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Abstract

Transforming an original image into a high-dimensional (HD) feature has been proven to be effective in classifying images. This paper presents a novel feature extraction method utilizing the HD feature space to improve the discriminative ability for face recognition. We observed that the local binary pattern can be decomposed into bit-planes, each of which has scale-specific directional information of the face image. Each bit-plane not only has the inherent local-structure of the face image but also has an illumination-robust characteristic. By concatenating all the decomposed bit-planes, we generate an HD feature vector with an improved discriminative ability. To reduce the computational complexity while preserving the incorporated local structural information, a supervised dimension reduction method, the orthogonal linear discriminant analysis, is applied to the HD feature vector. Extensive experimental results show that existing classifiers with the proposed feature outperform those with other conventional features under various illumination, pose, and expression variations.

Keywords: Face recognition, feature extraction, local binary pattern, high-dimensional feature, linear discriminant analysis, bit-plane decomposition