



Basic plots in R



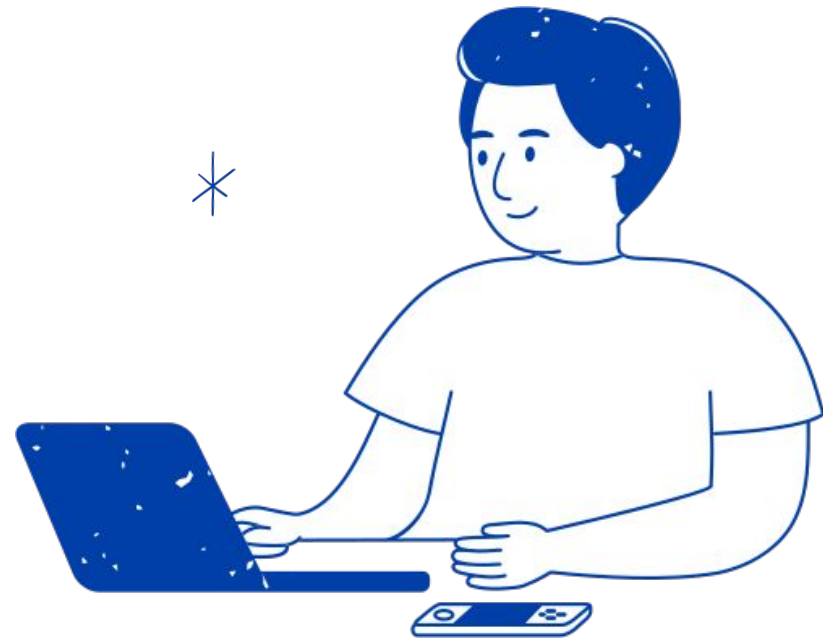
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Sep-8th-2024



R Graphics

- Histogram
- Boxplot
- Barplot
- Pie charts
- Plot and Scatter Plot



Dataset

```
> data <- read.csv("/home/nguyen/Downloads/smartphones.csv")
> dim(data)
[1] 1816    8
> head(data)
```

	Smartphone	Brand	Model	RAM	Storage	Color	Free	Final.Price
1	Realme C55 8/256GB Sunshower Libre	Realme	C55	8	256	Yellow	Yes	231.60
2	Samsung Galaxy M23 5G 4/128GB Azul Libre	Samsung	Galaxy M23	4	128	Blue	Yes	279.00
3	Motorola Moto G13 4/128GB Azul Lavanda Libre	Motorola	Moto G13	4	128	Blue	Yes	179.01
4	Xiaomi Redmi Note 11S 6/128GB Gris Libre	Xiaomi	Redmi Note 11S	6	128	Gray	Yes	279.99
5	Nothing Phone (2) 12/512GB Blanco Libre	Nothing	Phone (2)	12	512	White	Yes	799.00
6	Motorola Moto E32s 4/64GB Gris Libre	Motorola	Moto E32s	4	64	Gray	Yes	148.52

Smartphone Name: The unique identifier or model name of the smartphone.

Brand: Smartphone brand.

Model: Smartphone brand model.

RAM (Random Access Memory): The amount of memory available for multitasking.

Storage: capacity of the smartphone.

Color: Color of the smartphone.

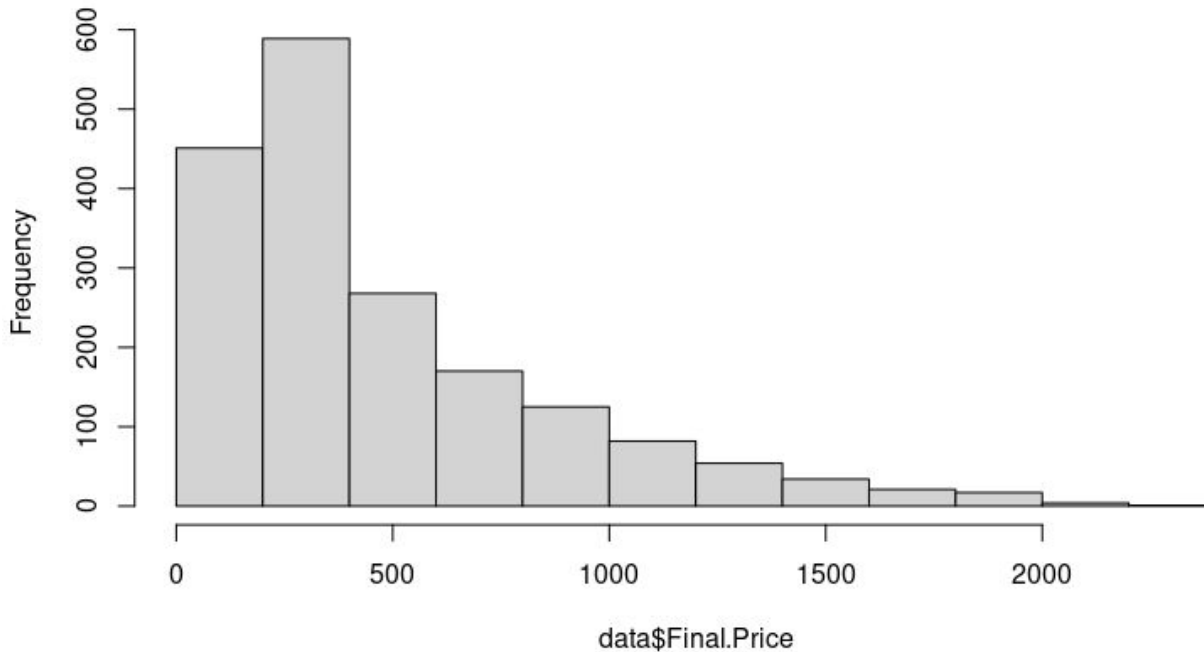
Free: Yes/No if the smartphone is attached to a cell company contract.

