Dual-geometric neighbor embedding for image super resolution with sparse tensor.

Neighbors embedding (NE) technology has proved its efficiency in single image super resolution (SISR). However, image patches do not strictly follow the similar structure in the low-resolution and high-resolution spaces, consequently leading to a bias to the image restoration. In this paper, considering that patches are a set of data with multiview characteristics and spatial organization, we advance a dual-geometric neighbor embedding (DGNE) approach for SISR. In DGNE, multiview features and local spatial neighbors of patches are explored to find a feature-spatial manifold embedding for images. We adopt a geometrically motivated assumption that for each patch there exists a small neighborhood in which only the patches that come from the same feature-spatial manifold, will lie approximately in a low-dimensional affine subspace formulated by sparse neighbors. In order to find the sparse neighbors, a tensor-simultaneous orthogonal matching pursuit algorithm is advanced to realize a joint sparse coding of feature-spatial image tensors. Some experiments are performed on realizing a 3X amplification of natural images, and the recovered results prove its efficiency and superiority to its counterparts.