

LEARNED UNROLLED SCHEMES FOR ESTIMATING SPATIO-TEMPORALLY VARYING REGULARISATION PARAMETERS IN IMAGE RECONSTRUCTION

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We discuss an image reconstruction approach with automated spatio(-temporally) varying regularisation parameter estimation motivated by recent developments in learned algorithm unrolling as well as by bilevel optimisation schemes. We consider a neural network consisting of two parts: The first part uses a deep convolutional neural network (CNN) to estimate a spatially varying (and temporally for dynamic problems) regularisation parameter for a classical variational problem (e.g. TV). The resulting parameter is fed to the second network which unrolls a finite number of iterations of a solution algorithm (e.g. PDHG). The overall network is trained end-to-end in a supervised fashion. We provide a series of numerical examples (dynamic MRI, quantitative MRI, dynamic denoising, tomographic reconstruction) that show the applicability of our approach.