

## 2D1431 Machine Learning

Help Document for lab 2, Bayes Classifier & Boosting

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This document should 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
```