Price: The cost of the smartphone in the respective currency.

Histogram

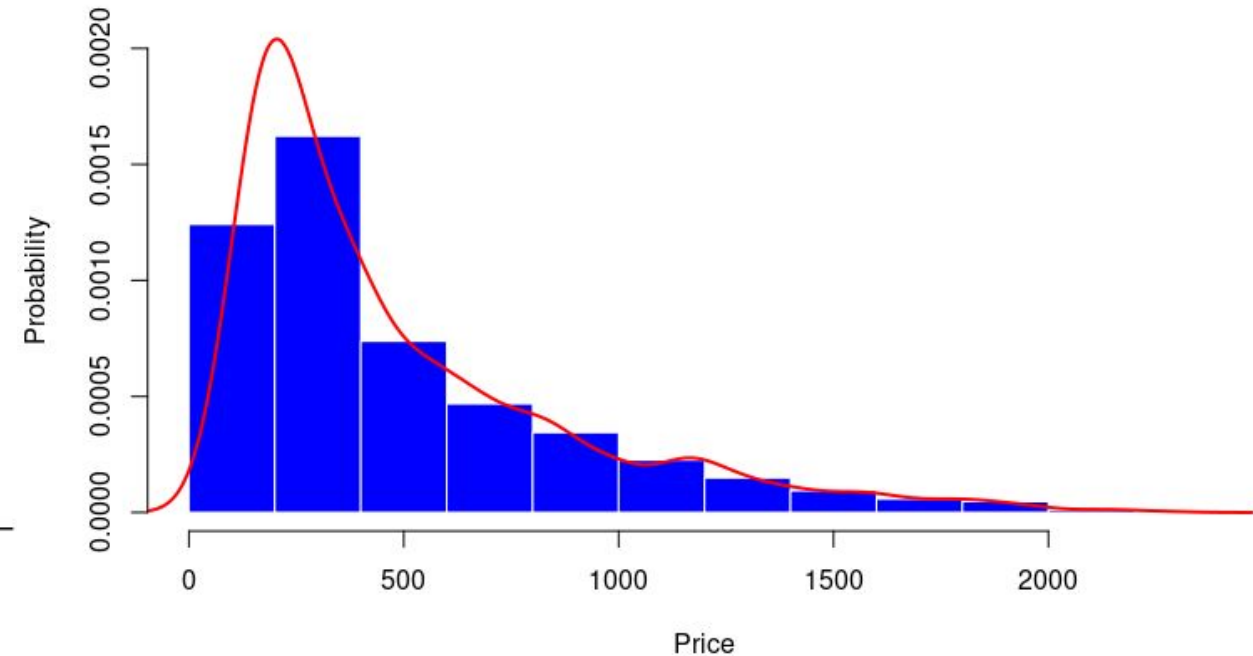
* `hist`(var, col, border, xlab, ylab, main, prob, xlim, ylim)
* `line`(density(na.omit(var)), col, lwd)

Histogram of data\$Final.Price



```
hist(data$Final.Price)
```

Distribution of the cost of smartphones

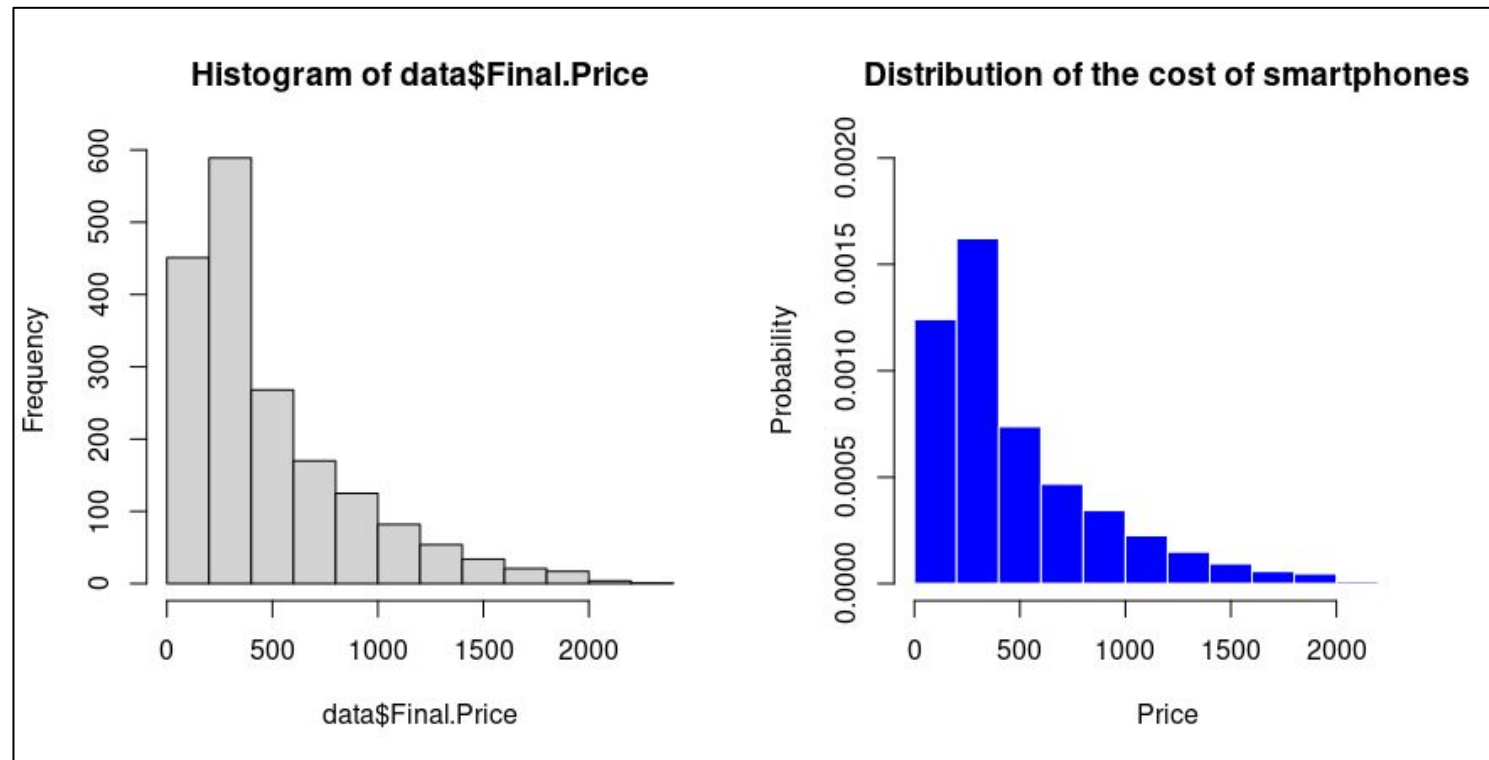


```
hist(data$Final.Price, col="blue", border="white",  
     xlab="Price", ylab="Probability",  
     main="Distribution of the cost of smartphones",  
     prob=TRUE, ylim=c(0, 0.002))  
lines(density(na.omit(data$Final.Price)), col="red", lwd=2)
```



