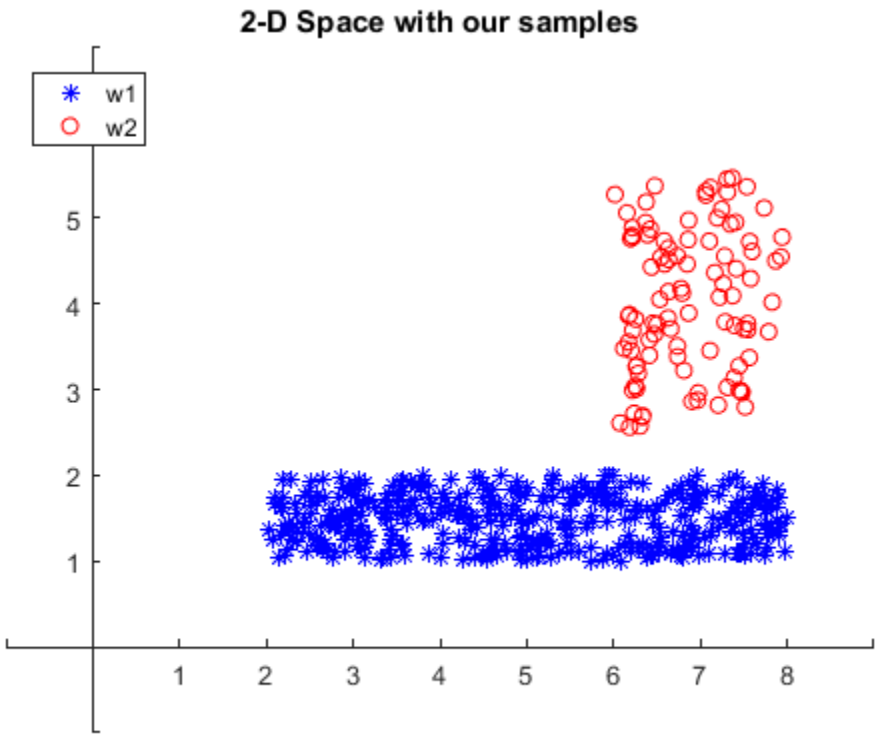
Table of Contents


```
close all
clc;clear;
rng default
```

