

Self-Similarity Prior

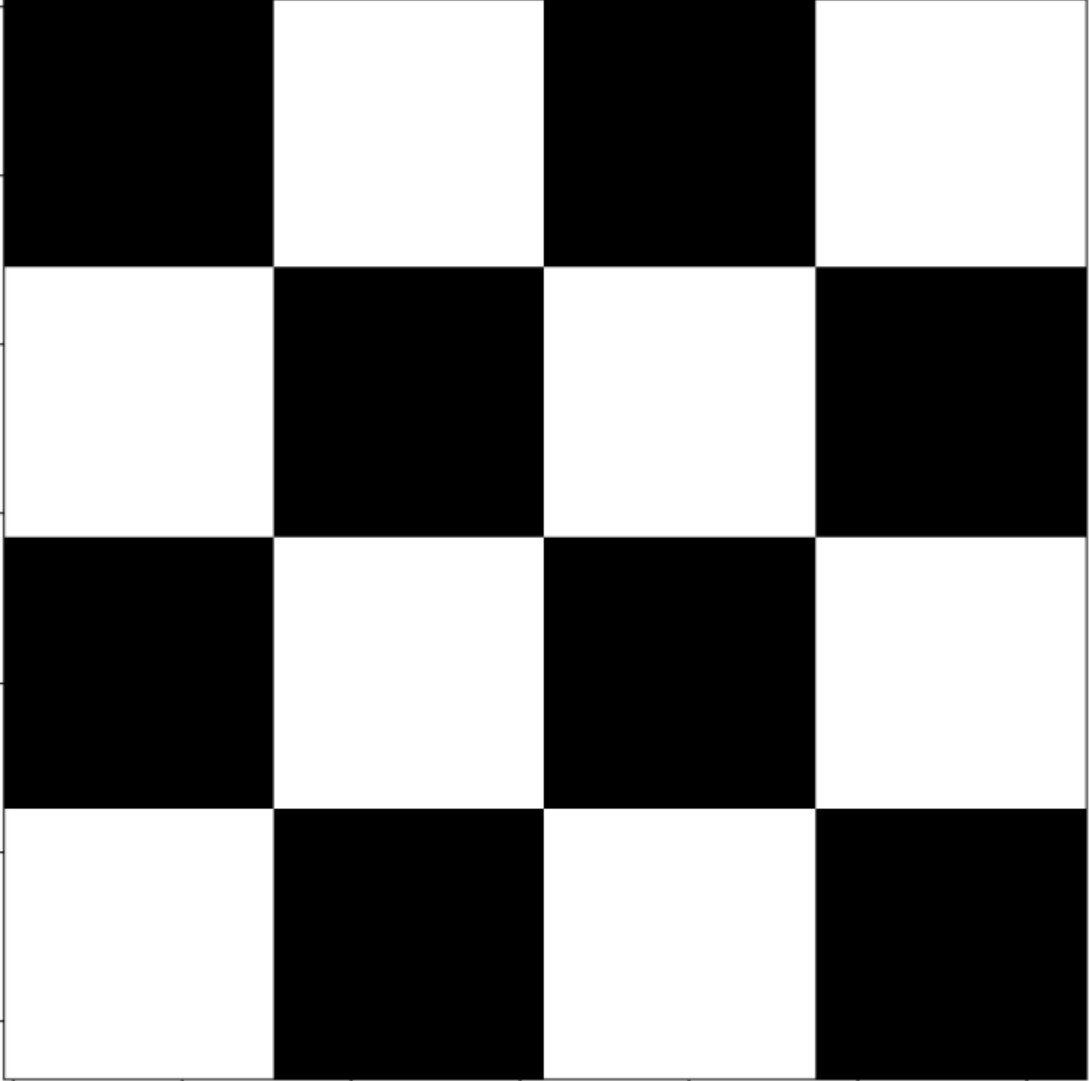
Mathematical Models and Methods for Image
Processing