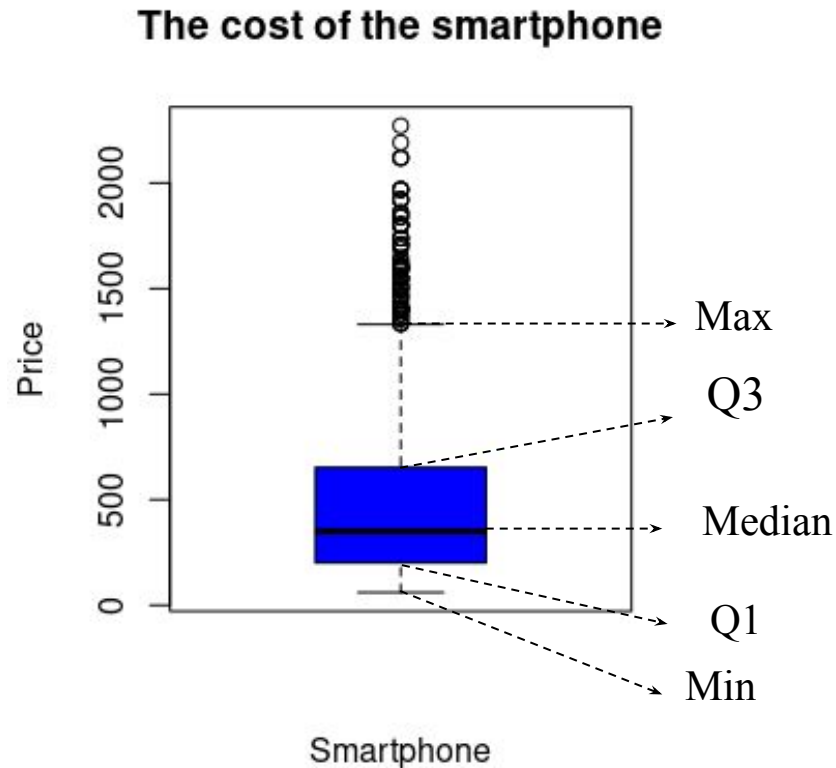
→ The number of rows
→ The number of columns

```
par(mfrow = c(1,2))  
hist(data$Final.Price)  
hist(data$Final.Price, col="blue", border="white",  
      xlab="Price", ylab="Probability",  
      main="Distribution of the cost of smartphones",  
      prob=TRUE, ylim=c(0,0.002))  
lines(density(na.omit(data$Final.Price)), col="red", lwd=2)
```

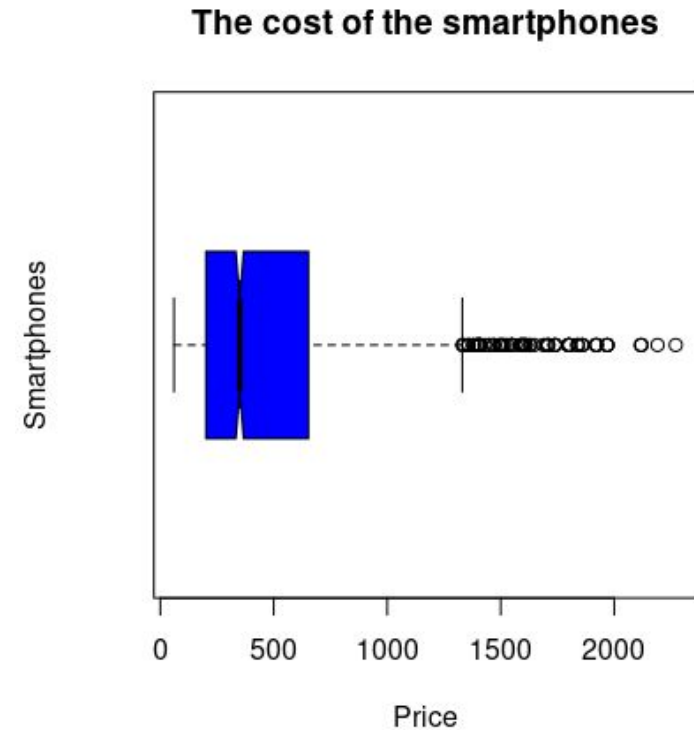


Boxplot

* `boxplot`(var, col, border, xlab, ylab, main, xlim, ylim, notch, horizontal)
* `boxplot`(var1~var2, col, border, xlab, ylab, main, xlim, ylim, notch, horizontal)

