

# Semismooth Newton methods in discrete TV and TGV regularization

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We are concerned with the numerical minimization of Tikhonov-type functionals with discrete total variation (TV) and total generalized variation (TGV) penalties with higher-order methods of generalized Newton type. It is well-known that even in a one-dimensional setting, the proximity operators of TV and TGV penalties do not have a closed-form expression. What is more, TGV-type penalties induce a multilevel structure of the overall minimization problem. The presented semismooth Newton approach is an alternative to the widely-used dual or primal-dual iterations and is very competitive in the case of low to medium noise levels.

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