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Sparse Representation and Adaptive Mixed Samples Regression for Single Image Super-Resolution

Chaopeng Zhang[1], Weirong Liu[1], Jie Liu[2], Chaorong Liu[3] and Changhong Shi[1]

***Abstract*—The example-based super-resolution (SR) methods can be mainly categorized into two classes: the internal SR methods and the external SR methods. The internal SR methods only use samples obtained from a single low resolution (LR) input, while the external SR methods only utilize an external database. The complementary information included in internal and external samples is rarely taken into account. This paper presents a novel extraction and learning method about the complementary information between external samples and internal samples, and then the learned complementary information is used to improve the single image SR performance. Firstly, we construct an initial high resolution (HR) image via sparse coding over the learned dictionary pair with external samples. Secondly, we propose an adaptive sample selection scheme (ASSS) to acquire the mixed samples. Thirdly, we present a novel adaptive mixed samples ridge regression (AMSRR) model to effectively learn the complementary information included in the mixed samples. Finally, we optimize the SR image. Extensive experimental results validate the effectiveness of the proposed algorithm comparing with the state-of-the-art methods.**

***Keywords*—Adaptive mixed samples, Ridge regression, Sparse representation, Super-resolution.**

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