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Blur Kernel Estimation via Salient Edges and Low Rank Prior for Blind Image Deblurring

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Abstract

Blind image deblurring, i.e., estimating a blur kernel from a single blurred image, is a severely ill-posed problem. In this paper, we find that the blur process changes the similarity of neighboring image patches. Based on the intriguing observation, we show how to effectively apply the low rank prior to blind image deblurring and present a new algorithm that combines low rank prior and salient edge selection. The low rank prior provides data-authentic prior for the intermediate latent image restoration, while salient edges provide reliable edge information for kernel estimation. When estimating blur kernels, salient edges are extracted from an intermediate latent image solved by combining the predicted edges and the low rank prior, which are able to remove tiny details and preserve sharp edges in the intermediate latent image estimation thus facilitating blur kernel estimation. We analyze the effectiveness of the low rank prior in image deblurring and show that it is able to favor clear images over blurred ones. In addition, we show that the proposed method can be extended to non-uniform image deblurring. Extensive experiments demonstrate that the proposed method performs favorably against state-of-the-art algorithms, both qualitatively and quantitatively.

Keywords: Blind image deblurring, low rank prior, salient edges, kernel

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