**Homework 2**

**A051010 林奕汝**

Principal Component Analysis (PCA)

1. Take the whole dataset consisting of d-dimensional samples ignoring the class labels.
2. Compute the d-dimensional mean vector, that is the means for every dimension.
3. Compute the covariance matrix of the whole data set.
4. Compute eigenvectors (e1,e2,...,ed) and corresponding eigenvalues (λ1, λ2,...,λd).
5. Sort the eigenvectors by decreasing eigenvalues and choose k eigenvectors with the largest eigenvalues to form a d×k dimensional matrix W (where every column represents an eigenvector).
6. Use this d×k eigenvector matrix to transform the samples onto the new subspace. This can be summarized by the mathematical equation: y=WT×x (where x is a d×1-dimensional vector representing one sample, and y is the transformed k×1-dimensional sample in the new subspace.)

# Reference:

# http://sebastianraschka.com/Articles/2014\_pca\_step\_by\_step.html