CS 663 : Digital Image Processing : Assignment 2

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Due Date :- 2nd September, 2019

Question 2: Edge-preserving Smoothing using Bilateral Filtering

- For `barbara.mat`:

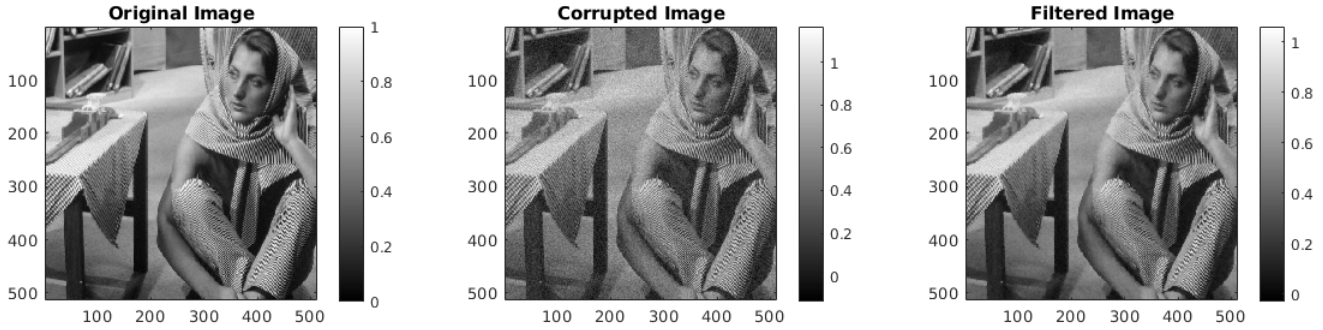


Figure 1: Bilateral Filtering applied to corrupted `barbara.mat` (shrinked by factor of 2)

Optimal Parameters:

- Window size: 7
- σ^*_{space}: 1.6
- $\sigma^*_{intensity}$: 0.1

Optimal RMSD: 0.032826

Other RMSD Values:

i $0.9 * \sigma_{space}$: 0.032839

ii $1.1 * \sigma_{space}$: 0.032867

iii $0.9 * \sigma_{intensity}$: 0.033029

iv $1.1 * \sigma_{intensity}$: 0.033006

- For `grass.png`:

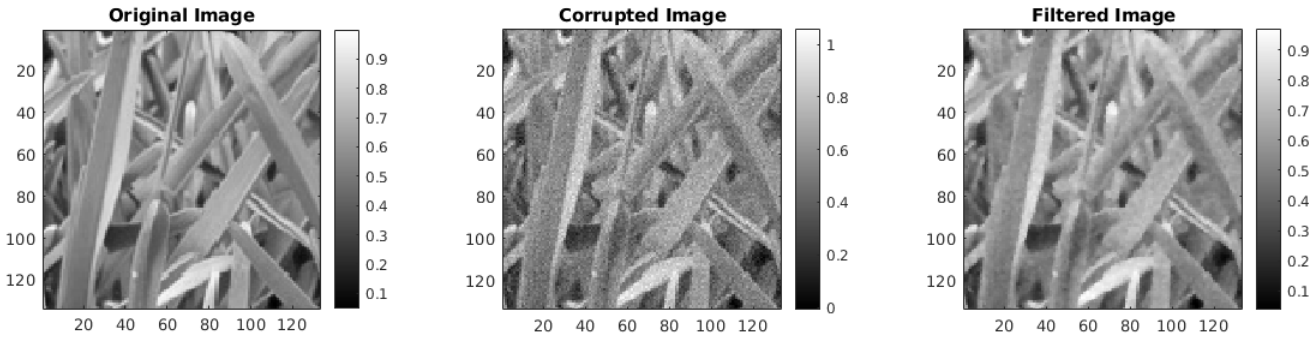


Figure 2: Bilateral Filtering applied to corrupted `grass.png`

Optimal Parameters:

- Window size: 7
- σ^*_{space}: 0.77
- $\sigma^*_{intensity}$: 0.18

Optimal RMSD: 0.028513

Other RMSD Values:

i $0.9 * \sigma_{space}$: 0.028800

ii $1.1 * \sigma_{space}$: 0.028728

iii $0.9 * \sigma_{intensity}$: 0.028592

iv $1.1 * \sigma_{intensity}$: 0.028566

- For `honeyCombReal.png`:

