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HYBRID REGULARIZATION FOR DATA RESTORATION

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During the last five years, several convex optimization algorithms have been proposed for solving inverse problems (e.g. [1,2]). Most of the time, they allow us to minimize a criterion composed of two terms one of which permits to "stabilize" the solution. Different choices are possible for the so-called regularization term, which plays a prominent role for solving ill-posed problems.
Much interest has been gained in introducing a priori information about the target image in a transformed domain. In this respect, redundant frames constitute more flexible tools than orthonormal bases for building linear representations of images. One of the drawbacks of the approaches based on wavelet representations is that they may introduce visual artefacts. Alternative solutions based on the use of the total variation can be employed but they often lead to so-called staircase effects. A compromise can be envisaged by combining these regularization functions.
We are interested in image deconvolution in the presence of non necessarily additive noise. We propose an algorithm based on [2,3] to achieve the minimization of the associated (possibly constrained) convex optimization problem when the proximity operator associated with the data fidelity term can not be explicitly expressed.

References

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[2] P. L. Combettes and J.-C. Pesquet, A Douglas-Rachford splitting approach to nonsmooth convex variational signal recovery, *IEEE Journal of Selected Topics in Sig. Proc.*, **1(4)**, pp. 564–574, Dec. 2007.
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