Total variation denoising in l^1 anisotropy

Michał Łasica

Institute of Applied Mathematics and Mechanics, University of Warsaw, Poland lasica@mimuw.edu.pl

The poster is based on a joint work with Salvador Moll and Piotr Mucha

We consider minimization problem for functional

$$u \mapsto \int_{\Omega} |u_{x_1}| + |u_{x_2}| + \frac{1}{2\lambda} \int_{\Omega} (u - f)^2$$

defined on $BV(\Omega)$, where Ω is a rectangle and λ is a positive number. We introduce a naturally defined class of functions piecewise constant on rectangles $PCR(\Omega)$ that is dense $L^2(\Omega)$. Our main result shows that if the datum f is a function in $PCR(\Omega)$, then minimizers also have this property. For data in $PCR(\Omega)$, the minimization problem is reduced to a finite algorithm. The proof is based on solving an anisotropic Cheeger-type problem and a calibration argument.

We discuss implications of the result, for instance we use it to prove that u inherits a large class of moduli of continuity from $f \in C(\Omega)$. We present a counterexample for inheritance of continuity in a non-convex Ω .

We mention generalizations and open problems.