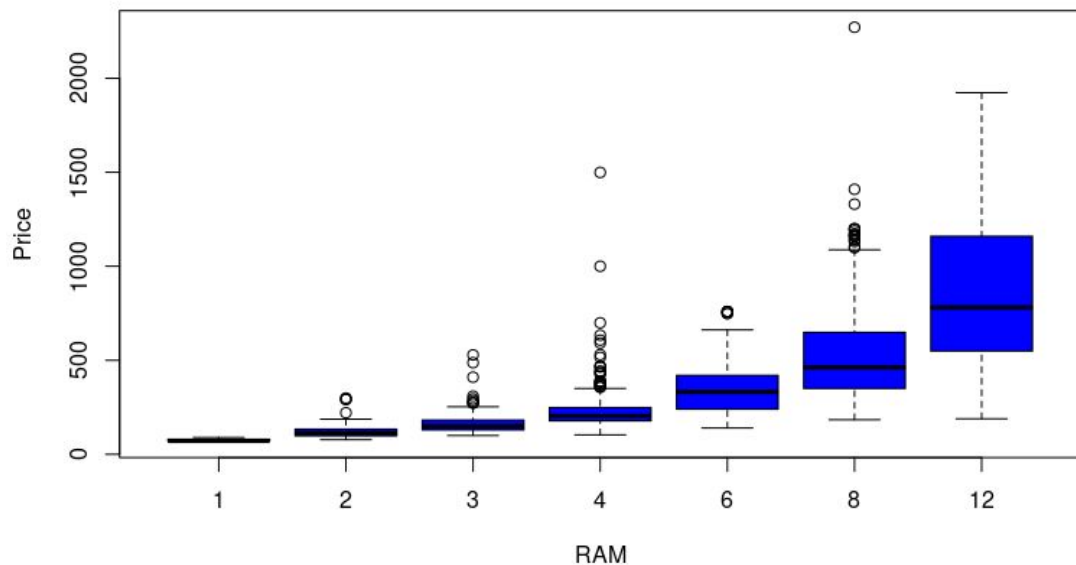


```
boxplot(data$Final.Price, col="blue",  
        xlab="Smartphones", ylab="Price",  
        main="The cost of the smartphones")
```



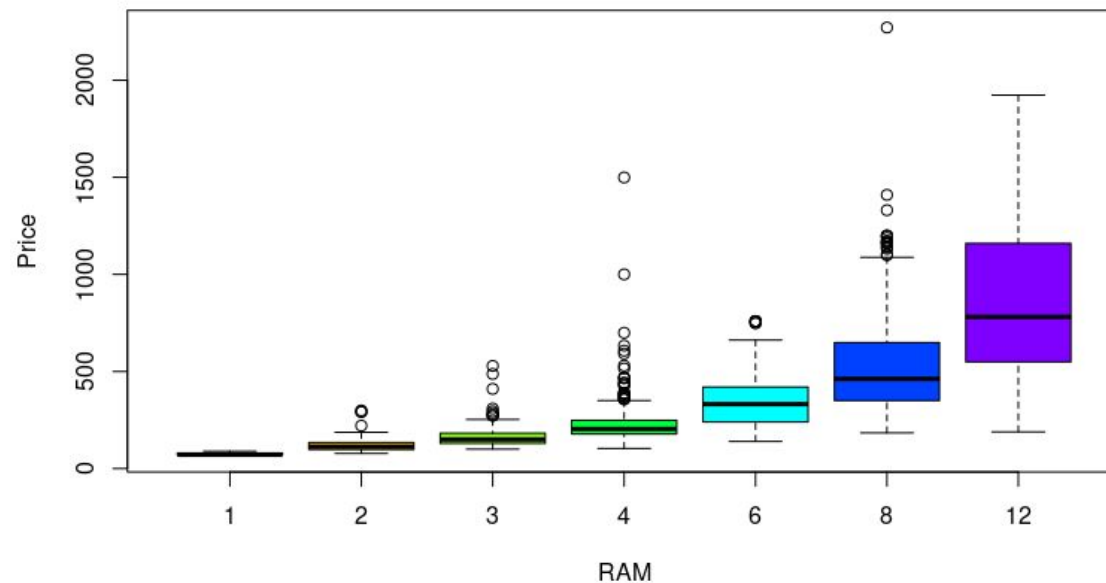
```
boxplot(data$Final.Price, col="blue", notch=T,  
        xlab="Price", ylab="Smartphones",  
        main="The cost of the smartphones",  
        horizontal=T)
```


The cost of the smartphones by RAM



```
boxplot(data$Final.Price~data$RAM, col="blue",
        xlab="RAM",ylab="Price",
        main="The cost of the smartphones by RAM",
        horizontal=F)
```

