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Spatial-scale-regularized blur kernel estimation for blind image deblurring

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Abstract

Blind image deblurring is a long-standing and challenging inverse problem in image processing. In this paper, we propose a new spatial-scale-regularized approach to estimate a blur kernel (BK) from a single motion blurred image by regularizing the spatial scale sizes of image edges. Furthermore, by applying shock filter into the proposed model, our method is able to recover sharp large-scale edges for accurate BK estimation. Finally, we propose an efficient optimization strategy which can solve the proposed model efficiently. Extensive experiments compared with state-of-the-art blind motion deblurring methods demonstrate the effectiveness of the proposed method in terms of subjective vision, deconvolution error ratio (DER), peak signal-to-noise ratio (PSNR), self-similarity measure (SSIM), and sum of squared differences error (SSDE).

Keywords: blind image deblurring; spatial scale; shock filter; large-scale edges; blur kernel.

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