Tube Methods for Total Variation Minimization

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Abstract: (about a joint work with Walter Hinterberger, Michael Hintermller, Karl Kunisch, Markus von Oehsen)

In this paper tube methods for reconstructing discontinuous data from noisy and blurred observation data are considered. It is shown that discrete total variation regularization (commonly used in inverse problems and image processing) and the taut-string algorithm (commonly used in statistics) select reconstructions in a tube. A version of the taut-string algorithm applicable for higher dimensional data is proposed. This formulation results in a bilateral contact problem which can be solved very efficiently using an active set strategy. As a by-product it is shown that the Lagrange multiplier of the active set strategy is an efficient parameter for edge detection.

Moreover, we present relations to some recently proposed algorithms in image processing.

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