part A

```
[w1, w2] = A();
```

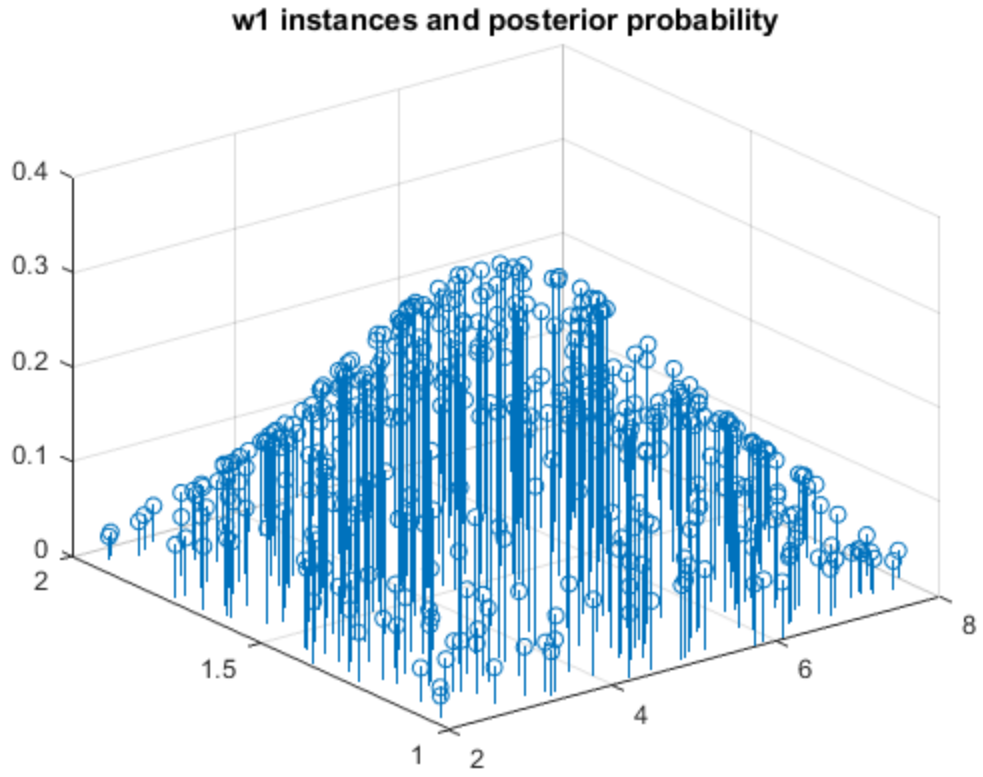
part A: Generate data

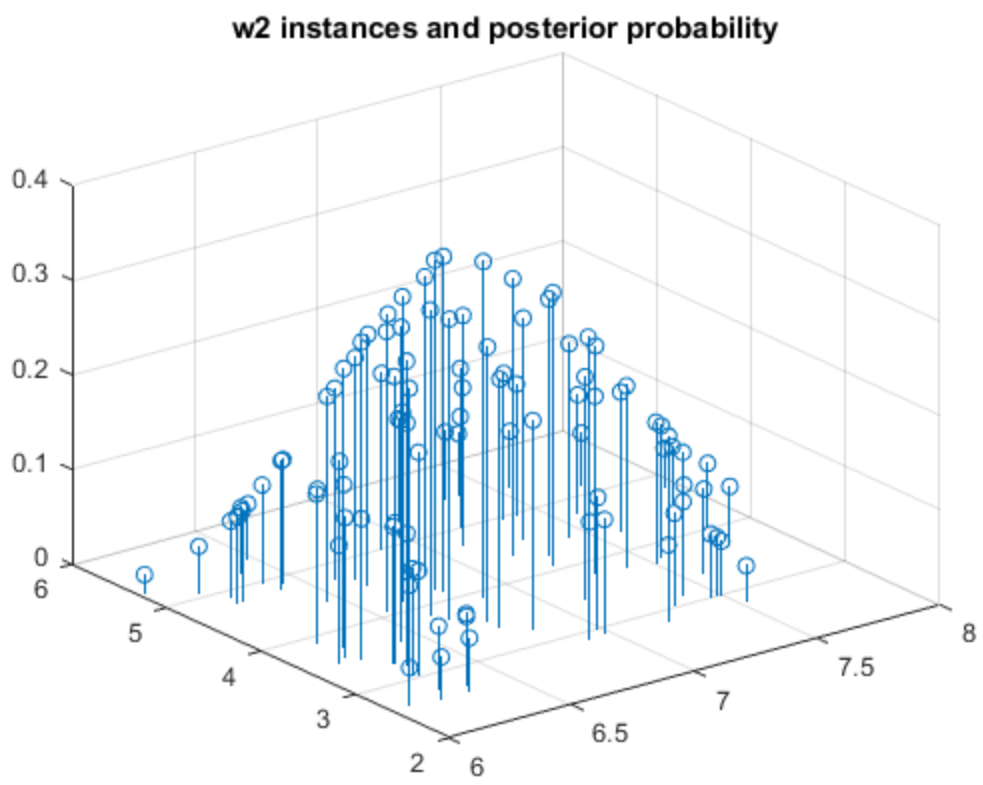


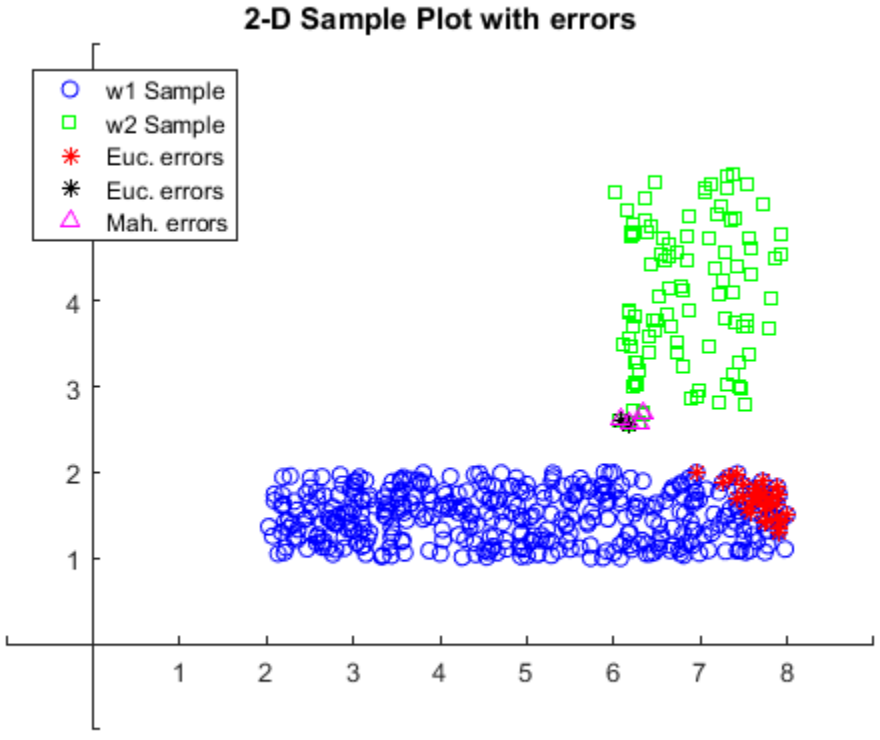
part B

```
[m1, m2, s1, s2] = B(w1, w2);
```

```
part B: Bayessian Classification in 2-D space

w1 mean is [4.9673      1.4918]
w2 mean is [6.8619      4.0363]

NN (Euc) error : 6.4%
NN (Mah) error : 1%
Warning: Ignoring extra legend entries.

Bayesian error : 0%
```




