Domain decomposition methods for total variation minimization

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Domain decomposition methods are well-known techniques to address a very large scale problem by splitting it into smaller scale sub-problems. The theory of such methods is fully clarified when the energy minimized by the method is either smooth and strictly convex or splits additively with respect to the decomposition. Otherwise counterexamples to convergence exist. In this talk we present a convergent overlapping domain decomposition method for energy functionals with total variation terms, which are nonsmooth and do not split additively. We state several open problems, such as the rate of convergence and scalability with respect to the mesh size. We conclude the talk by showing an extension of the proposed algorithm to a multiscale (wavelet) subspace correction method. We present a counterexample to convergence in a specific case and preconditioning effects in other cases related to certain image deblurring problems.