Stefano Bertolasi

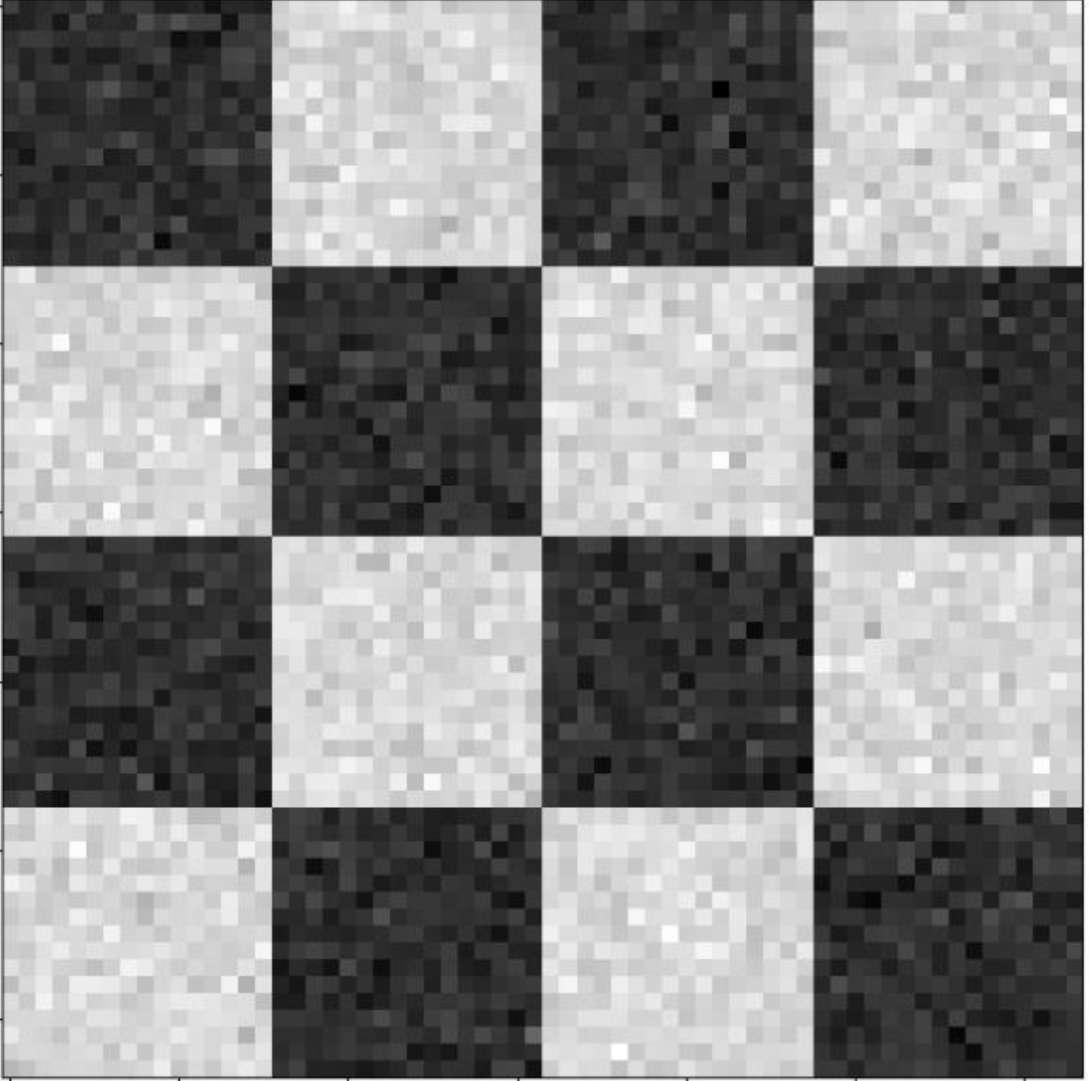
April 16th 2025