w2 instances and posterior probability
0.4
0.3
0.2
0.1
0
6
5
4
3
2
6
6.5
7
7.5
8


2-D Sample Plot with errors
w1 Sample
w2 Sample
Euc. errors
Euc. errors
Mah. errors
4
3
2
1
1
2
3
4
5
6
7
8

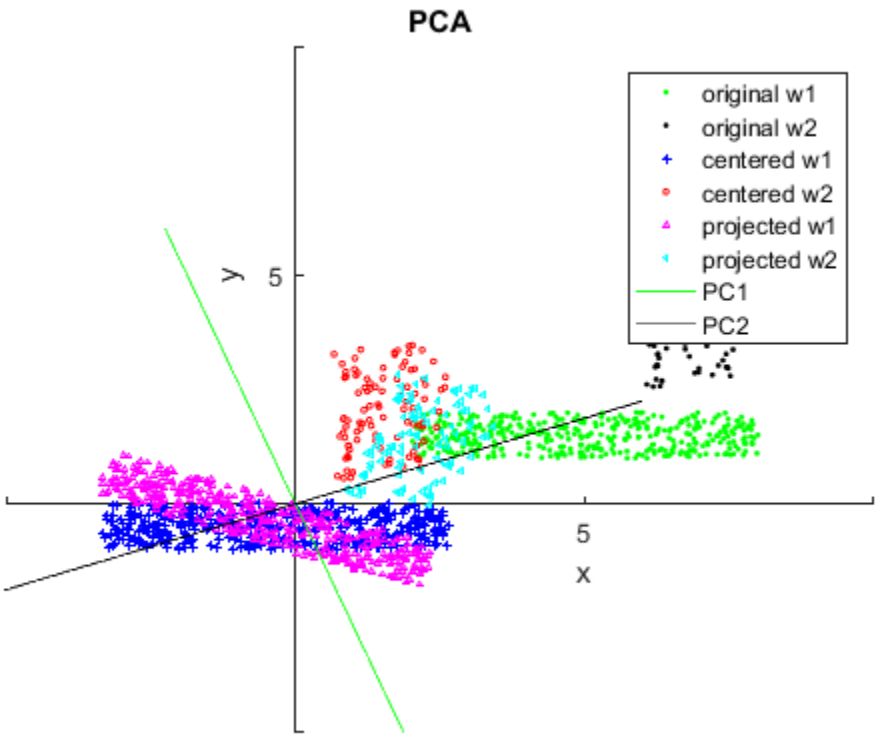
part C

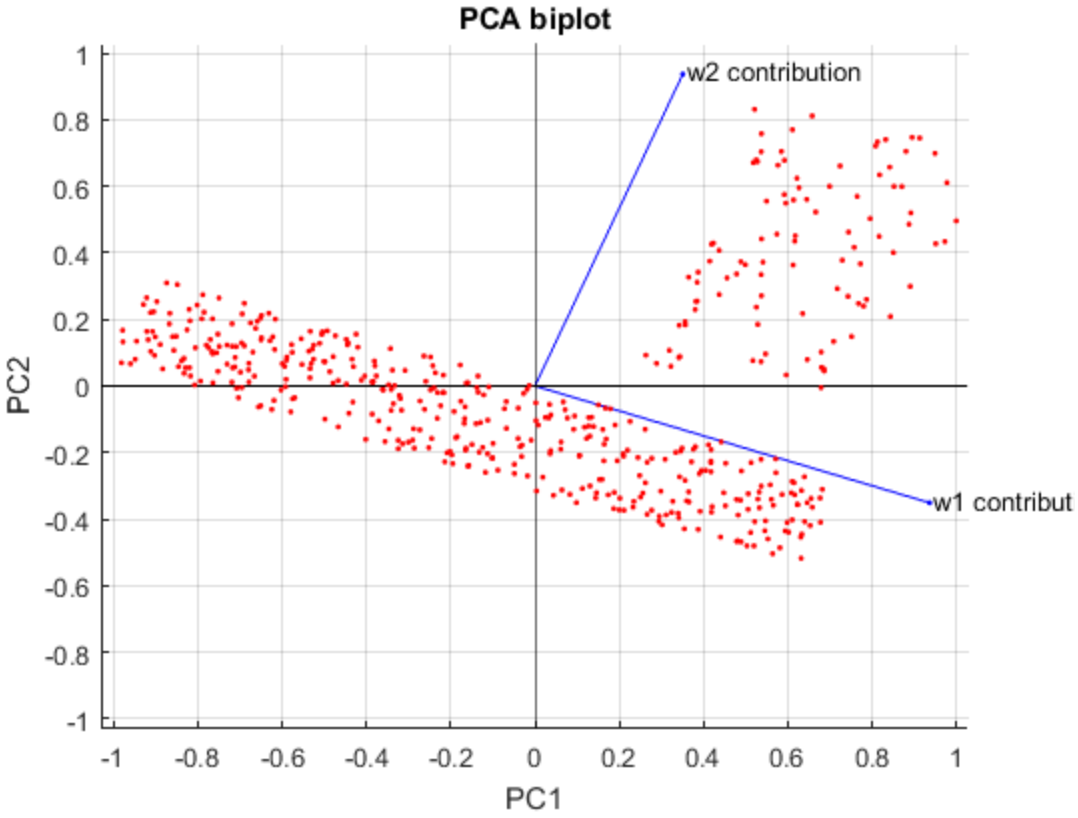
```
C(w1, w2, m1, m2, s1, s2)
```

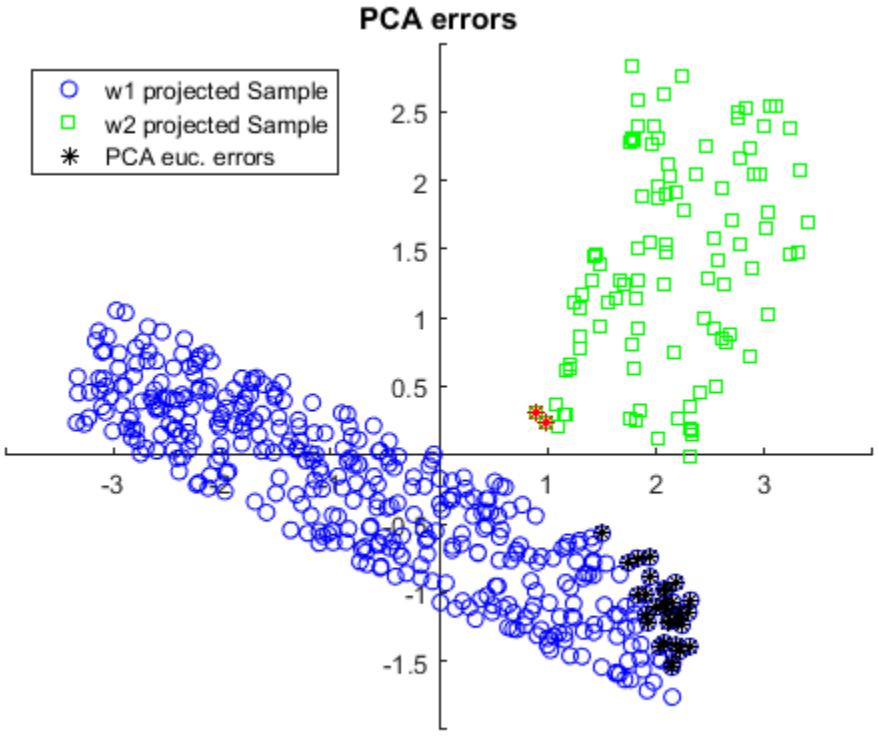
part C: Features' dimensionality deduction

