

## Q657 Project 2: Eigenfaces

**Due: Tuesday March 4th before class.**

You are to use Principle Component Analysis (PCA) to compute Eigenfaces and corresponding Eigenvalues of the face data, and then we are to

- Project the data into a 2D space defined by the first two principle components and find the face(s) that is closest to yours.
- Find the best two principle components (a 2D subspace) that you can separate individual faces using the k-mean clustering method (k equal to the number of people, we have six pictures per person).
- Find the best two principle components that the k-mean clustering method can group data points (faces) into two categories -- male and female.
- Use k nearest neighbors to build a male-female classifier. To report the result, you need to use cross-validation (e.g. 50% of data as training and the other half used in testing).
- Find the best two principle components that the k-mean clustering method can group data points (faces) into three facial expression categories – neural, happy and sad.
- Report quantitative results (correct %) and visualize the results in the 2D figures for the above tasks.
- Write a report to describe the performance of your face programs, analyze the results and discuss possible improvements.
- Report individual efforts in the project (who implements which parts, etc.).

Hint: You can do whatever pre-processing on the original images.