

# A Fast Optimization Transfer Algorithm for Image Inpainting in Wavelet Domains

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A wavelet inpainting problem refers to the problem of filling in missing wavelet coefficients in an image. A variational approach was used in T. Chan, Shen and Zhou (Total variation wavelet inpainting, *J. Math. Imaging Vision*, 25(1):107-125, 2006). The resulting functional was minimized by the gradient descent method. In this talk, we use an optimization transfer technique which involves replacing their univariate functional by a bivariate functional by adding an auxiliary variable. Our bivariate functional can be minimized easily by alternating minimization: for the auxiliary variable, the minimum has a closed form solution; and for the original variable, the minimization problem can be formulated as a classical total variation (TV) denoising problem, and hence can be solved efficiently using a dual formulation. We show that our bivariate functional is equivalent to the original univariate functional. We also show that our alternating minimization is convergent. Numerical results show that the proposed algorithm is very efficient and outperforms that in Chan, Shen and Zhou.