

Pattern Recognition

**ECE 4363 / ECE 5363
Spring 2019**

Project 3

1. Synthesize a 2-class problem with samples drawn from two Gaussian distributions with the following parameters.

```
m=[zeros(5,1) ones(5,1)];  
S(:,1)= [0.8 0.2 0.1 0.05 0.01;  
          0.2 0.7 0.1 0.03 0.02;  
          0.1 0.1 0.8 0.02 0.01;  
          0.05 0.03 0.02 0.9 0.01;  
          0.01 0.02 0.01 0.01 0.8];  
S(:,2)= [0.9 0.1 0.05 0.02 0.01;  
          0.1 0.8 0.1 0.02 0.02;  
          0.05 0.1 0.7 0.02 0.01;  
          0.02 0.02 0.02 0.6 0.02;  
          0.01 0.02 0.01 0.02 0.7];  
P=[1/2 1/2]';
```

2. Draw $N^{train} = 100$ training samples with `rng(0)` and $N^{test} = 10,000$ test samples with `rng(100)`.
3. Use the training samples to learn three classifiers:
 - i. Naïve Bayes classifier
 - ii. Bayes classifier that uses MLE for parameter estimation
 - iii. Bayes classifier that uses the true parameter values
4. Report test errors for each classifier using the test samples
5. Repeat steps 2-4 with $N^{train} = 1000$.

Upload a single m-file to Blackboard before midnight on 04/05/19.