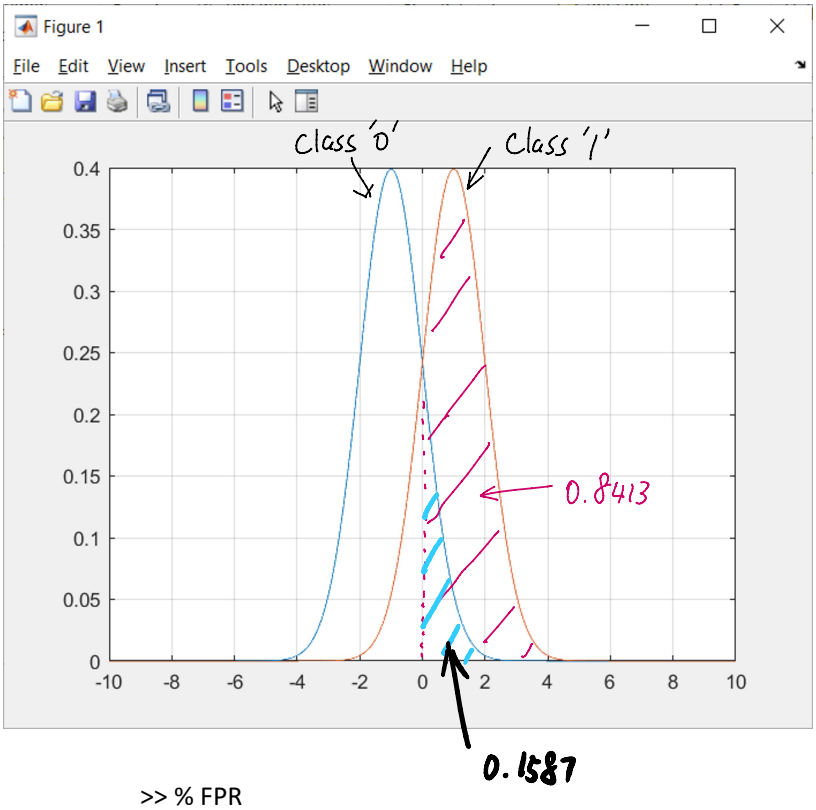
Lecture 11

The ROC (Receiver Operating Characteristic) Curve

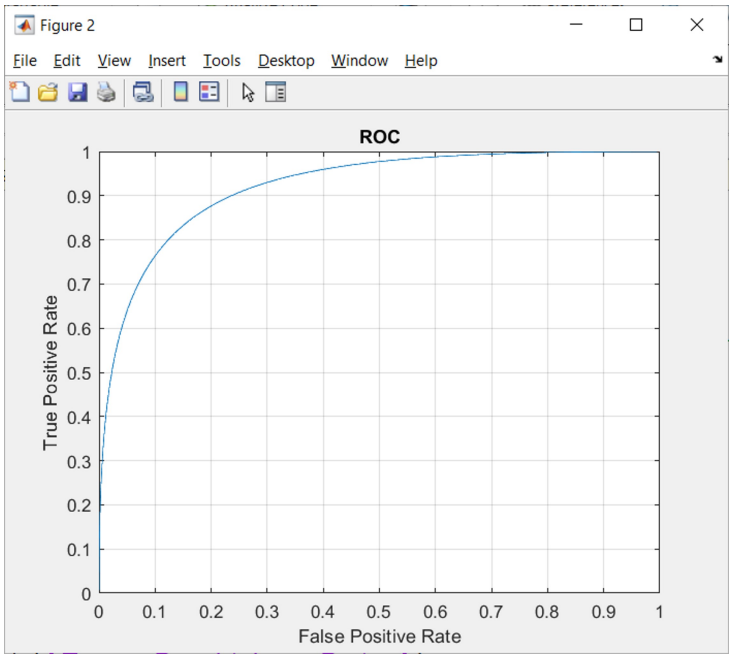
http://www.ece.uah.edu/~dwpan/course/ee610/code/Performance%20Evaluation/roc_pdf.m

```
>> clear all;
close all;
D = 1;  % 2D is the distance between two means
sigma = 1;
m0 = -D;
m1 = D;
x = -10:0.01:10;
f0 = 1/(sqrt(2*pi)*sigma)*exp(-(x-m0).^2/(2*sigma^2));
f1 = 1/(sqrt(2*pi)*sigma)*exp(-(x-m1).^2/(2*sigma^2));
plot(x,f0);
hold on;
plot(x,f1);
Grid

>> B = 0;
>> % TPR for Class 1
TPR = qfunc((B - m1)/sigma)

TPR =

   0.8413

% FPR
FPR = qfunc((B - m0)/sigma)
```




```
>> % FPR
FPR = qfunc((B - m0)/sigma)

FPR =

   0.1587
```

```
>> % Decease B continously to generate the ROC curve
% Both TPR and FPR will be in an increasing order
B = 10: -0.01: -10;
TPR = qfunc((B - m1)/sigma);
FPR = qfunc((B - m0)/sigma);
>> figure;
plot(FPR, TPR); grid
xlabel('False Positive Rate');
ylabel('True Positive Rate');
title('ROC');

>> % Area under the ROC curve
% Note: Both FPR and TPR are going from highest to lowest
AUC = trapz(FPR, TPR)

AUC =

    0.9213
```



Unsupervised Learning

K-Means