

DD2431 Machine Learning

Help for lab 3, Bayes Classifier & Boosting

Staffan Ekvall

April 28, 2010

This document can be used as a help to verify that you have completed each step. Compare your results to the data given here. The data we operate on is just the first 10 rows of each data set. Thus, it is possible to calculate by hand what to expect at each step.

```
>> data1 = data1(1:10,:)
data1 =
    0.4211    0.3684         0
    0.3529    0.3529         0
    0.3000    0.4000         0
    0.5556    0.3889         0
    0.5263    0.3684         0
    0.3250    0.3500         0
    0.3372    0.3488         0
    0.3370    0.3478         0
    0.3759    0.3534         0
    0.4302    0.3663         0
>> data2 = data2(1:10,:)
data2 =
    0.4353    0.3294    1.0000
    0.3594    0.3438    1.0000
    0.3618    0.3374    1.0000
    0.3660    0.3447    1.0000
    0.3632    0.3498    1.0000
    0.3600    0.3511    1.0000
    0.3525    0.3525    1.0000
    0.3534    0.3534    1.0000
    0.3562    0.3519    1.0000
    0.3612    0.3524    1.0000
>> test_data = [data1; data2];
```

Assignment 1 & 2

```
>> [mu sigma] = bayes(test_data)
mu =
    0.3961    0.3645
    0.3669    0.3466
sigma =
    0.0823    0.0170
    0.0231    0.0075
>> p = prior(test_data)
p = 0.5000    0.5000
>> g = discriminant(test_data(:,1:2), mu, sigma, p);
g =
    5.8082    1.0339
    5.5112    7.4298
    3.0103   -21.3728
    2.9706   -41.0217
    4.6021   -19.9444
    5.1422    6.2244
    5.1986    7.0972
    5.1396    7.1134
    5.6362    7.4844
    5.7894    0.8115
    3.6299    0.9753
    5.0336    7.8360
    4.5185    7.1837
    5.1316    7.9279
    5.4245    7.8630
    5.4732    7.7414
    5.4883    7.4687
    5.5343    7.3840
    5.4890    7.6087
    5.5377    7.6370
error_test = 0.3000
```

You should be able to explain why the decision function looks as it does!

Assignment 3 & 4

```
>> [mu sigma p alpha classes] = adaboost(test_data, 6)
mu(:, :, 1) =
    0.3961    0.3645
    0.3669    0.3466
mu(:, :, 2) =
    0.3759    0.3589
    0.3749    0.3446
mu(:, :, 3) =
    0.3713    0.3574
    0.3795    0.3435
mu(:, :, 4) =
    0.3713    0.3574
    0.3637    0.3495
mu(:, :, 5) =
    0.3604    0.3544
    0.3699    0.3478
mu(:, :, 6) =
    0.3587    0.3538
    0.3729    0.3470
sigma(:, :, 1) =
    0.0823    0.0170
    0.0231    0.0075
sigma(:, :, 2) =
    0.0693    0.0149
    0.0310    0.0090
sigma(:, :, 3) =
    0.0637    0.0138
    0.0338    0.0095
sigma(:, :, 4) =
    0.0637    0.0138
    0.0226    0.0070
sigma(:, :, 5) =
    0.0503    0.0109
    0.0295    0.0088
sigma(:, :, 6) =
    0.0463    0.0101
    0.0319    0.0094
p =
    0.5000    0.5000
    0.5952    0.4048
    0.6245    0.3755
    0.3558    0.6442
    0.4772    0.5228
    0.5130    0.4870
```

```
alpha =  
    0.4236  
    0.1682  
    0.9847  
    0.3641  
    0.1257  
    0.2397  
classes =  
    0  
    1  
boost_error_test = 0.2000
```