4105109 Computer Vision

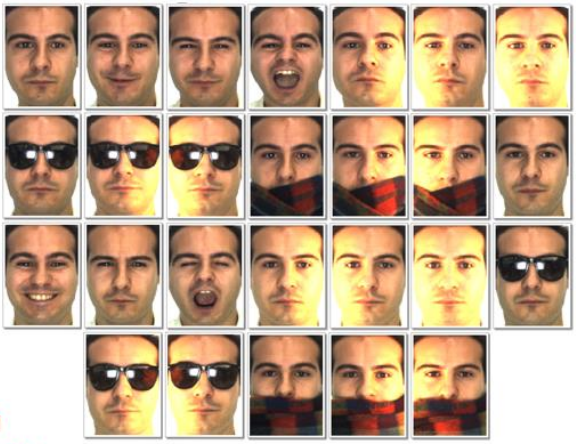
Assignment #1

Deadline : 10/27(Tue) 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:

(i) For each value of d, show the d eigenfaces, and

(ii) 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 *nearest neighbor search* for all test images, and report their error rate.