LDA: Banknotes

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We reconsider the **banknote** data set. It exists in the `MixGHD` library.

```
#install.packages("MixGHD")
library(MixGHD)
```

```
## Loading required package: MASS
```

The data set `banknote` is used to predict the `Status` of Swiss Franc bills based on measurements of the bills.

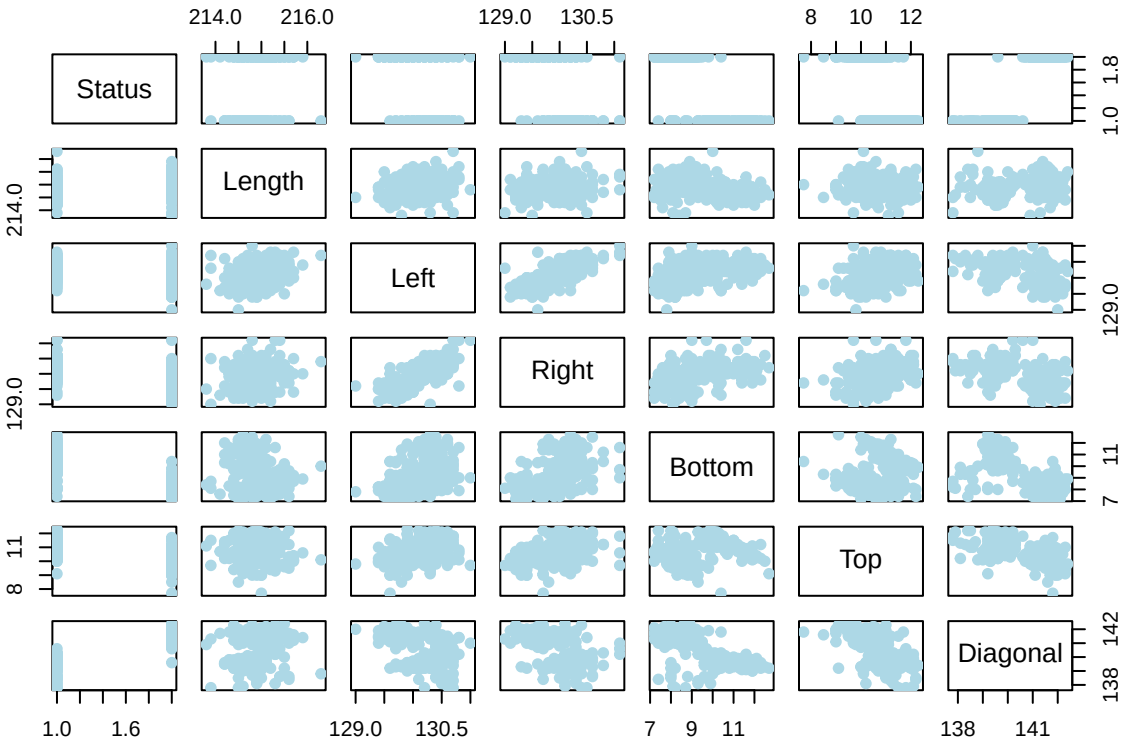
```
data(banknote)
names(banknote)
```

```
## [1] "Status"   "Length"   "Left"     "Right"    "Bottom"   "Top"      "Diagonal"
```

```
attach(banknote)
data<-banknote
```

We can start with visualization (as usual).

```
pairs(data,
      col="lightblue", pch=19)
```



Our aim is to perform the linear discriminant analysis here. First, we will partition our data into training and testing.

```
set.seed(1)
ind.train <- sample(nrow(data), floor(nrow(data)*0.6))
training<-data[ind.train,]
testing<-data[-ind.train,]
```

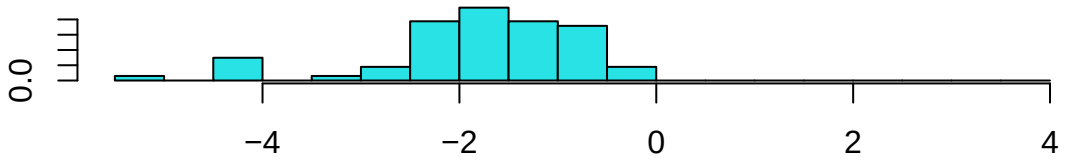
My goal with this example is to ultimately demonstrate how to plot a partition in the plane. So, I will arbitrarily choose two explanatory variables: `Top` and `Diagonal`.

```
library(MASS)
linear <- lda(Status~Top+Diagonal, data=training)
summary(linear)
```

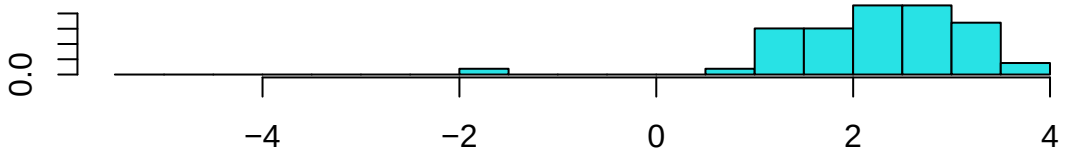
```
##         Length Class  Mode
## prior   2      -none- numeric
## counts  2      -none- numeric
## means   4      -none- numeric
## scaling 2      -none- numeric
## lev     2      -none- character
## svd     1      -none- numeric
## N       1      -none- numeric
## call    3      -none- call
## terms   3      terms  call
## xlevels 0      -none- list
```

Histogram

```
p <- predict(linear, training)
ldahist(data = p$x[,1], g = training$Status)
```



group counterfeit



group genuine