

Computer Vision Homework #8

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1. Gaussian noise with amplitude of 10

- Original



- Filtered

3x3 Box filter	5x5 Box filter
A grayscale image of the same woman, but with noticeable vertical banding and loss of detail, characteristic of a simple box filter.	A grayscale image of the same woman, showing more pronounced vertical banding than the 3x3 filter, indicating a larger kernel's effect on the noise.
$SNR = 17.738$	$SNR = 14.866$

3x3 Median filter	5x5 Median filter
	
$SNR = 17.683$	$SNR = 16.006$

Opening then closing	Closing then opening
	
$SNR = 13.242$	$SNR = 13.567$

2. Gaussian noise with amplitude of 30

- Original



- Filtered

3x3 Box filter	5x5 Box filter
A grayscale image of the same woman, but with significantly less noise than the original. The 3x3 Box filter has removed some of the high-frequency noise while preserving some texture.	A grayscale image of the same woman, showing even less noise than the 3x3 filter. The 5x5 Box filter has reduced more noise but also appears slightly smoother or more blurred.
$SNR = 9.789$	$SNR = 10.809$

3x3 Median filter	5x5 Median filter
	
$SNR = 10.721$	$SNR = 12.438$

Opening then closing	Closing then opening
	
$SNR = 7.676$	$SNR = 8.005$

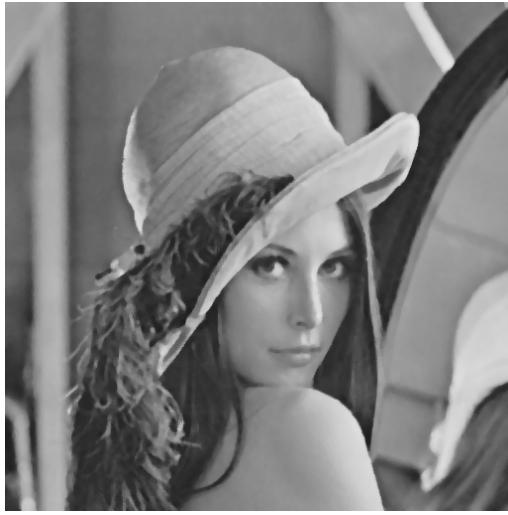
3. Salt-and-pepper noise with probability 0.05

- Original



- Filtered

3x3 Box filter	5x5 Box filter
A grayscale image of the same woman, but with significantly less noise than the original. The features are more distinct, though some blurring is visible.	A grayscale image of the same woman, showing even less noise than the 3x3 filter. The features are clearer, and the overall quality appears higher.
$SNR = 9.453$	$SNR = 11.149$

3x3 Median filter	5x5 Median filter
	
$SNR = 19.028$	$SNR = 16.404$

Opening then closing	Closing then opening
	
$SNR = 5.988$	$SNR = 5.438$

4. Salt-and-pepper noise with probability 0.1

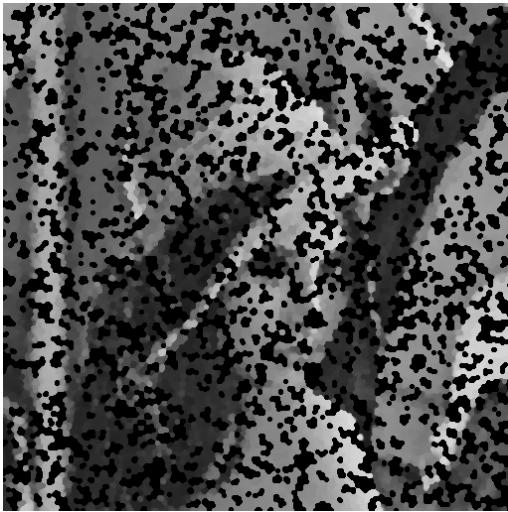
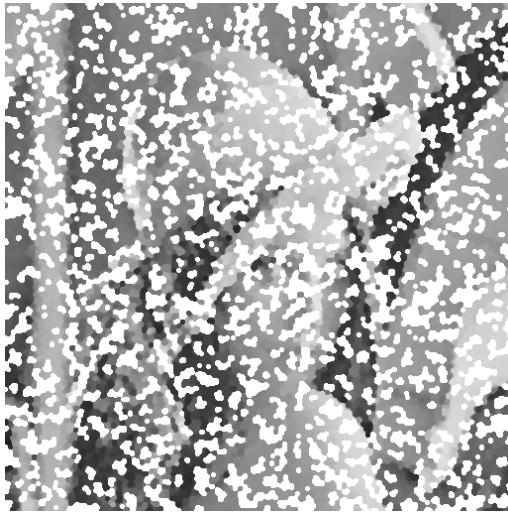
- Original



- Filtered

3x3 Box filter	5x5 Box filter
A grayscale image of the same woman wearing a hat, but with significantly less noise than the original. The features are more clearly defined, though some blurring is visible.	A grayscale image of the same woman wearing a hat, showing even less noise than the 3x3 filter. The features are sharper, but the image appears slightly more blurred.
$SNR = 6.288$	$SNR = 8.457$

3x3 Median filter	5x5 Median filter
	
$SNR = 14.787$	$SNR = 15.721$

Opening then closing	Closing then opening
	
$SNR = -2.344$	$SNR = -2.541$