Denoising by convolution

Original

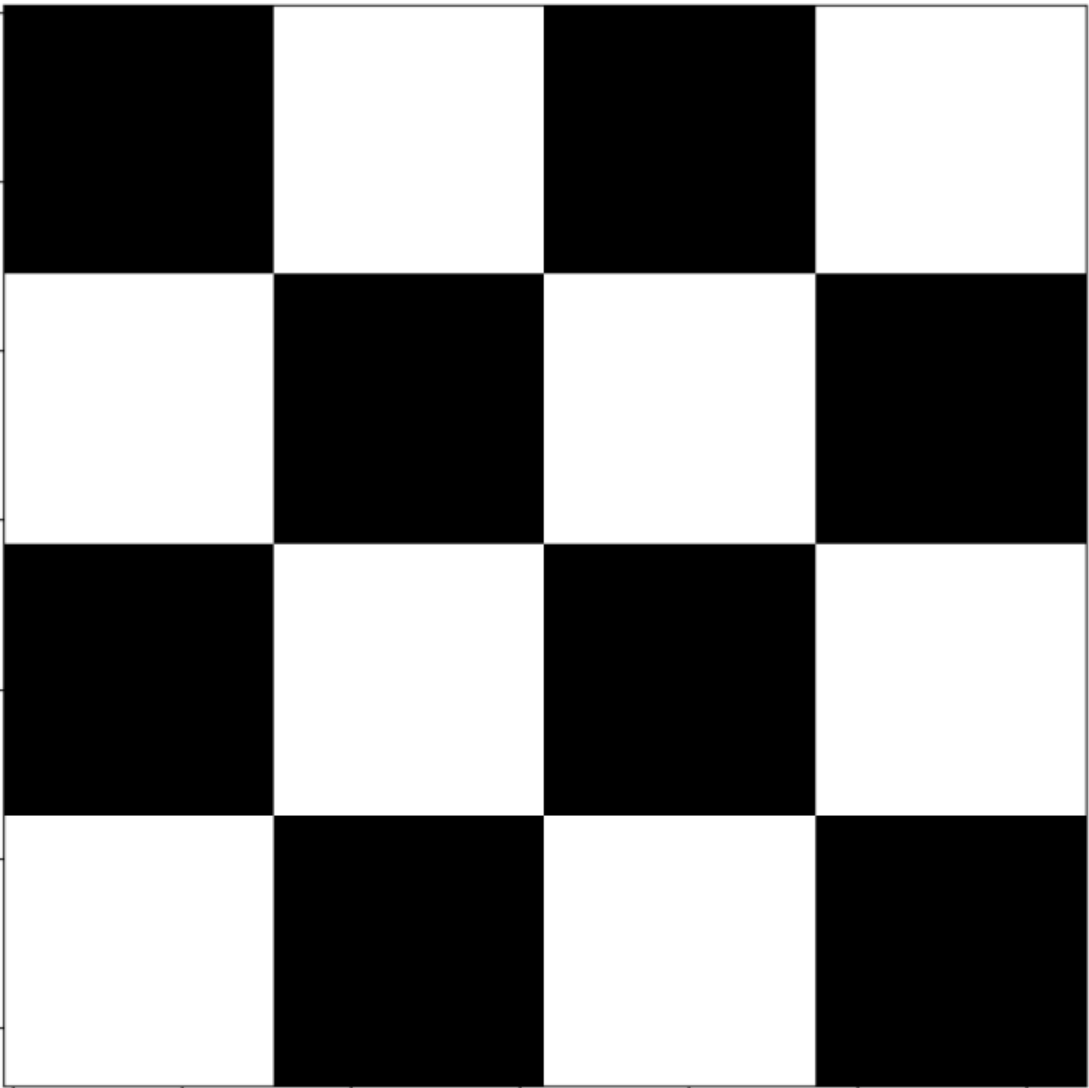


Noisy

