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REMOVING MULTIPLICATIVE NOISE BY DOUGLAS-RACHFORD SPLITTING METHODS

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Multiplicative noise appears in various image processing applications, e.g., gamma distributed (speckle) noise in synthetic aperture radar (SAR) or Poisson noise in connection with blur in electronic microscopy and positron emission tomography (PET).
We start by reviewing recently proposed denoising methods, in particular we will see that the minimizer of functional proposed in [2] based on the MAP estimator for gamma distributed noise in [1] coincides with the minimizer of an I-divergence - TV model. Then we propose to compute the minimizer of certain functionals by applying Douglas-Rachford splitting combined with an efficient algorithm to solve the involved nonlinear systems of equations. We prove the convergence of our iterative scheme. Note that for the involved functionals Douglas-Rachford splitting is equivalent to an alternating split Bregman algorithm. Finally we demonstrate the performance of our algorithm by numerical examples.
This is joint work with S. Setzer and T. Teuber (University of Mannheim).

References

[1] G. Aubert and J.-F. Aujol, A variational approach to removing multiplicative noise, *SIAM Journal on Applied Mathematics*, **68/4** (2008) 925–946.

[2] J. Shi and S. Osher, A nonlinear inverse scale space method for a convex multiplicative noise model, *SIAM Journal on Imaging Sciences*, **1/3** (2008) 294–321.