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An introduction to total variation for image analysis. (English) Zbl 1209.94004

Fornasier, Massimo (ed.), Theoretical foundations and numerical methods for sparse recovery. Papers based on the presentations of the summer school “Theoretical foundations and numerical methods for sparse recovery”, Vienna, Austria, August 31 – September 4, 2009. Berlin: Walter de Gruyter (ISBN 978-3-11-022614-0/hbk; 978-3-11-022615-7/ebook). Radon Series on Computational and Applied Mathematics 9, 263-340 (2010).

Summary: These notes address various theoretical and practical topics related to total variation based image reconstruction. They focus first on some theoretical results on functions which minimize the total variation, and in a second part, describe a few standard and less standard algorithms to minimize the total variation in a finite-differences setting, with a series of applications from simple denoising to stereo, or deconvolution issues, and even more exotic uses like the minimization of minimal partition problems.

For the entire collection see [\[Zbl 1195.94005\]](#).

MSC:

- [94A08](#) Image processing (compression, reconstruction, etc.) in information and communication theory
- [26B30](#) Absolutely continuous real functions of several variables, functions of bounded variation
- [26B15](#) Integration of real functions of several variables: length, area, volume
- [49-01](#) Introductory exposition (textbooks, tutorial papers, etc.) pertaining to calculus of variations and optimal control
- [49M25](#) Discrete approximations in optimal control
- [49M29](#) Numerical methods involving duality
- [65-01](#) Introductory exposition (textbooks, tutorial papers, etc.) pertaining to numerical analysis
- [65K15](#) Numerical methods for variational inequalities and related problems

Cited in **63** Documents

Keywords:

[total variation](#); [variational image reconstruction](#); [functions with bounded variation](#); [level sets](#); [convex optimization](#); [splitting algorithms](#); [denoising](#); [deconvolution](#); [stereo](#)