CS 6643 **Fall 2017**
Project 2: Face Recognition **E. K. Wong**

Project description. Design a face recognition system using the eigenface method you have learned in class. You will be given a set of M training images and another set of test images. Use the training images to produce a set of eigenfaces. Then recognize the face in the input image using the eigenface method. Use Euclidean distance as distance measure for computing d_i, for $i = 0$ to M. You can manually choose the thresholds T_0 and T_1 that produce the best results.

Python, C/C++, Matlab or Java are the recommended programming languages. You can use built-in library functions to read/write/display images, to compute eigenvalues and eigenvectors, and to perform other matrix/vector arithmetic operations, but you cannot use library functions to perform other steps you are required to implement in the project.

What to hand in:

a) An **MS Words file** that contains your **source code** (with full comments and documentation), the **language** and **compiler** used, **instructions on how to compile and run your program**, **and the following**: (1) The manually chosen thresholds $T_0\ and\ T_1,$ the mean face m, and the M eigenfaces. The eigenfaces are contained in the matrix $U,$ with each column represents an eigenface. You can output each eigenface as an $N \times N$ image. (2) The PCA coefficients $\overrightarrow{(\Omega_i)}$ for each training image. (3) For each test image: the image after subtracting the mean face $(\vec{I})$, its PCA coefficients (Ω_I), the reconstructed face image $(\vec{I}_R)$, distances d_i for $i = 0\ to\ M$, and classification result (*non-face, unknown face,* or *identify of face.*) To put images on an MS Words file, you can simply do a copy-and-paste operation.

b) Your **executable code**, the **original output image files** as described in (a) above as individual files.

Points will be taken off if any of the above are missing.