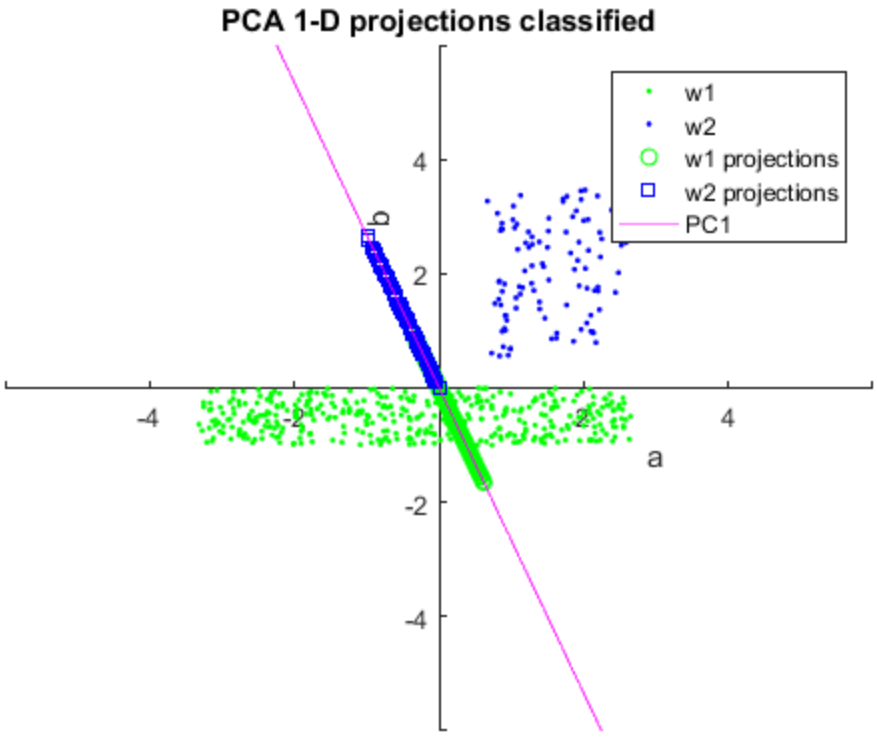
Variance explained by PC1 : 77.776%
After PCA (Euc) classification error with 2-D data : 6.4%
PCA 1-D projections (Euc) classification error : 11%

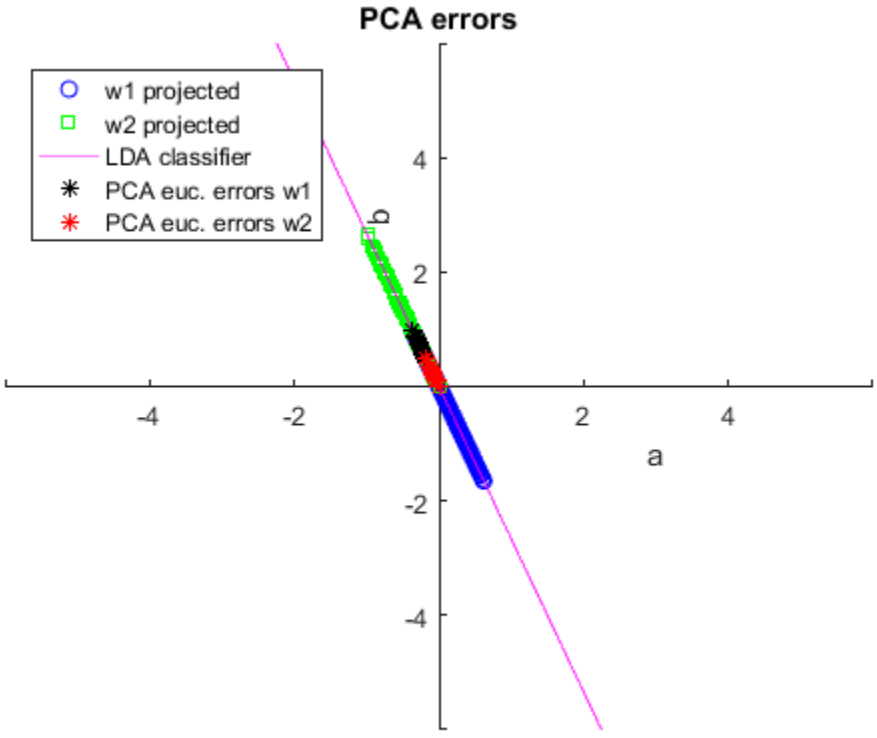
LDA 2-D classification error : 1.2%
LDA 1-D projections (Euc) classification error : 28.6%

