

4105109 Computer Vision
Assignment #1

Deadline : 10/15 (Wed) 11:59 p.m.

Apply PCA to AR face datasets. It comprises images from 100 subjects, each of which has 26 images in lighting and occlusion conditions.

AR Face Dataset

- **AR Face Database**

- **50 males, 50 females**
- **1 : Neutral expression**
- **2 : Smile**
- **3 : Anger**
- **4 : Scream**
- **5 : Left light on**
- **6 : Right light on**
- **7 : All side lights on**
- **8 : Wearing sun glasses**
- **9 : Wearing sun glasses and left light on**
- **10 : Wearing sun glasses and right light on**
- **11 : Wearing scarf**
- **12 : Wearing scarf and left light on**
- **13 : Wearing scarf and right light on**
- **One session has 13 images. There are two sessions for each person.**



(a) Using PCA to project the data into a space of dimensionality $d = 1, 5, 9$. To do so, use session 1 as training set to compute eigenvectors and use session 2 as testing images.

Then, show the following results:

- For each value of d , show the d eigenfaces, and
- For each subject, randomly select an image from its test set, and then display the respective approximation using the d eigenfaces (for each value of d).

(b) With the learned projections by PCA for $d = 1, 5, 9$, perform face recognition via *nearestneighbor search* for all test images, and report their error rate.