Abstract

Identifying an individual based on a face image is a simple task for humans to perform and a very difficult one for Vision Computing. Since 1993, several research groups in all over the world have been studied this problem. Most of the methods proposed for recognizing the identity of an individual represent a n intensity pixel image as a n-dimensional vector, when, in general, n is a very large number value. Face images are highly redundant, since every individual has two eyes, one nose, one mouth and so on. Then, instead of using n intensity values, it is generally possible to characterize an image instance by a set of p features, for $p << n$. This work studies face recognition systems consisting of a PCA stage for dimensionality reduction followed by a classifier. The PCA stage takes the n-pixels face images and produces the corresponding p most expressive features, based on the whole available training set. Three classifiers proposed in the literature are studied: the Euclidean and Mahalanobis distances, the RBF neural network, and the Fisher classifier. This work also proposes a new classifier, which introduces the concept of Mixture Covariance Matrices (MPM) in the Minimum Total Probability of Misclassification rule for normal populations. The four classifiers are evaluated using the Olivetti Face Database varying their parameters in a wide range. In the experiments carried out to compare those approaches the new proposed classifier reached the best recognition rates and showed to be less sensitive to the choice of the training set.