PART A: PCA COMPRESSION

Download the dataset of faces from the website. Scale each image to at least 60% when you are processing them.

Compute the mean and the covariance matrix of the pixels of the images using only the first 20 people and the first 5 expressions. Let’s call this set the “training set” and call the set containing the remaining faces the “test set”.

Compute the principal components of the images. These are called eigenfaces.

Compress some of the faces belonging to the training set by representing them with summation of principal components. Evaluate the compression error both visually and by the use of SSD (sum of square differences) error metric using respectively 10, 50, 100 and 200 eigenfaces.

Compress some of the faces belonging to the test set and evaluate the error as before.

Try to compress your own face or some other images which do not represent faces. Note that the size of these images has to be the same as the size of the ones used to compute the eigenfaces.

PART B: FACE DETECTOR

Compute the mean and the eigenfaces using the entire dataset. Load FaceDetection.bmp. Plot the not being a face error for each x-position in the image using the SSD compression error and locate the global minimum.


Tips: Some Matlab commands you might find useful: eigs