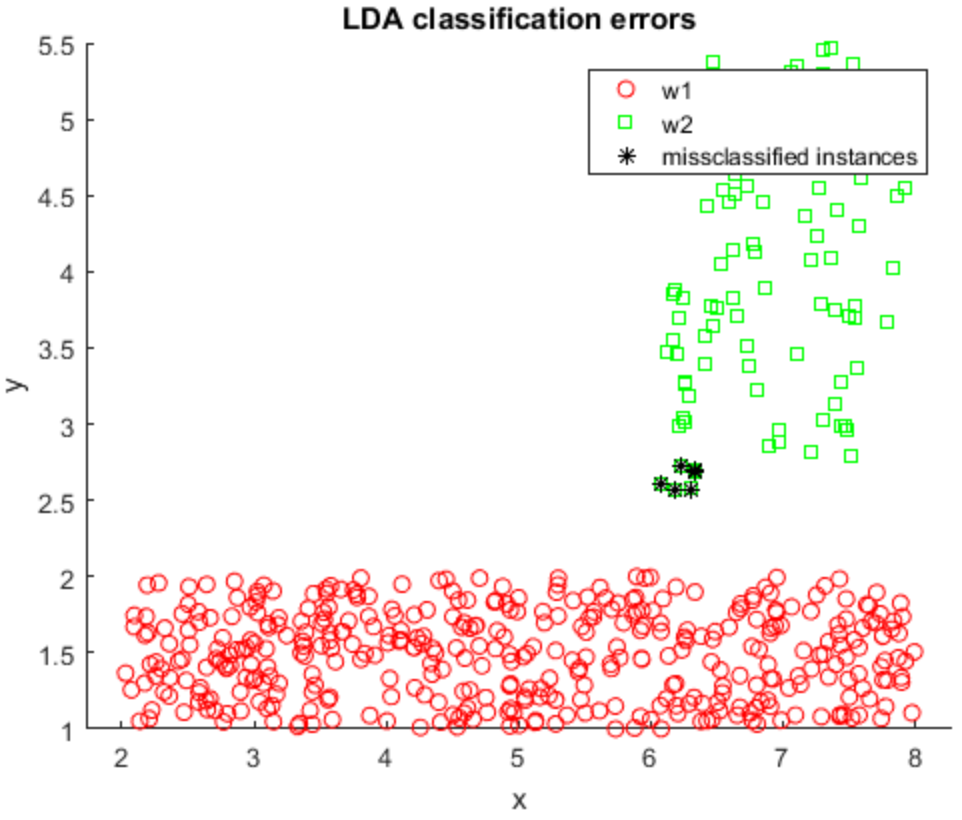


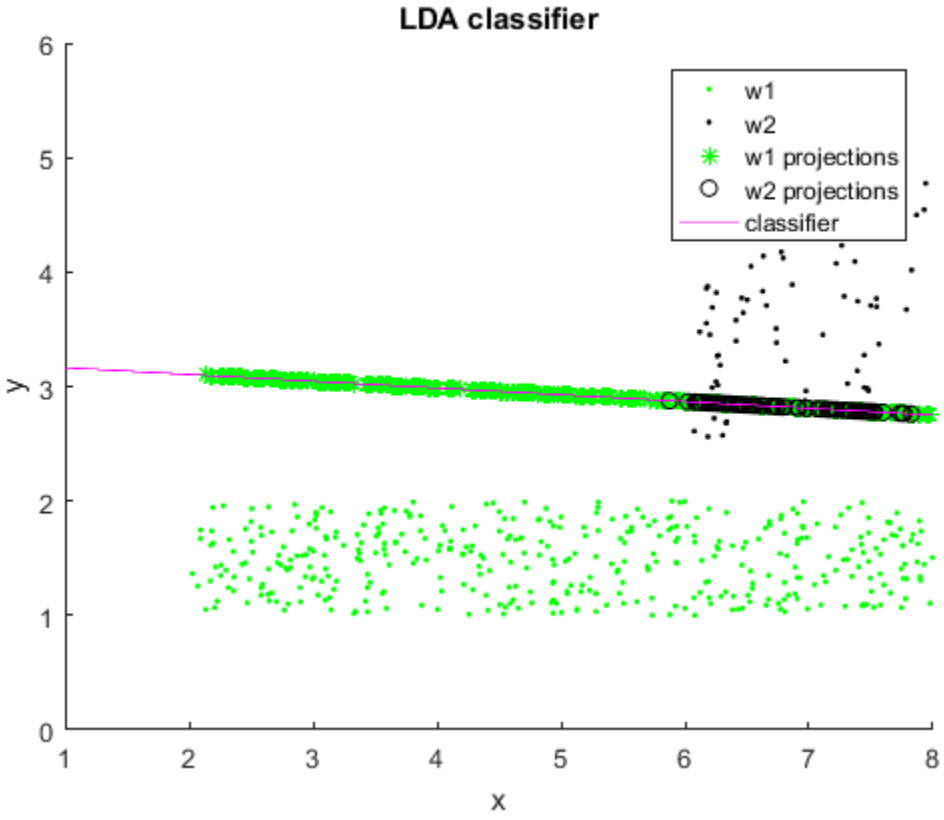

PCA biplot
w2 contribution
w1 contribut
PC1
PC2
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1
-0.8
-0.6
-0.4
-0.2
0
0.2
0.4
0.6
0.8
1

