Face Recognition Using Sparse Fingerprint Classification Algorithm

ABSTRACT:

Unconstrained face recognition is still an open problem as state-of-the-art algorithms have not yet reached high recognition performance in real-world environments. This paper addresses this problem by proposing a new approach called Sparse Fingerprint Classification Algorithm (SFCA). In the training phase, for each enrolled subject, a grid of patches is extracted from each subject's face images in order to construct representative dictionaries. In the testing phase, a grid is extracted from the query image and every patch is transformed into a binary sparse representation using the dictionary, creating a fingerprint of the face. The binary coefficients vote for their corresponding classes and the maximum-vote class decides the identity of the query image. Experiments were carried out on seven widely-used face databases. The results demonstrate that when the size of the dataset is small or medium (e.g., the number of subjects is not greater than one hundred), SFCA is able to deal with a larger degree of variability in ambient lighting, pose, expression, occlusion, face size, and distance from the camera than other current state-of-the-art algorithms.

INTRODUCTION:

FACE recognition has been a very active area of research in computer vision, making many important contributions since the 1990s. In recent years the emphasis of face recognition research has shifted to dealing with unconstrained conditions, including variability in ambient lighting, pose, expression, face size, occlusion and distance from the camera . In the last few years, many approaches have been proposed to deal with the aforementioned problems . Algorithms based on Sparse Representation Classification (SRC) have been widely explored recently. In the sparse representation approach, a dictionary is built from the gallery images, and matching is done by reconstructing the query image using a sparse linear combination of the

dictionary. The identity of the query image is assigned to the class with the minimal reconstruction error. Many variations of this approach were recently proposed. In, registration and illumination are simultaneously considered in the sparse representation. In , an intra-class variant dictionary is constructed to represent the possible variation between gallery and query images. In , sparsity and correlation are jointly considered. In and , structured sparsity is proposed for dealing with occlusion and illumination. In, the dictionary is assembled by the class centroids and sample-to-centroid differences.