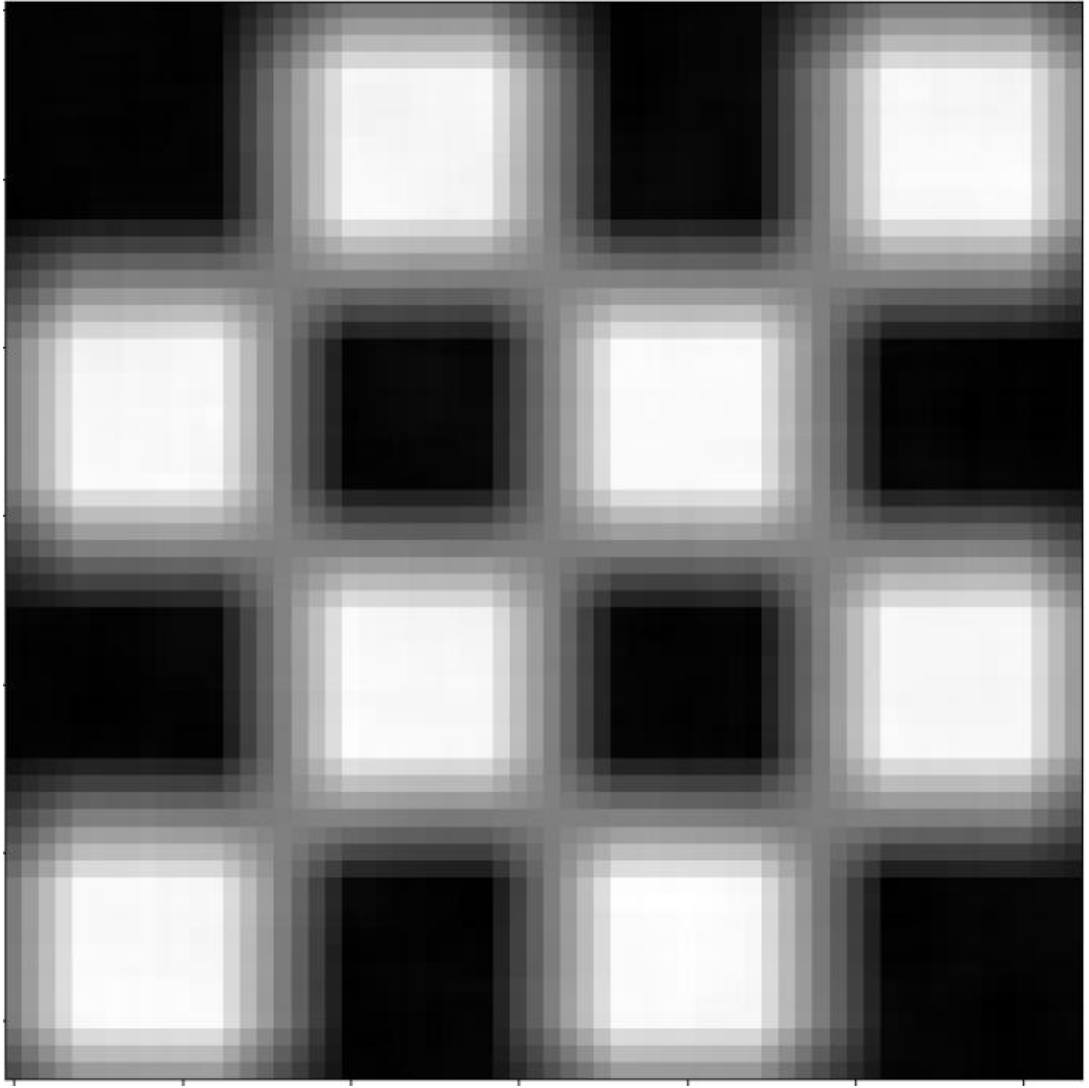


Denoising by convolution