The cost of the smartphones by RAM



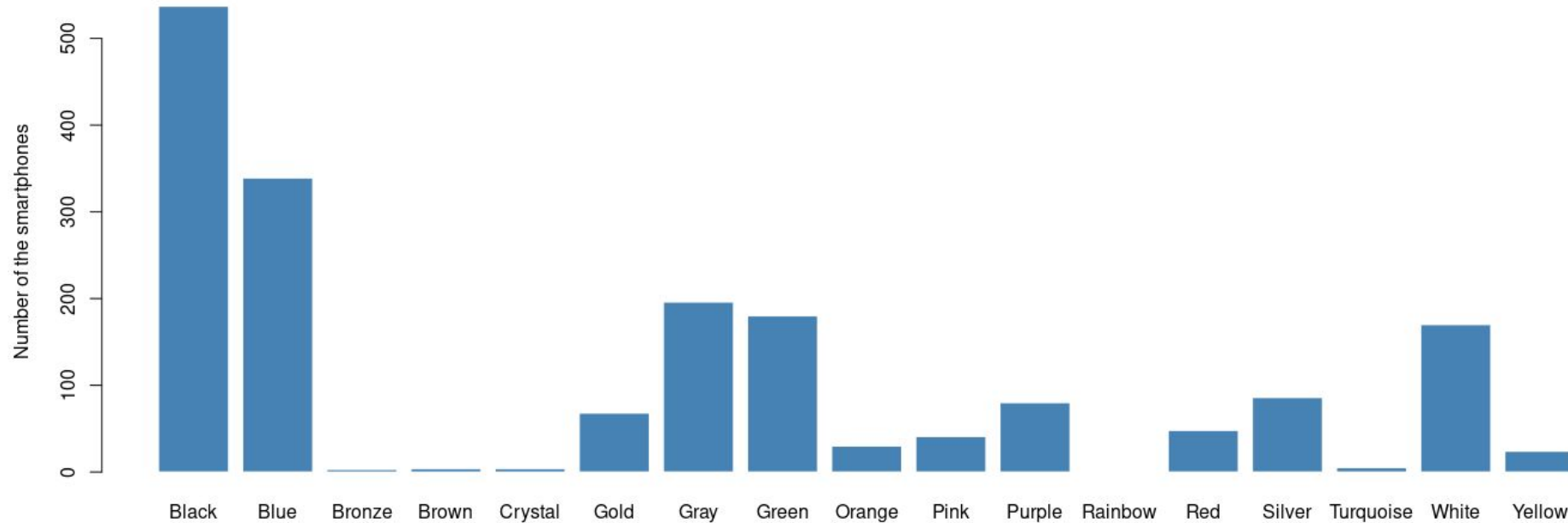
```
boxplot(data$Final.Price~data$RAM,
        col=rainbow(length(unique(data$RAM))),
        xlab="RAM",ylab="Price",
        main="The cost of the smartphones by RAM",
        horizontal=F)
```



Barplot

`barplot(var, col, border, xlab, ylab, main, cex.axis, cex.name, density, las, horiz)`

Barplot about smartphone numbers by color



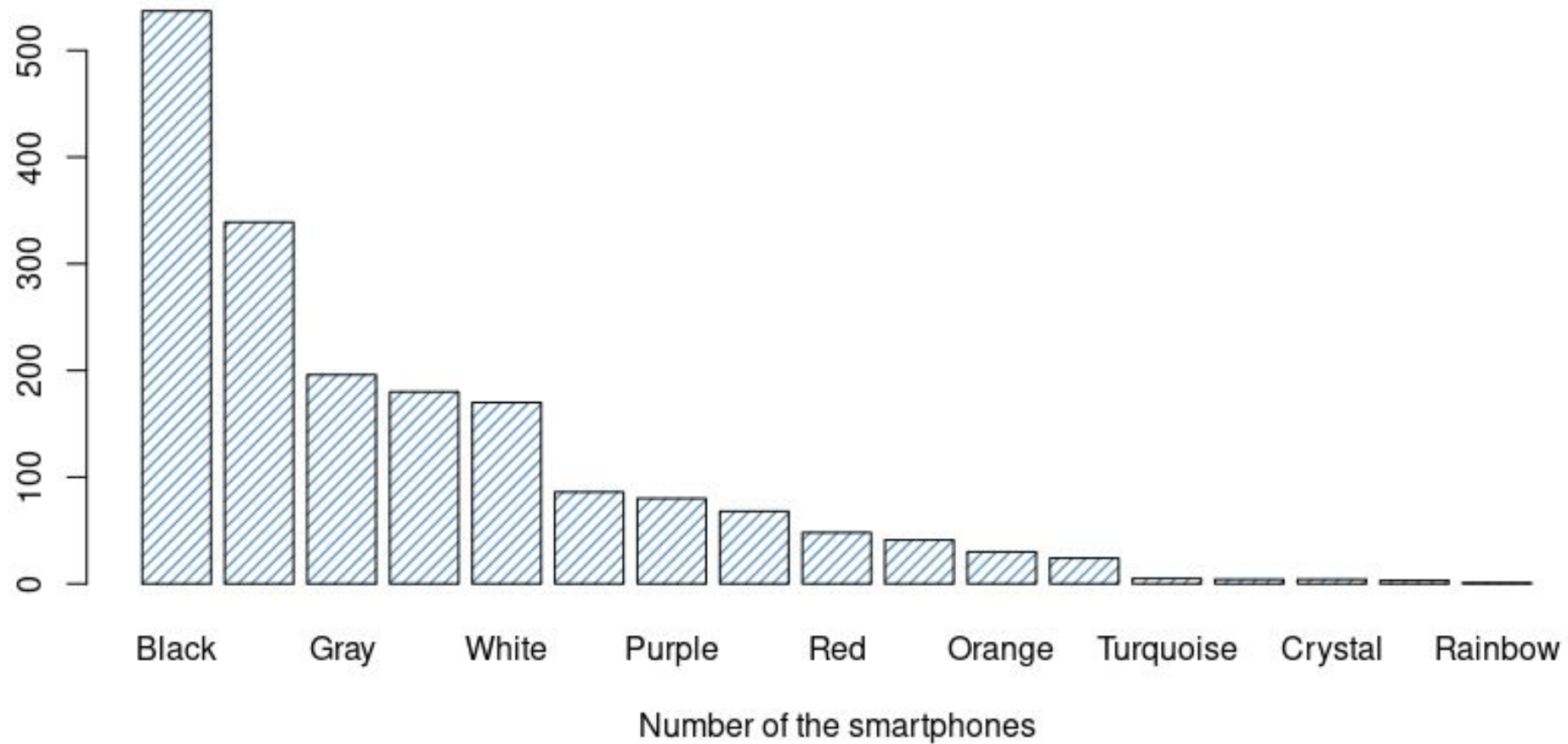
```
> dt <- table(data$Color)
> dt
```

Black	Blue	Bronze	Brown	Crystal	Gold	Gray	Green	Orange
537	339	3	4	4	68	196	180	30
Pink	Purple	Rainbow	Red	Silver	Turquoise	White	Yellow	
41	80	1	48	86	5	170	24	

```
> barplot(dt, col="steelblue", border="white", xlab="Color", ylab="Number of the smartphones",
+         main="Barplot about smartphone numbers by color",
+         cex.axis=1, cex.names=1)
> |
```



