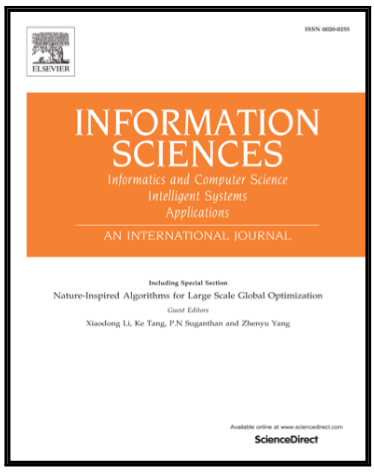

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Single Image Super-Resolution Using Multi-Scale Deep Encoder-Decoder with Phase Congruency Edge Map Guidance

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Abstract

This paper presents an end-to-end multi-scale deep encoder (convolution) and decoder (deconvolution) network for single image super-resolution (SISR) guided by phase congruency (PC) edge map. Our system starts by a single scale symmetrical encoder-decoder structure for SISR, which is extended to a multi-scale model by integrating wavelet multi-resolution analysis into our network. The new multi-scale deep learning system allows the low resolution (LR) input and its PC edge map to be combined so as to precisely predict the multi-scale super-resolved edge details with the guidance of the high-resolution (HR) PC edge map. In this way, the proposed deep model takes both the reconstruction of image pixels' intensities and the recovery of multi-scale edge details into consideration under the same framework. We evaluate the proposed model on benchmark datasets of different data scenarios, such as Set14 and BSD100 - natural images, Middlebury and New Tsukuba - depth images. The evaluations based on both PSNR and visual perception reveal that the proposed model is superior to the state-of-the-art methods.

Keywords:
single image super-resolution, multi-scale deep model, deep encoder-decoder, phase congruency edge map