SGCRSR: Sequential gradient constrained regression for single image super-resolution

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SGCRSR: Sequential gradient constrained regression for single image super-resolution

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Abstract

Single image super-resolution (SISR), which aims to produce an image with higher resolution and better visual quality from the given single low-resolution (LR) image, has attracted extensive attention in recent years. In particular, the regression-based SISR approaches, which learn the mapping between L-R and high-resolution (HR) patch pairs, are efficient and effective as a w-hole. However, the super-resolved images produced by this kind of method often suffer from visual artifacts as no extra constraints or priors are en-forced. To alleviate these shortcomings, we propose a Sequential Gradien-t Constrained Regression-based single image Super-Resolution (SGCRSR) framework, which provides an effective way to combine the conventional learning-based and reconstruction-based approaches. Firstly, we improve the performance of the well-known super-resolution (SR) method A+ by ad-dressing its deficiencies in both training and testing stages and propose the enhanced A+ (EA+). Then, the EA+ model is applied in dual intensity-gradient domain to construct the Gradient Constrained Regression (GCR)-based SR unit. Finally, a GCR-based sequential SR framework, namely the SGCRSR, is established to improve the quality of super-resolved images gradually. Extensive experiments show that the proposed SGCRSR achieves better performance than several state-of-the-art SR algorithms.

Keywords: Image super-resolution, Sequential regression, Gradient constraint, Combination

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