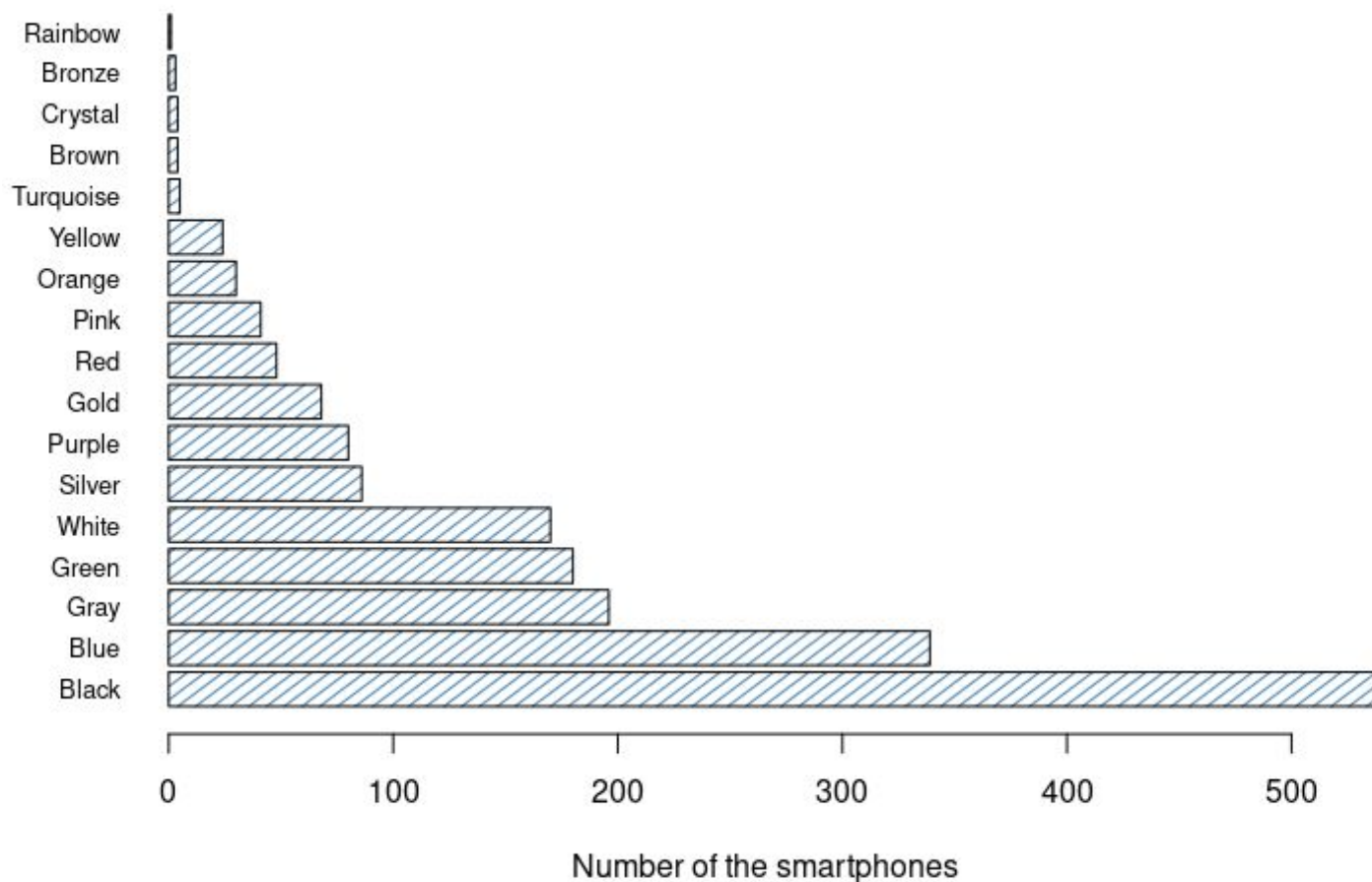

Barplot about smartphone numbers by color



```
barplot(dt[order(dt, decreasing=TRUE)], col="steelblue",  
        xlab="Number of the smartphones",  
        main="Barplot about smartphone numbers by color",  
        cex.names=1, density=20)
```



Barplot about smartphone numbers by color



```
barplot(dt[order(dt, decreasing=TRUE)], col="steelblue",  
        xlab="Number of the smartphones",  
        main="Barplot about smartphone numbers by color",  
        las=1, cex.names=0.8, density=20, horiz=TRUE)
```

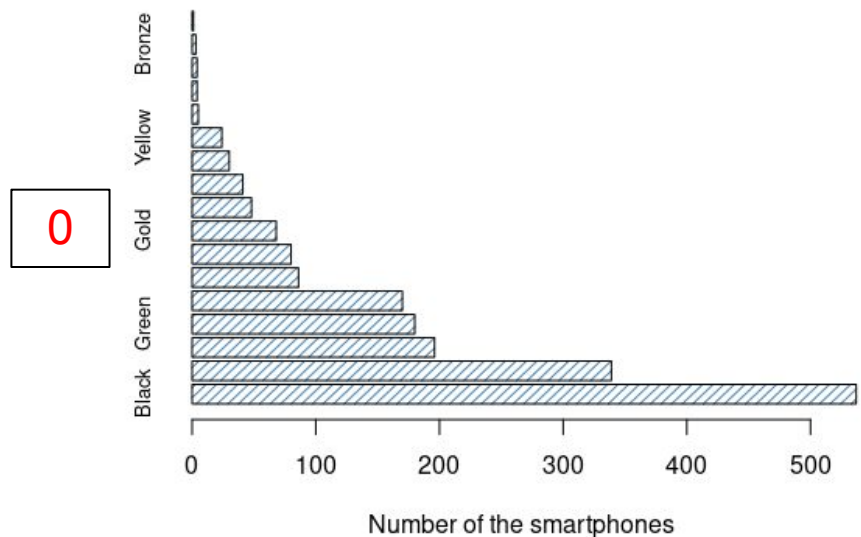


The `las` argument allows to change the orientation of the axis labels:

