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A Constrained Iterated Tikhonov Regularization Algorithm for Image Restoration.

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Many problems that arise in image processing applications require the solution of an ill-posed inverse problem, that is, one in which minor noise or perturbations in the data may result in major instabilities in the computed solution. Tikhonov regularization can be used to stabilize the inverse solution. However, it is well known that iterative schemes must be used to efficiently solve large-scale, sparse, or structured problems. Furthermore, due to physical properties of image processing, it is often desirable to compute nonnegative solutions. We have developed a constrained iterative Tikhonov scheme for image restoration (i.e. deblurring) that incorporates nonnegativity, and we use sophisticated state-of-the-art solvers for efficient implementation and automatic selection of regularization parameters.