# CS6001 Assignment 2: Face vs. Non-face

**This project will implement the Generative model for face classification (classifying face images from background images).**

A dataset of faces and non-face background images are uploaded to Canvas.

**<u>Important note: don't re-distribute the dataset. We only use it in our class projects.</u>**

(1). Describe the image data of each class with a multivariate Gaussian distribution ($face: w = 1; non-face: w = 0$):

$$\Pr(x|w = 1) = Norm_x[\mu_1, \Sigma_1]$$

$$\Pr(x|w = 0) = Norm_x[\mu_0, \Sigma_0]$$

Learn the parameters of each class ($\mu_w, \Sigma_w$) from the training dataset using the previous introduced methods such as the Maximum Likelihood.

(2). During the inference, we assume the prior of each class is equal. Apply the Bayesian rule to the training and testing dataset and report the accuracy.

Something to try during the project:

(a) Assume the covariance matrix is a diagonal matrix, build the generative model and visualize the mean and variance (e.g., Figure 7.2);
(b) Use the single red, green and blue channel for the generative model, and compare their performance with the three channels together;
(c) Try some other color spaces;
(d) Try the spatial gradient of the images (magnitude and orientation);
(e) (Optional) Try the image whitening or histogram equalization technique to overcome the illumination problem.

**Upload running MATLAB codes and a written report to Canvas by the due date & time including**

a) Brief summary of what you think the project was about,

b) Brief outline of the algorithmic approach,

c) Pictures of intermediate and final results that convince me that the program does what you think it does.

d) Any design decisions you had to make and your experimental observations. What do you observe about the behavior of your program when you run it? Does it seem to work the way you think it should? Play around a little with different setting to see what happens. Note, your open-ended exploration is highly valued.