

The  $L^1$ -Potts functional. Fast algorithm and application to  
deconvolution.

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**Abstract**

We recover piecewise constant signals from noisy measurements  $f$  by the minimization of the  $L^1$ -Potts functional  $\gamma\|\nabla u\|_0 + \|u - f\|_1$ . We present an algorithm which computes an exact minimizer of this non-convex optimization problem and has  $O(n^2)$  time complexity and  $O(n)$  space requirement. We show that our algorithm recovers mildly blurred piecewise constant signals without knowledge of the blurring operator. For strongly blurred signals and known blurring operator, we introduce a closely related iterative reconstruction algorithm.