A Box Relaxation Implementation in C for the Dual formulation of TV using Staggered Discretization

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Abstract

Total Variation (TV) was introduced for (scalar) image denoising and reconstruction in the celebrated paper by Rudin, Osher and Fatemi "Non-linear Total Variatin Based Noise Removal Algorithms". Due to the very nonlinear character of the associated diffusion process, TV-based approaches to image processing are very popular. The objectives of this project are

- To implement in C code the numerical schemes presented in the "Box Relaxation Schemes in Staggered Discretizations for the Dual Formulation of Total Variation Minimization", for (color) denoising.
- To publish the code and a paper in the Image Processing on-Line (IPOL) Journal.

The student will learn

- Image processing based on Variational Calculus.
- Write and implement numerical algorithms for solving Partial Differential Equations in the context of image processing.
- The process of writing and submitting a journal paper.