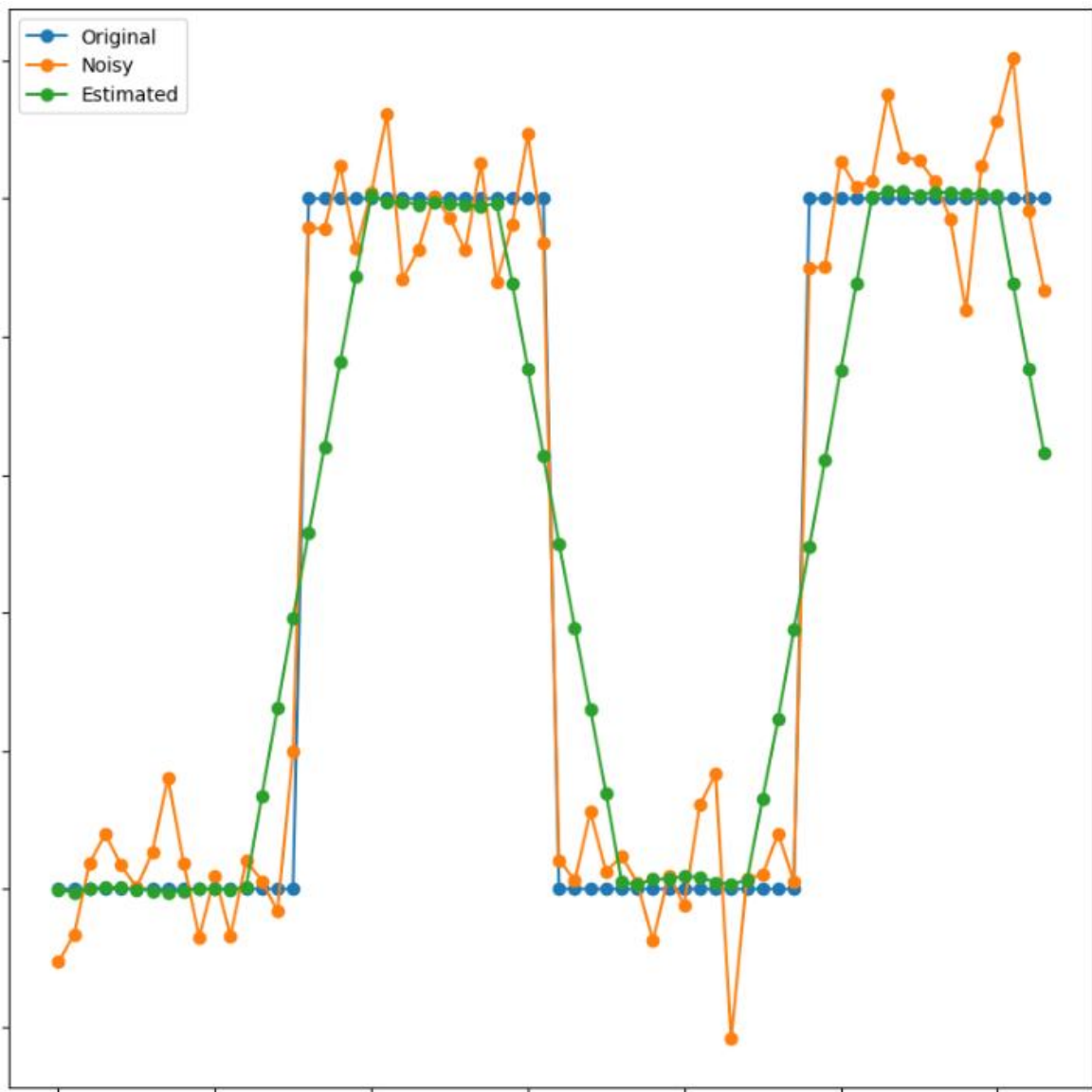
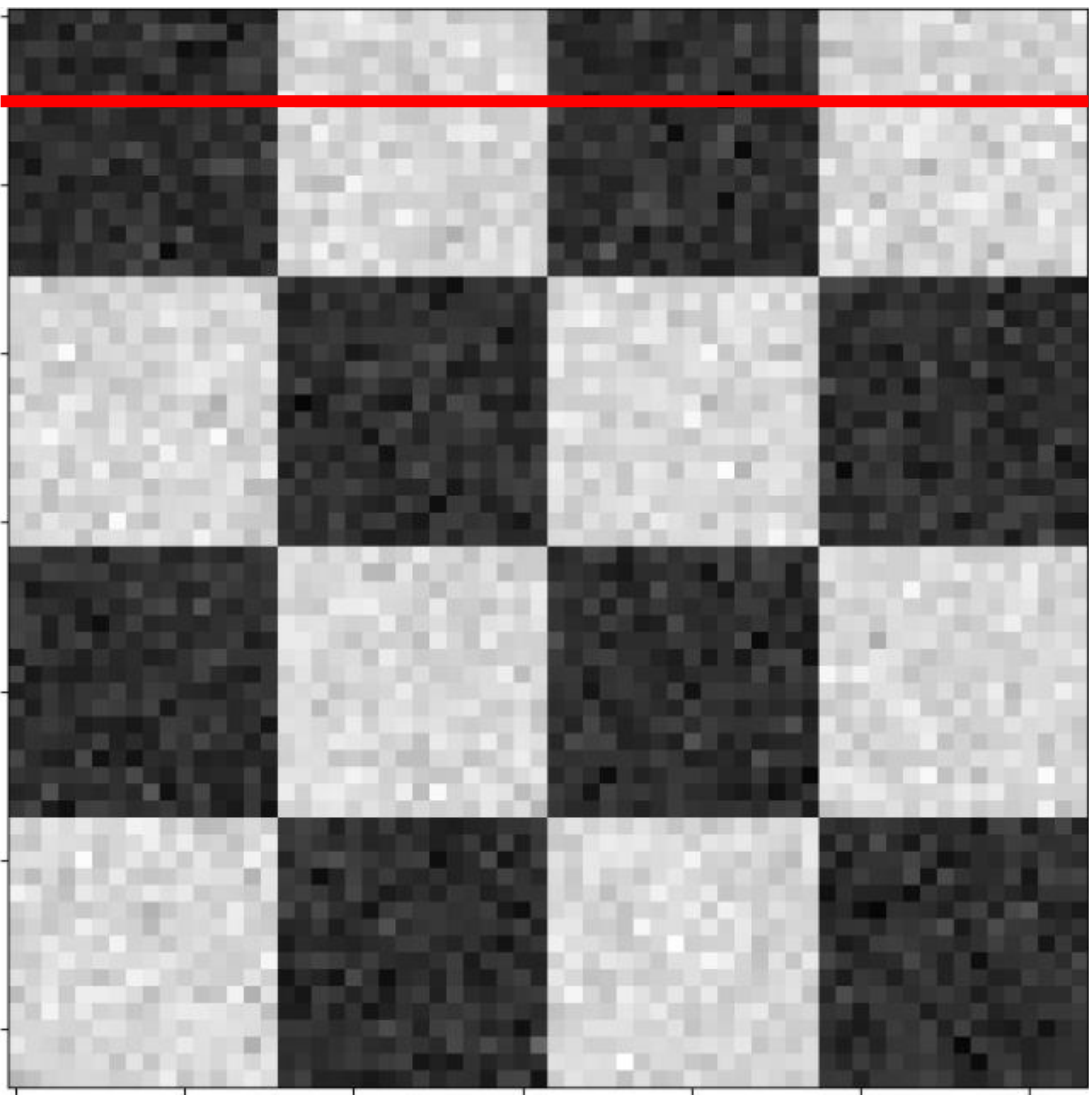
Original



