

ISLR Lab

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4.6.3 Linear Discriminant Analysis

```
[1]: library(ISLR)  
      attach(Smarket)
```

```
[14]: train=(Year <2005)  
Smarket.2005= Smarket [!train ,]  
Direction.2005= Direction [!train]
```

```
library(MASS)  
lda.fit=lda(Direction~Lag1+Lag2 ,data=Smarket ,subset=train)  
print(lda.fit)
```

```
Call:  
lda(Direction ~ Lag1 + Lag2, data = Smarket, subset = train)
```

```
Prior probabilities of groups:
```

```
    Down      Up  
0.491984 0.508016
```

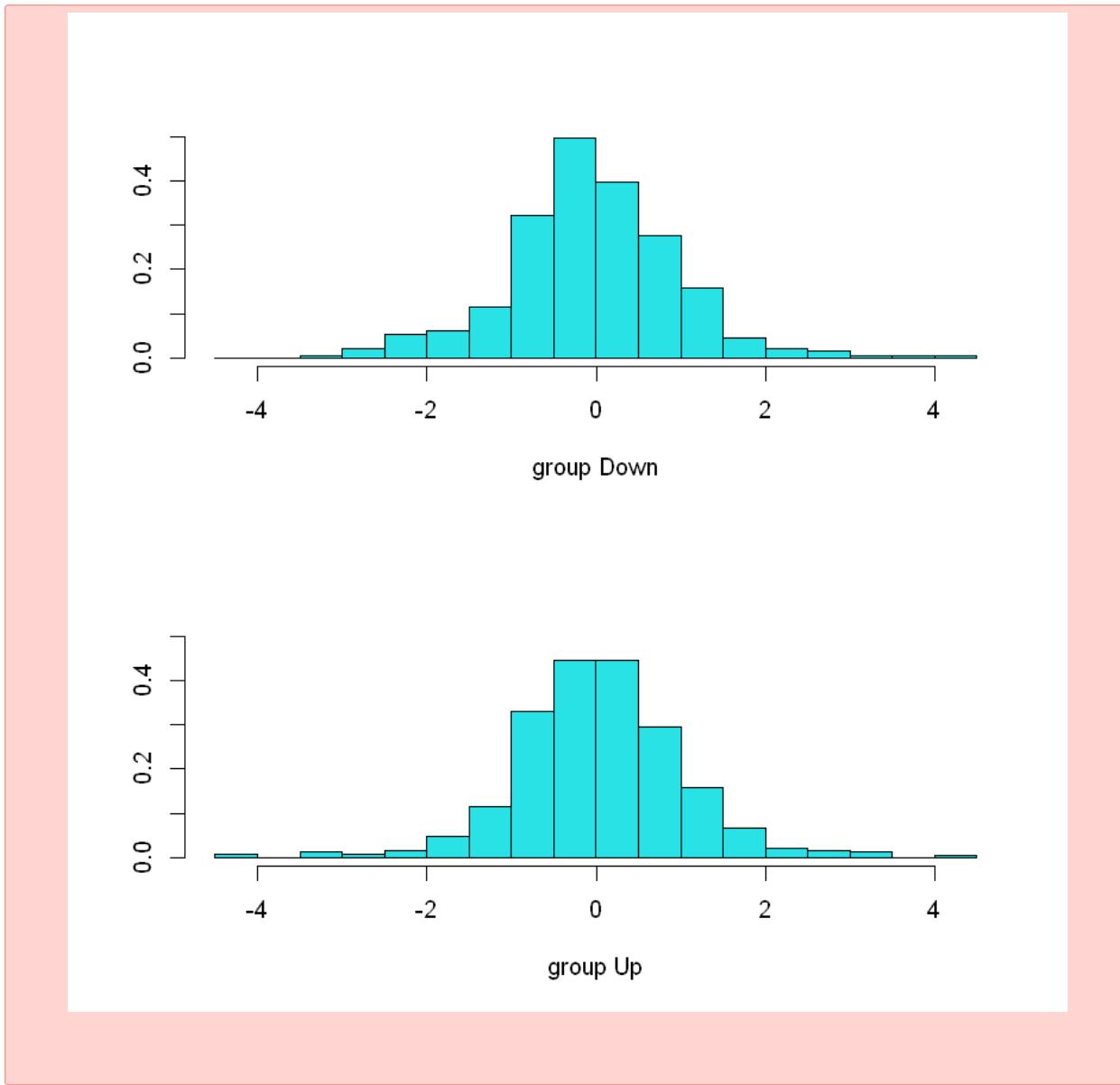
```
Group means:
```

	Lag1	Lag2
Down	0.04279022	0.03389409
Up	-0.03954635	-0.03132544

```
Coefficients of linear discriminants:
```

	LD1
Lag1	-0.6420190
Lag2	-0.5135293

```
[15]: plot(lda.fit)
```



```
[16]: lda.pred=predict (lda.fit, Smarket.2005)
print(names(lda.pred))
```

```
[1] "class"      "posterior"   "x"
```

```
[17]: lda.class=lda.pred$class
print(table(lda.class ,Direction.2005))
```

```
Direction.2005
lda.class Down Up
  Down    35  35
  Up     76 106
```

```
[19]: mean(lda.class==Direction.2005)
```

```
0.55952380952381
```

```
[20]: sum(lda.pred$posterior[,1]>=.5)
sum(lda.pred$posterior[,1]<.5)
```

```
70
```

```
182
```

```
[22]: print(lda.pred$posterior [1:20,1])
print(lda.class[1:20])
```

```
 999      1000      1001      1002      1003      1004      1005      1006
0.4901792 0.4792185 0.4668185 0.4740011 0.4927877 0.4938562 0.4951016 0.4872861
 1007      1008      1009      1010      1011      1012      1013      1014
0.4907013 0.4844026 0.4906963 0.5119988 0.4895152 0.4706761 0.4744593 0.4799583
 1015      1016      1017      1018
0.4935775 0.5030894 0.4978806 0.4886331
 [1] Up     Up     Up     Up     Up     Up     Up     Up     Up     Down   Up    Up
[16] Up     Up     Down  Up    Up
Levels: Down Up
```

```
[23]: sum(lda.pred$posterior[,1]>.9)
```

```
0
```

4.6.5 K-Nearest Neighbors

```
[26]: library(class)
train.X=cbind(Lag1 ,Lag2)[train ,]
test.X=cbind(Lag1 ,Lag2)[!train ,]
train.Direction =Direction[train]
```

```
[28]: set.seed(1)
knn.pred=knn(train.X,test.X,train.Direction ,k=1)
print(table(knn.pred ,Direction.2005))
```

```
Direction.2005
knn.pred Down Up
Down    43 58
Up      68 83
```

```
[29]: (83+43) /252
```

```
0.5
```

```
[32]: knn.pred=knn(train.X,test.X,train.Direction ,k=3)
print(table(knn.pred ,Direction.2005))
```

```
Direction.2005  
knn.pred Down Up  
Down    48 54  
Up      63 87
```

```
[33] : mean(knn.pred==Direction.2005)
```

```
0.535714285714286
```