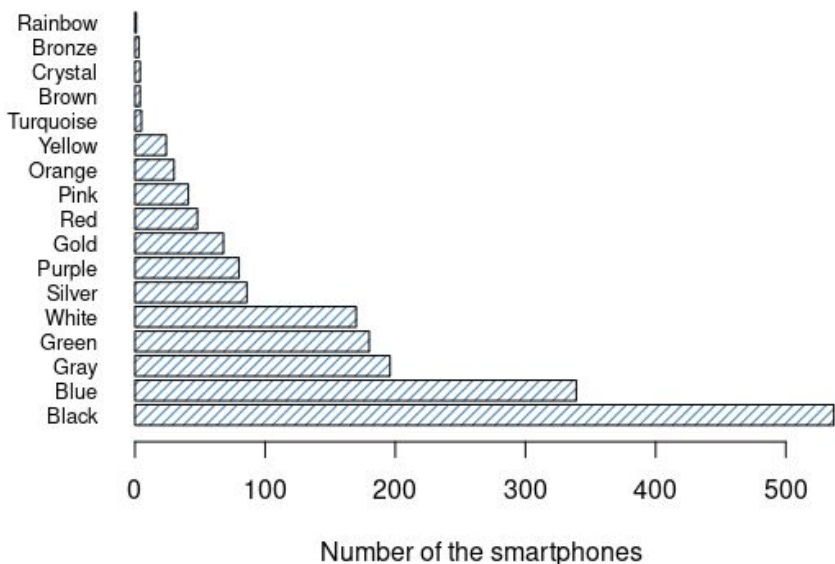
- `0` : always parallel to the axis
- `1` : always horizontal
- `2` : always perpendicular to the axis
- `3` : always vertical.

This is specially helpful for horizontal bar chart.

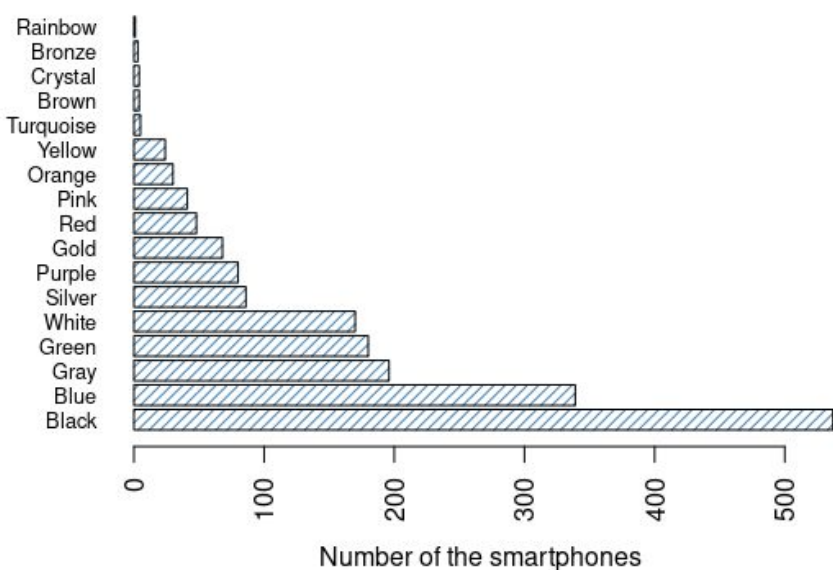
Barplot about smartphone numbers by color



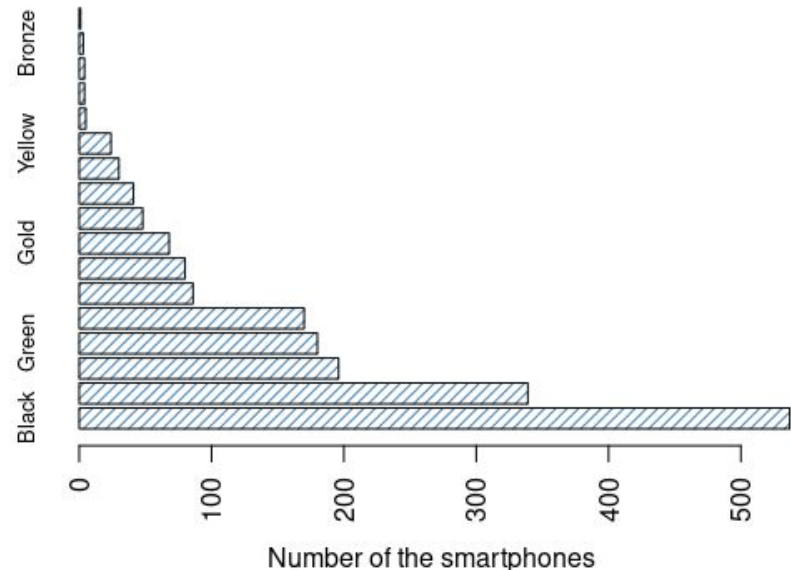
Barplot about smartphone numbers by color



