



Dictionary learning-based image super-resolution for multimedia devices

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Abstract

In multimedia devices such as mobile phones, surveillance cameras, and web cameras, image sensors have limited spatial resolution. As a result, the image captured from these devices misses high-frequency content and exhibits visual artifacts. Image super-resolution (SR) algorithms can minimize these artifacts by reconstructing missing high-frequency textures. Image SR algorithm estimates a high resolution (HR) image from a given low-resolution (LR) image. Given a single LR image, reconstructing an HR image makes SR be an extremely ill-posed problem. Over the past decade, dictionary learning-based methods have shown promising results in SR reconstruction. These methods extract numerous patches from external images for training dictionaries via sparse representation. However, these methods do not involve any patch selection mechanism that enhances the learning process. This paper proposes a dictionary learning-based SR algorithm that extracts selective patches from an input LR image based on the *iScore* criterion. Results show that patch selection criteria keep only 36% of all extracted patches for training while improving the peak signal-to-noise ratio (PSNR). Furthermore, we have proposed a method to initialize dictionaries to achieve better convergence that enhances PSNR.

Keywords Super-resolution · Dictionary learning · Sparse representation · Multimedia devices

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