

Pattern Recognition

ECE 4363 / ECE 5363

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)`. For those programming in Python, the datasets are provided in the attached Excel files.
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 clearly for each classifier using the test samples
5. Repeat steps 2-4 with $N^{train} = 1000$.

Upload a single m-file or py-file named Lastname_Project3.* to Blackboard prior to the deadline.