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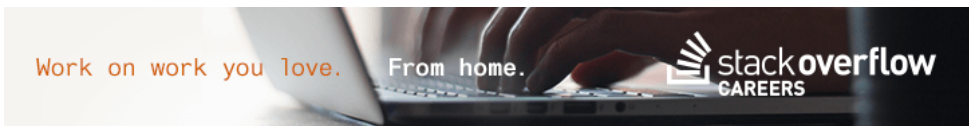
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Should I choose mean or median filter for gaussian noise



I know Gaussian filter will do the best, but now I need to choose from this two. I am not quite sure, please give your suggestions. Thanks!

image-processing filtering

asked Dec 17 '13 at 16:02



roland luo

375 1 7 16

1 You may want to try both on your image, and had better upload the images. – [lennon310](#) Dec 17 '13 at 17:36

4 Answers

Look into adaptive versus non-adaptive filtering, and linear (ie: mean) versus non-linear (ie: median or mode) filtering.

1. Adaptive Filtering: http://www.giassa.net/?page_id=639
2. Non-linear Filtering: http://www.giassa.net/?page_id=635

As EMS already noted, median filtering is less sensitive to outliers than the mean filter. If your data is representative of an image with additive Gaussian noise, the mean filter works quite well, but rapidly diminishes the quality of the image due to the blurring effect it introduces. The effect rapidly gets worse as the filter kernel order (ie: dimensions) increases past 3×3 .

If you have any amount of impulse/salt-and-pepper noise, it would be worth doing an adaptive median filter first, THEN applying a mean filter if it's warranted. The adaptive median filter will barely decrease image quality at all, and may be enough on its own.

If you really want to improve results, you could read into attempts at adaptive Gaussian filters, which would be even better than the Mean Filter.

So, in short:

1. (Optional) Adaptive Median Filter
2. Mean Filter or Adaptive Gaussian Filter

answered Dec 17 '13 at 16:43



Dogbert

8,133 5 24 67



As a general rule of thumb - if your noise is salt-n-pepper you should use median filter. If you assume that the original signal is low frequency (like a smooth surface with no texture) then gaussian filter is a good choice. Box filter (mean) is usually used to approximate gaussian filter. For removing white noise you could use the weiner filter.

answered Dec 17 '13 at 17:39



zenpoy

8,168 3 27 64

Median filtering is generally less sensitive to outliers than mean filtering. If you don't believe that the Gaussian assumption of the data will hold very accurately, then a median filter may be the better choice. However, if the Gaussian assumption holds pretty well, then the median filter may be less efficient. My guess is the efficiency trade-off won't be too drastic, so erring on the side of the median filter is probably fine.

This topic is touched upon in the book "[Image Processing and Analysis](#)" by Tony Chan during his development of total variation minimization-based denoising.

answered Dec 17 '13 at 16:06



Mr. F

16.9k 9 56 115

If there are clear bright dots or speckles on your image, use median filter. In most other cases, mean filter may be a better choice.

answered Dec 17 '13 at 21:09



user3054997

35 1 9