

# Multilevel proximal methods for Image Restoration

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Solving large scale optimization problems is a challenging task and exploiting their structure can alleviate its computational cost. This idea is at the core of multilevel optimization methods. They leverage the definition of coarse approximations of the objective function to minimize it. In this talk, we present a multilevel proximal algorithm IML FISTA that draws ideas from the multilevel optimization setting for smooth optimization to tackle non-smooth optimization. In the proposed method we combine the classical accelerations techniques of inertial algorithm such as FISTA with the multilevel acceleration.

IML FISTA is able to handle state-of-the-art regularization techniques such as total variation and non-local total-variation, while providing a relatively simple construction of coarse approximations. The convergence guarantees of this approach are equivalent to those of FISTA. Finally we demonstrate the effectiveness of the approach on color images reconstruction problems and on hyperspectral images reconstruction problems.

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