

Faces detection: The Eigenfaces method

A dataset is provided that contains face images, in matlab format: Olivetti.mat. The dataset consists of images of 40 different faces, with each face being imaged 10 times. Each image consists of 64×64 (rows \times columns), as in Fig. 1.

The purpose of this exercise is to apply the method of Principal Component Analysis, in order to identify different faces:

1. Divide the dataset into training and test subset (the intersection of the two subsets must be empty, but all 40 persons must be included in both subsets).
2. Apply the method of PCA to the training set and define the required number of eigenvalues .
3. Identify each of the faces in the remaining test set, as following:
 - a. For each unknown face
 - i. Calculate its projection to each of the eigenfaces
 - ii. Use the projections as features to classify the unknown face into one of the 40 different faces (you may use any classifier of your choice)
4. Create the (40x40) Confusion matrix



Fig. 1. The Olivetti dataset