Abstract

A novel image super-resolution reconstruction framework based on multi-groups of coupled dictionary and alternative learning is investigated in this paper. In dictionary learning phase, each image of a training image set is taken as high resolution image (HRI), the reduced and re-enlarged result of HRI by interpolation is taken as low resolution image (LRI), and the difference between them is residual image. To obtain the mapping between residual and LRI, coupled dictionaries are learned from joint data composed of residual image patch and LRI patch features. Considering that distinguished texture and structural characteristics reflected in image patches and dictionary learning efficiency as well, multi-groups of coupled dictionary and alternative learning scheme are proposed. In reconstruction phase, LRI is obtained first. Then sparse representations and corresponding errors are calculated for each patch of the LRI by using low resolution component of each group of coupled dictionary. The residual component of coupled dictionary with minimum errors is applied to reconstruct the corresponding residual image patch. All such reconstructed residual patches compose a residual image. Finally, the residual image and the LRI are fused to produce an expected HRI. An experimental study is performed to establish that the proposed approach improves the super-resolution reconstruction
quality.

References


Index Terms

Computer Science  Image Processing
Keywords
Super-resolution  Sparse Representation  Multi-dictionary  Alternative Learning  Principal Subspace
Orthogonal Gaussian Mixture Model