

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

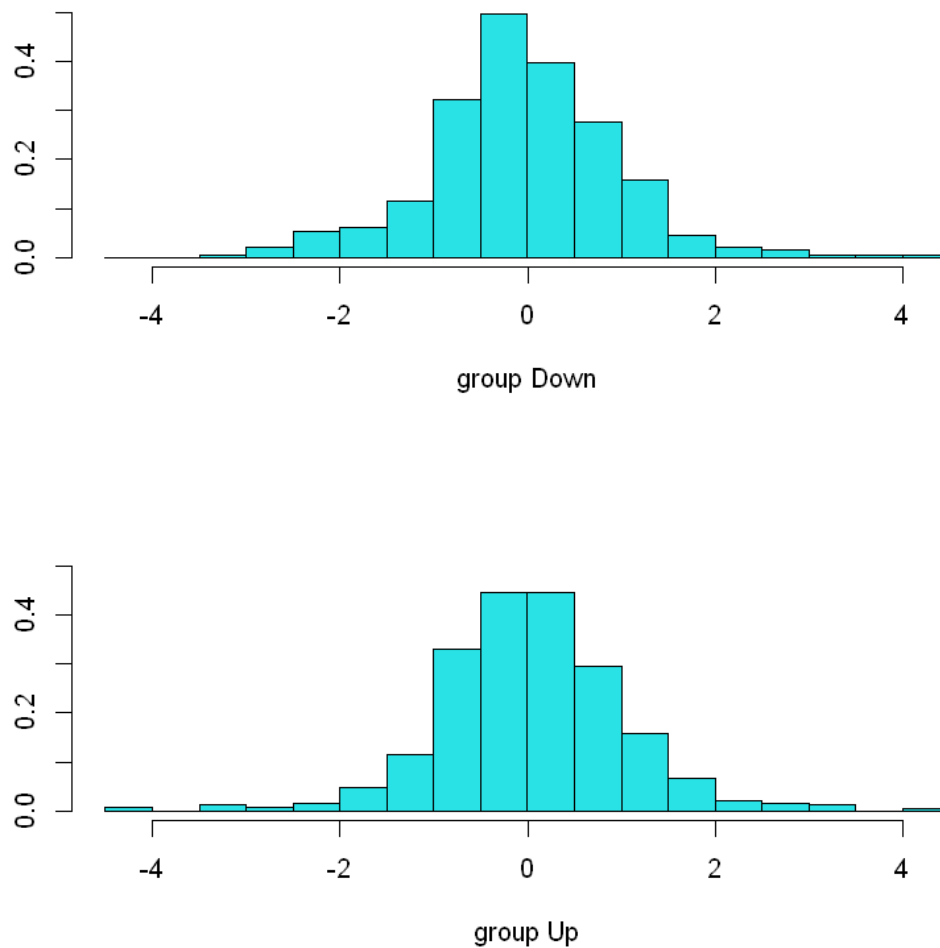
Group means:

	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  Up  Up  Up  Down Up  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
```