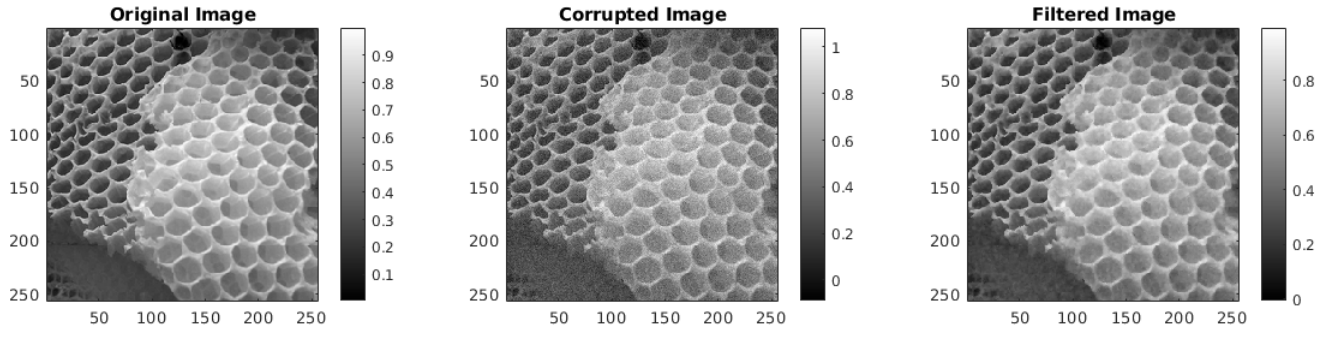


Figure 3: Bilateral Filtering applied to corrupted `honeyCombReal.png`

Optimal Parameters:

- Window size: 15
- σ^*_{space}: 0.88
- $\sigma^*_{intensity}$: 0.162

Optimal RMSD: 0.028522

Other RMSD Values:

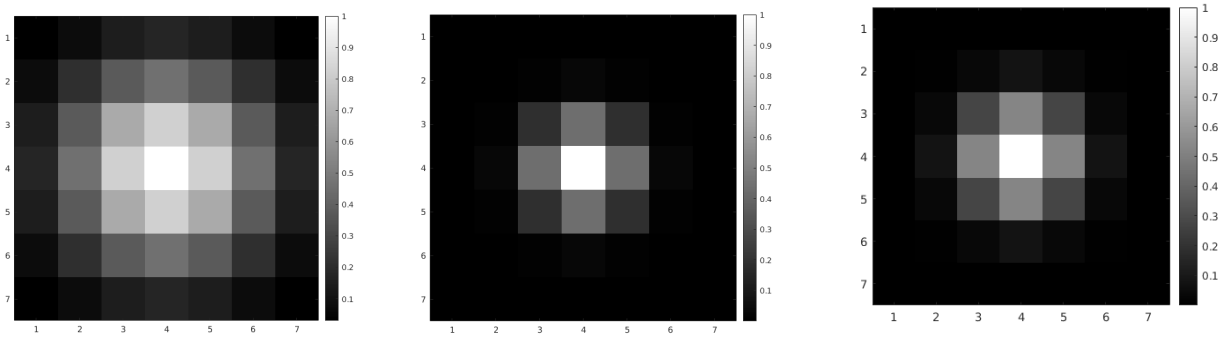
i $0.9 * \sigma_{space}$: 0.028888

ii $1.1 * \sigma_{space}$: 0.028531

iii $0.9 * \sigma_{intensity}$: 0.028671

iv $1.1 * \sigma_{intensity}$: 0.028584

- **Spatial Gaussian used in Bilateral Filtering for each Image**



(a) For `barbara.mat` (b) For `grass.png` (c) For `honeyCombReal.png`

Figure 4: Spatial Gaussian Mask used for each image

- `barbara.mat`: $\sigma^*_{spatial} = 1.6$
- `grass.png`: $\sigma^*_{spatial} = 0.77$
- `honeyCombReal.png`: $\sigma^*_{spatial} = 0.88$