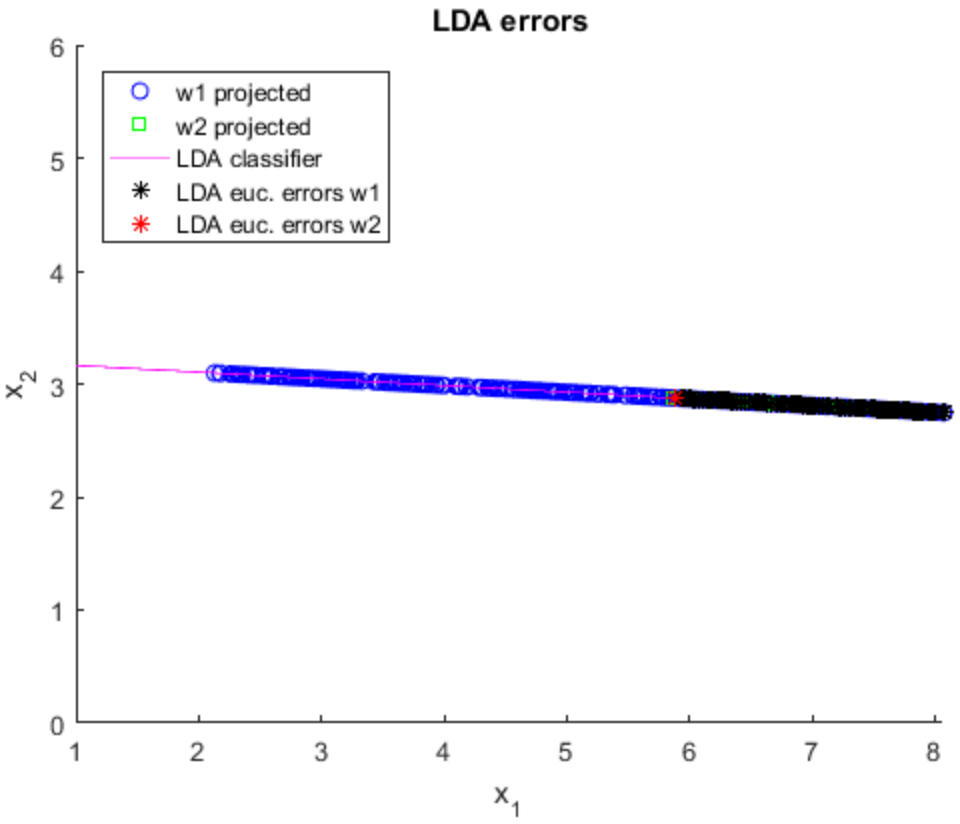

PCA errors
w1 projected Sample
w2 projected Sample
PCA euc. errors
2.5
2
1.5
1
0.5
-1
-1.5
-3
1
2
3


PCA 1-D projections classified
w1
w2
w1 projections
w2 projections
PC1
4
2
-2
-4
-4
-2
2
4
a
b


PCA errors
w1 projected
w2 projected
LDA classifier
PCA euc. errors w1
PCA euc. errors w2
4
2
-2
-4
-4
-2
2
4
a
b


LDA classification errors
w1
w2
missclassified instances
y
x
5.5
5
4.5
4
3.5
3
2.5
2
1.5
1
2
3
4
5
6
7
8

