

**FAST GRADIENT-BASED SCHEMES
FOR TOTAL VARIATION MINIMIZATION**

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We present fast gradient-based schemes for image denoising and deblurring problems based on the discretized total variation (TV) minimization model with constraints. Our approach relies on combining a novel monotone version of the fast iterative shrinkage/thresholding algorithm (FISTA) we recently introduced in [1], with the well known dual approach to the denoising problem. We derive a fast algorithm for the constrained TV-based image deblurring problem. The proposed scheme is remarkably simple and is proven to exhibit a global rate of convergence which is significantly better than currently known gradient based methods. Our results [2] are applicable to both the anisotropic and isotropic discretized TV functionals. Initial numerical experiments confirm the predicted underlying theoretical convergence rate results, and demonstrate the viability and efficiency of the proposed algorithms on image deblurring problems with box constraints.

This talk is based on joint work with **Amir Beck**, Technion, Israel Institute of Technology.

References

- [1] A. Beck and M. Teboulle, A Fast Iterative Shrinkage-Thresholding Algorithm for Linear Inverse Problems, *SIAM J. Imaging Sciences* **2**, (2009), 183–202.
- [2] A. Beck and M. Teboulle, Fast Gradient-Based Algorithms for Constrained Total Variation Image Denoising and Deblurring Problems. Submitted for publication (2008).