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1 Meta images

1, 2 show the original and the noisy images that are to be fed to the mean shift filter.

As σ increases, the noise in both images increases. Since, the resolution of the Kodak image is much higher than the Barbara image, the effect of noise on the details is lesser. Hence, we expect more noise degradation in the Barbara image and this is also observed.

2 Mean Shift filter on original images

3, 4 show the results of Mean Shift filter applied on the original Barbara and Kodak image.

As we go from left to right (increasing σ_s, σ_r), for both images, the image looks smoother.

3 Mean Shift filter on noisy images

5, 6 show the results of Mean Shift filter applied on the noisy Barbara and Kodak image.

We get similar results as in 2, from left to right (increasing σ_s, σ_r), for both images, smoothening increases.

Note the size of the filter is such that it includes the points at most $\lceil 3\sigma_s \rceil$ *away from the center point.*

(a) Given image (b) Corrupted with Gaussian noise $\mu = 0, \sigma = 5$ (c) Corrupted with Gaussian noise $\mu = 0, \sigma = 10$

Figure 1: Barbara image

(a) Given image (b) Corrupted with Gaussian noise $\mu = 0, \sigma = 5$ (c) Corrupted with Gaussian noise $\mu = 0, \sigma = 10$

Figure 2: Kodak image

(a) $\sigma_s = 0.1, \sigma_r = 0.1$ (b) $\sigma_s = 2, \sigma_r = 2$ (c) $\sigma_s = 3, \sigma_r = 15$

Figure 3: Mean Shift filter on original Barbara image

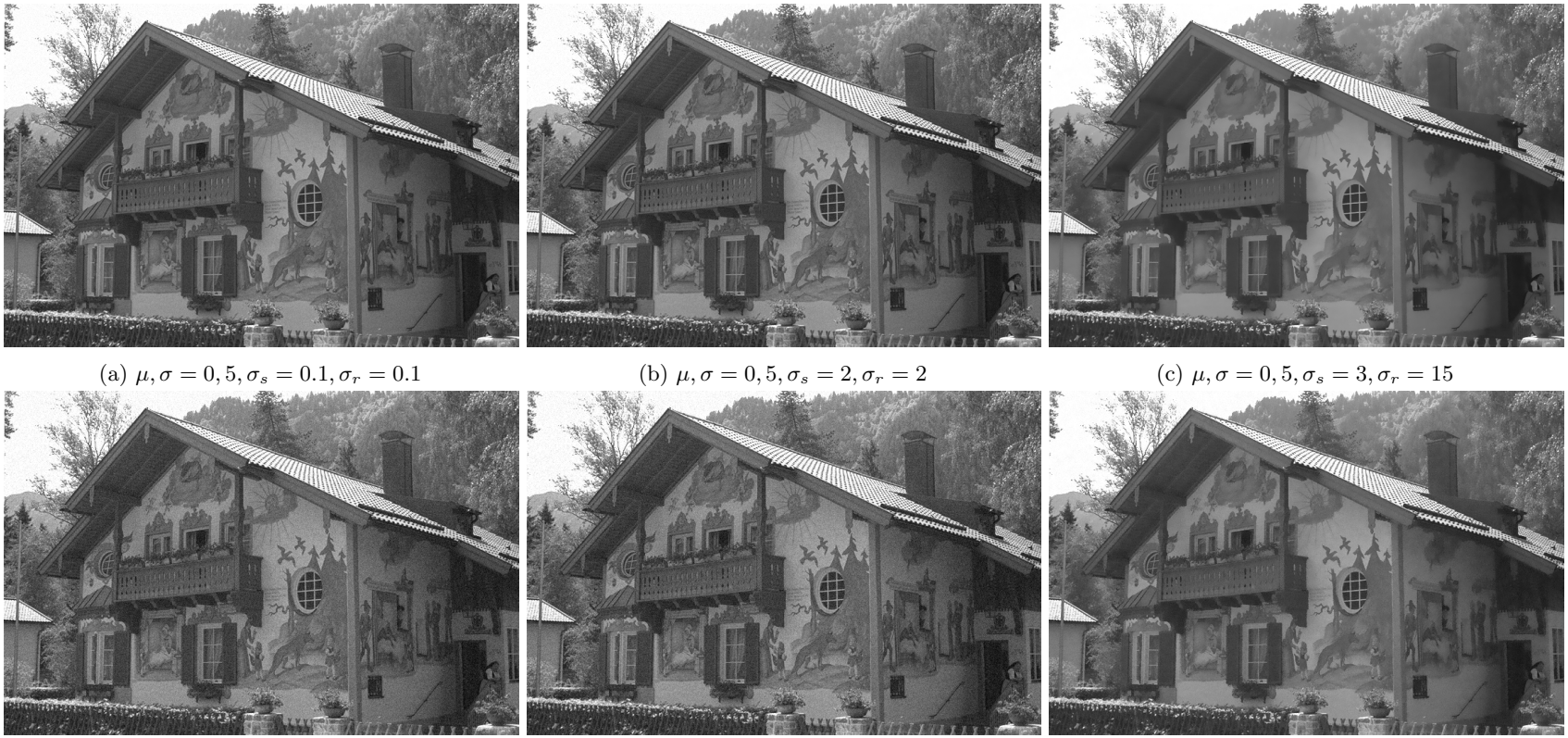
(a) $\sigma_s = 0.1, \sigma_r = 0.1$ (b) $\sigma_s = 2, \sigma_r = 2$ (c) $\sigma_s = 3, \sigma_r = 15$

Figure 4: Mean Shift filter on original Kodak image

(a) $\mu, \sigma = 0, 5, \sigma_s = 0.1, \sigma_r = 0.1$ (b) $\mu, \sigma = 0, 5, \sigma_s = 2, \sigma_r = 2$ (c) $\mu, \sigma = 0, 5, \sigma_s = 3, \sigma_r = 15$

(d) $\mu, \sigma = 0, 10, \sigma_s = 0.1, \sigma_r = 0.1$ (e) $\mu, \sigma = 0, 10, \sigma_s = 2, \sigma_r = 2$ (f) $\mu, \sigma = 0, 10, \sigma_s = 3, \sigma_r = 15$

Figure 5: Mean Shift filter on noisy Barbara images



(a) $\mu, \sigma = 0, 5, \sigma_s = 0.1, \sigma_r = 0.1$ (b) $\mu, \sigma = 0, 5, \sigma_s = 2, \sigma_r = 2$ (c) $\mu, \sigma = 0, 5, \sigma_s = 3, \sigma_r = 15$

(d) $\mu, \sigma = 0, 10, \sigma_s = 0.1, \sigma_r = 0.1$ (e) $\mu, \sigma = 0, 10, \sigma_s = 2, \sigma_r = 2$ (f) $\mu, \sigma = 0, 10, \sigma_s = 3, \sigma_r = 15$

Figure 6: Mean Shift filter on noisy Kodak images