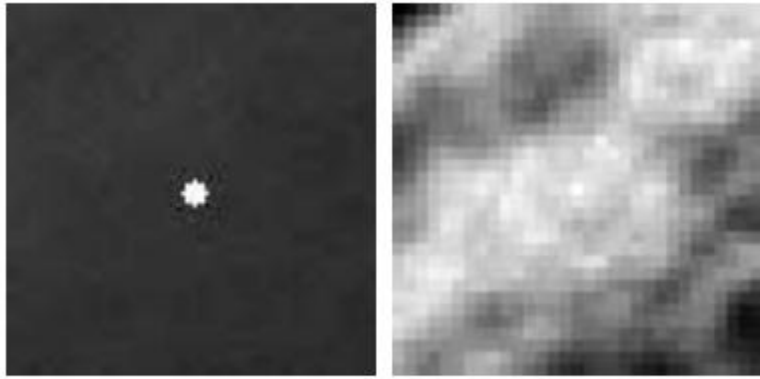
Estimated



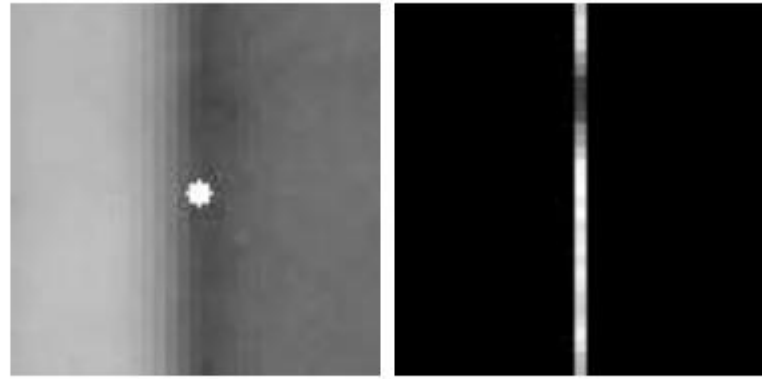
Cross Section



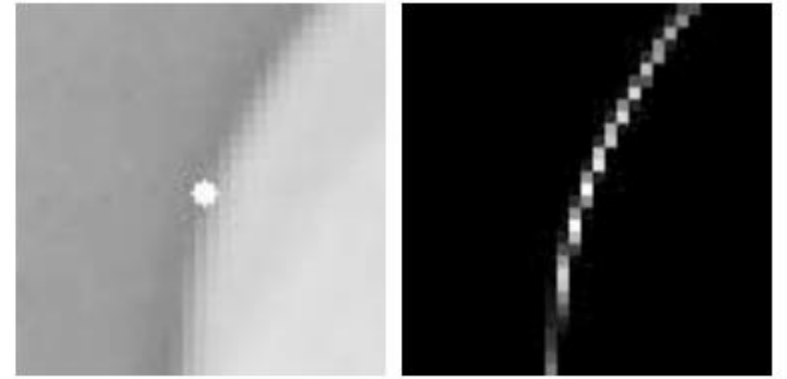
Weights in Nonlocal Means



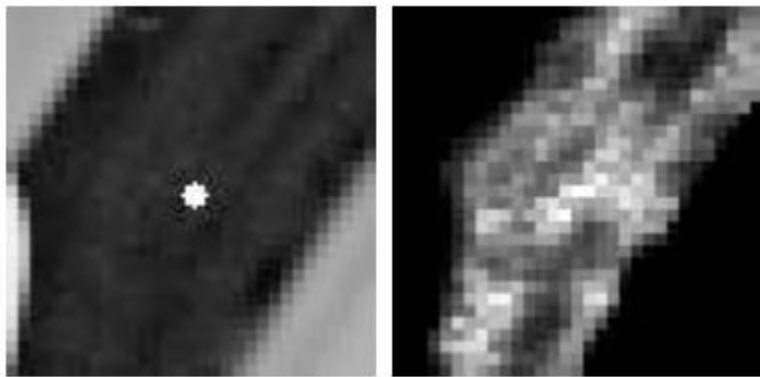
(a)



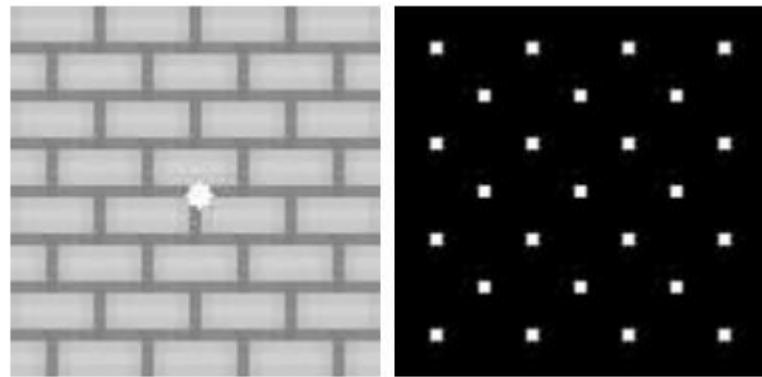
(b)



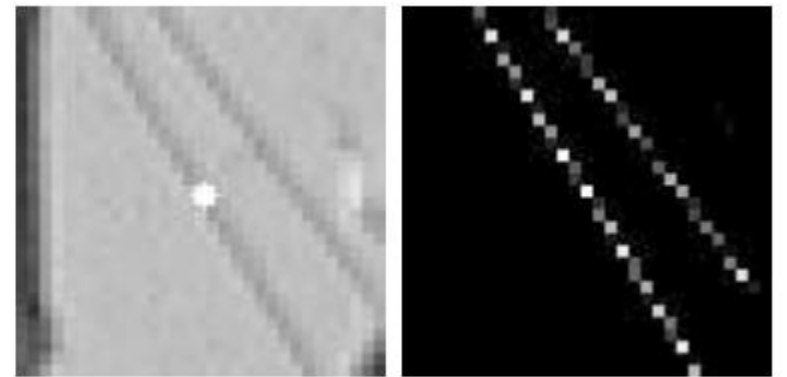
(c)



(d)



(e)



(f)

Buades, Antoni, Bartomeu Coll, and J-M. Morel. "A non-local algorithm for image denoising." *2005 IEEE Computer Society Conference on Computer Vision and Pattern Recognition (CVPR'05)*. Vol. 2. IEEE, 2005.

Assignment: Implement the non-local means algorithm

- The estimate is point-wise: you cannot use the step to speed up computation
- Try using:
 - $\sigma = 20$
 - $R = 25$
 - $M = 49$ (7x7 patches)
- To develop and debug, start by cropping a portion of image

Estimated Image,
PSNR = 28.67

