Pattern Recognition Practical 3

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Assignment 1 Classification error, hit/false alarm rates, ROC curve, discriminability

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Figure 1 shows the ROC-curves we acquired using the code given in listing **??** in the appendix. The figure shows that the higher the difference between the means of the two distributions is (i.e. the further away the distributions are from each other), the higher the number of hits is per number of fals alarms. This means that classification will go better when distributions are farther away from each other, which is of intuitively comprehensable as well.

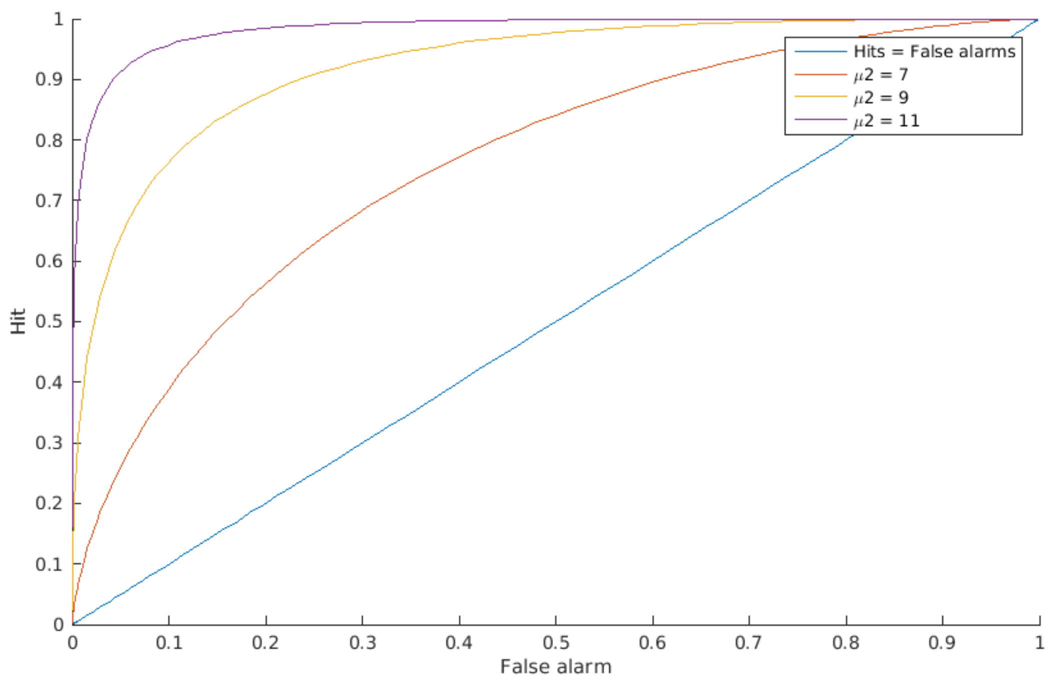

Figure 1: ROC-curves for $\mu_2 = 7, 9, 11$ and the hits = false alarms marker line.

Assignment 2 K-nearest neighbor classification

Assignment 3 Parzen windows, posterior probabilities

Appendix

../Code/assign1_1.m

```
% 1. Choose a value of x    and compute the probabilities of hit (h) and false
    alarm (fa).
% x* = 6
% hit = integral 6 to inf for dist 2 = 1 - integral -inf to 6 =
1 - normcdf(6, 7, 2)
% fa = integral 6 to inf for dist 1 = 1 - integral -inf to 6 =
1 - normcdf(6, 5, 2)

% Plot the point (fa, h) in a graph with horizontal axis fa and vertical axis h.
% Choose a few other values of x    in the interval [  1   3  ;   2 + 3  ] (-1
    ; 13)
% and plot the corresponding (fa, h) points too. Repeat the computation of a ROC
% curve for the cases   2 = 9 and   2 = 11 and plot all three ROC curves in the
    same
% diagram.
x = []; y1 = []; y2 = []; y3 = [];
for xStar = -1:0.1:13
    x(end+1) = (1 - normcdf(xStar, 5, 2));
    y1(end+1) = (1 - normcdf(xStar, 7, 2));
    y2(end+1) = (1 - normcdf(xStar, 9, 2));
    y3(end+1) = (1 - normcdf(xStar, 11, 2));
end
hold on
plot(x,x)
plot(x,y1)
plot(x,y2)
plot(x,y3)
xlabel('False alarm')
ylabel('Hit')
legend('Hits = False alarms', '\mu2 = 7','\mu2 = 9','\mu2 = 11')

% What is the value of the discriminability d for
% each of these cases?
% D(9) = (9-5)/2 = 2,
% D(11) = (11-5)/2 = 3
```

[caption=Code assignment 1.1,label=ass1.1]