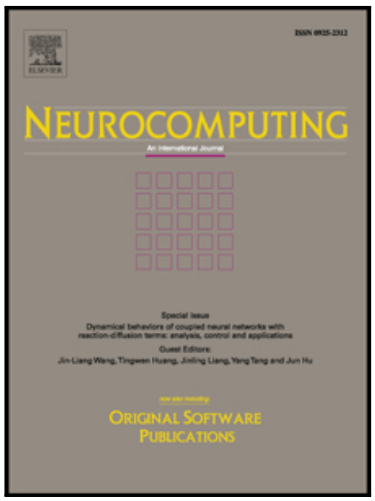

Multiscale Self-similarity and Sparse Representation Based Single Image Super-Resolution

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Multiscale Self-similarity and Sparse Representation Based Single Image Super-Resolution

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Abstract Recent research has demonstrated that the performance of sparse representation based methods for single image super-resolution (SISR) reconstruction relies strongly on the degree of accuracy of sparse coding coefficients, and accordingly several more accurate models have been developed to overcome it by exploiting the nonlocal patch redundancy within the observed image. However, the capability of those models may be limited as they fail to simultaneously consider the redundant information both within the same scale and across multiple scales. Thus, in this paper, an improved SISR reconstruction method is proposed, in which a compensative pair of regularization terms defined by l_1-norm is first constructed by taking advantage of the multiscale self-similarity. Then the calculated sparse coefficients are further aligned to this pair of standards in order to suppress sparse coding noise, and consequently result in more faithful recoveries. Finally, based on conventional iterative shrinkage-thresholding algorithm, a local-to-global and coarse-to-fine mathematic implementation is established to solve the proposed model effectively. Extensive experiments on both synthetic and real images demonstrate that our proposed method leads to a promising SISR performance and surpasses the recently published counterparts in terms of both objective evaluation and visual perception.

Keywords

Single image super-resolution; Sparse representation; Multiscale self-similarity; Sparse coefficient alignment

1. Introduction

Recently, image super-resolution (SR) has already become one of the most appealing research areas in the field of image processing due to a rapidly growing demand for high-resolution (HR) images in a wide range of digital imaging applications, such as medical diagnosis, remote sensing, vehicle license plate recognition, and so on [1]. Generally, SR is termed the technique that is applied to the issue of transcending the inherent

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