Insights: Publications

Efficient and Robust Non-Local Means Denoising Methods for Biomedical Images

ITM Web Conf., Volume 29, 1st International Conference on Computational Methods and Applications in Engineering (ICCMAE),

OCTOBER 15, 2019 Written by Troy V. Viger

Denoising is an important step to improve image quality and to increase the performance of image analysis. However, conventional partial differential equation based image denoising methods, especially total variation functional minimization techniques, do not work very well on biomedical images such as magnetic resonance images (MRI), ultrasound, and X-ray images. These images present small structures with signals barely detectable above the noise level which involve more complex noise and unclear edges. The recently developed non-local means (NLM) filtering method can treat these types of images better. The standard NLM filter uses the weighted averages of similar patches present in the image. Since the NLM filter is a non-local averaging method, it is very accurate in removing noise but has computational complexity. We develop efficient and optimized NLM based methods and their associate numerical algorithms. The new methods are still accurate enough and more efficient than the original NLM filter. Numerical results show that the new methods compare favorably to the conventional denoising methods.

Related People



Troy V. Viger
t 404.685.6788
tviger@ktslaw.com