant RMSD every time we run the code. To generate the filtered image the code uses the function myBilateralFiltering which takes the pixel p, window around that pixel, σ_s(spatial standard deviation) and σ_i(intensity standard deviation). It returns the filtered intensity at that point.

- Part D (Spatial Filters)- This part generates the spatial Gaussian filters as an image for visualization. We use colorjet to have better visualization.