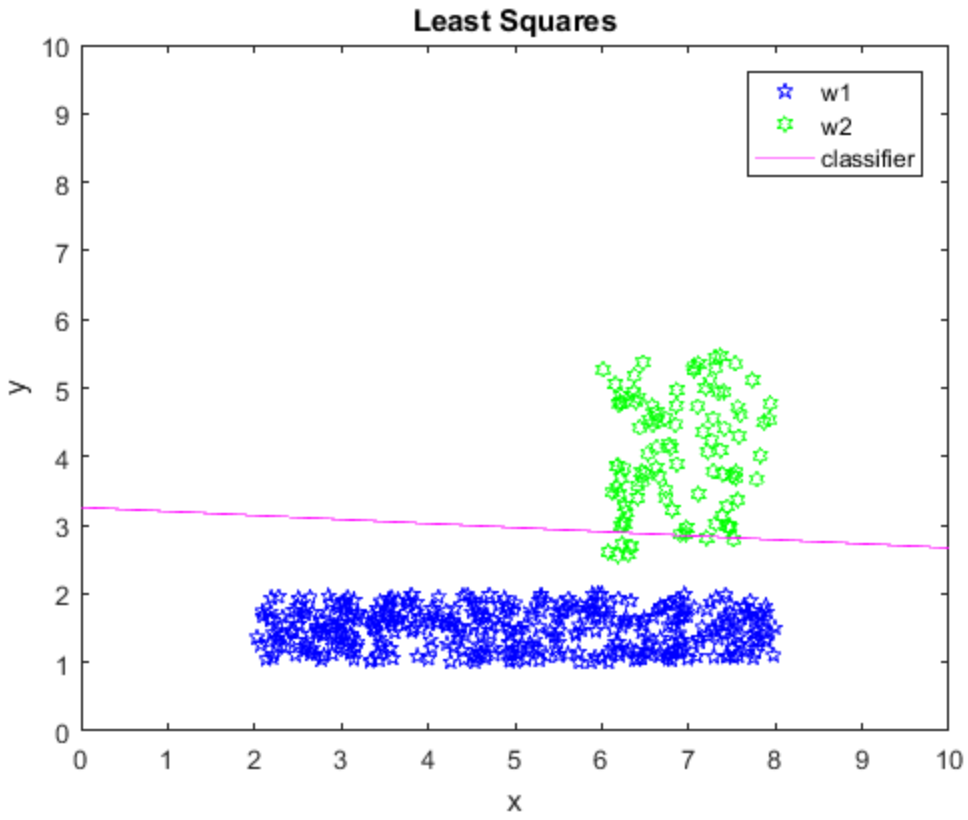

LDA classifier
w1
w2
w1 projections
w2 projections
classifier
y
x
6
5
4
3
2
1
0
1
2
3
4
5
6
7
8

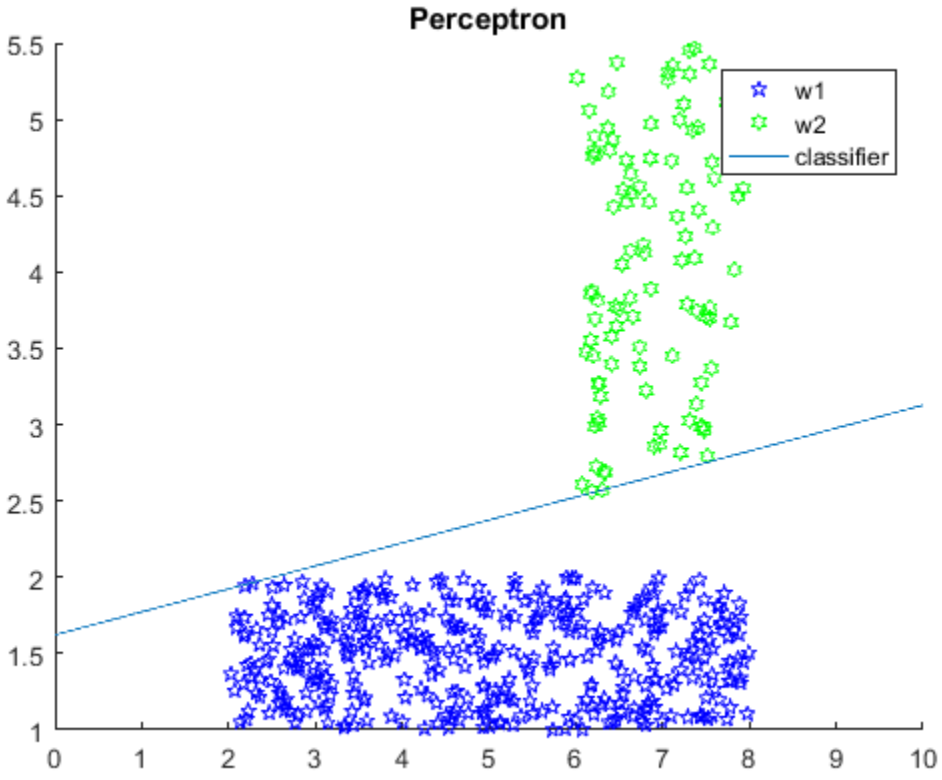


part D

```
D(w1, w2)
```

```
part D: Linear classification with several cost functions

Minimum least Square Error is: 49.9357
Least Squares classification error : 1.6%

finished in: 144 steps
Perceptron classification error : 0%

 The end :)
```


Least Squares
w1
w2
classifier
y
x
0
1
2
3
4
5
6
7
8
9
10


Perceptron
w1
w2
classifier
1
1.5
2
2.5
3
3.5
4
4.5
5
5.5
0
1
2
3
4
5
6
7
8
9
10

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