Dual-grid parameter choice method for total variation regularized image deblurring

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I will talk about a new parameter choice method for total variation (TV) deblurring of images which is based on a dual-grid computation of the solution. Instead of a single grid we have two grids with different discretisation. The first grid is the same were the measurement is given. The origin of the second grid is shifted half a pixel width both horizontally and vertically. Note that the underlying true image is the same for both grids. Assume that the pixel size is much smaller than a typical constant valued area in an image. The premise of the study is that when solving the TV regularised noisy deblurring problem with a large enough parameter the solutions on both grids will converge to the same image. The proposed algorithm looks for the smallest parameter with which convergence can be numerically detected. The method has been tested on both simulated and real image data. Computational experiments suggest that an optimal parameter can be chosen by monitoring the relative difference of the TV seminorms of the dual-grid solutions while changing the regularisation parameter size. This talk is based on collaboration with Yiqiu Dong (DTU), Samuli Siltanen (University of Helsinki), Matti Lassas (University of Helsinki) and Ilmari Pohjola (University of Helsinki).