Barplot about smartphone numbers by color



Barplot about smartphone numbers by color

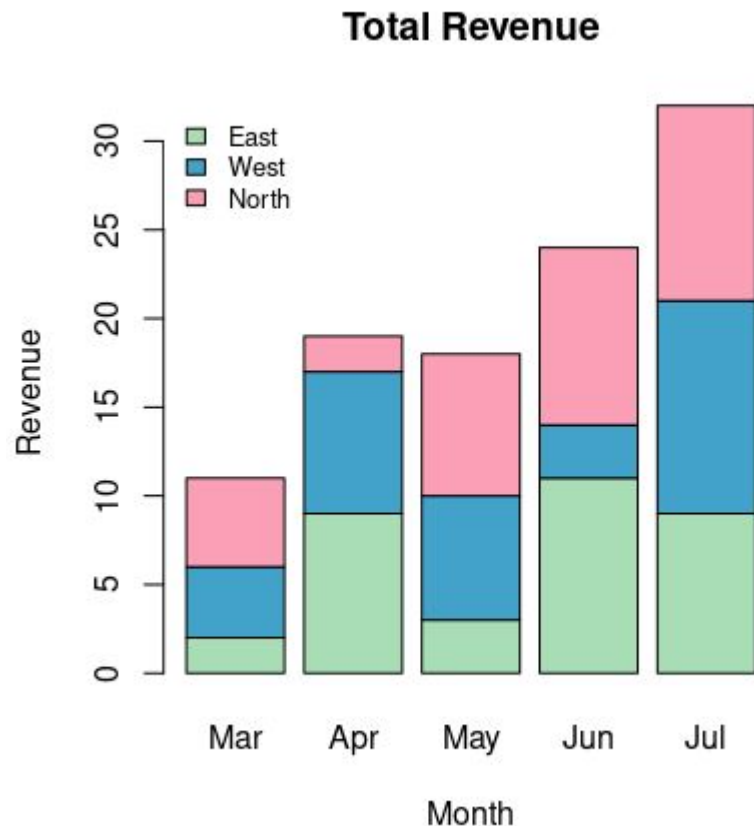
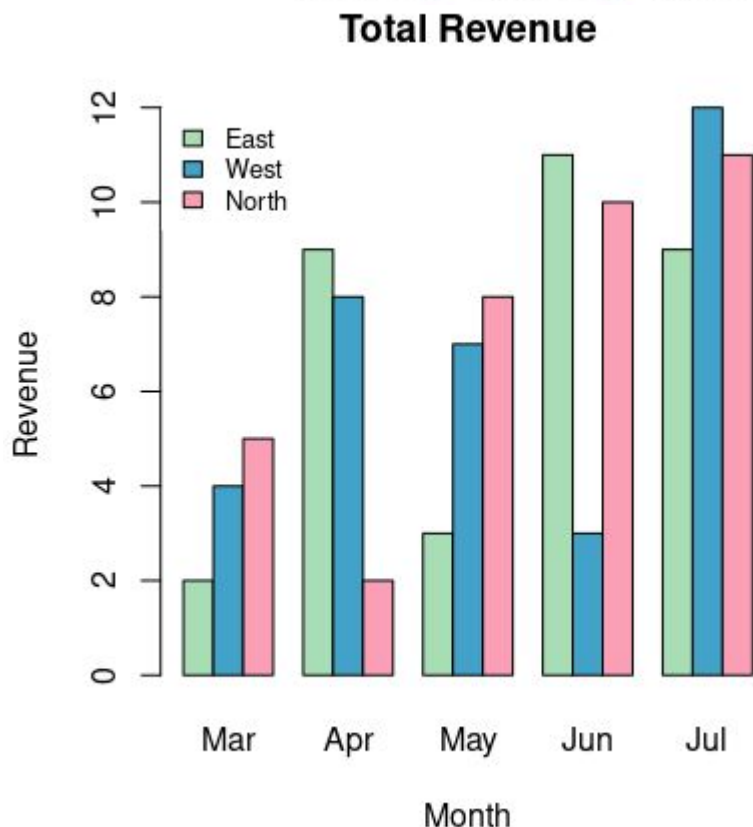




```
colors = c("#a8ddb5", "#43a2ca", "#fa9fb5")
months <- c("Mar", "Apr", "May", "Jun", "Jul")
regions <- c("East", "West", "North")
## Create the matrix of the values.
Values <- matrix(c(2, 9, 3, 11, 9, 4, 8, 7, 3, 12, 5, 2, 8, 10, 11),
                 nrow = 3, ncol = 5, byrow = TRUE)
```



```
> Values
      [,1] [,2] [,3] [,4] [,5]
[1,]    2    9    3   11    9
[2,]    4    8    7    3   12
[3,]    5    2    8   10   11
> |
```



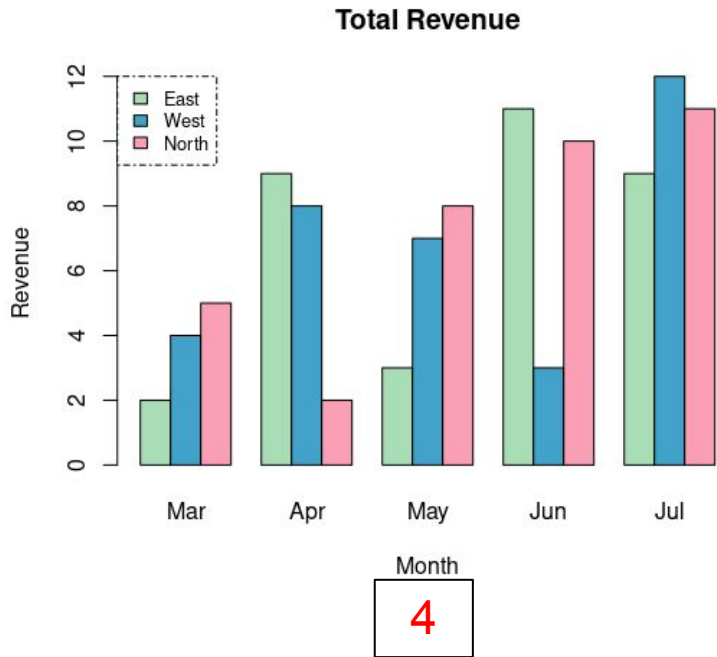
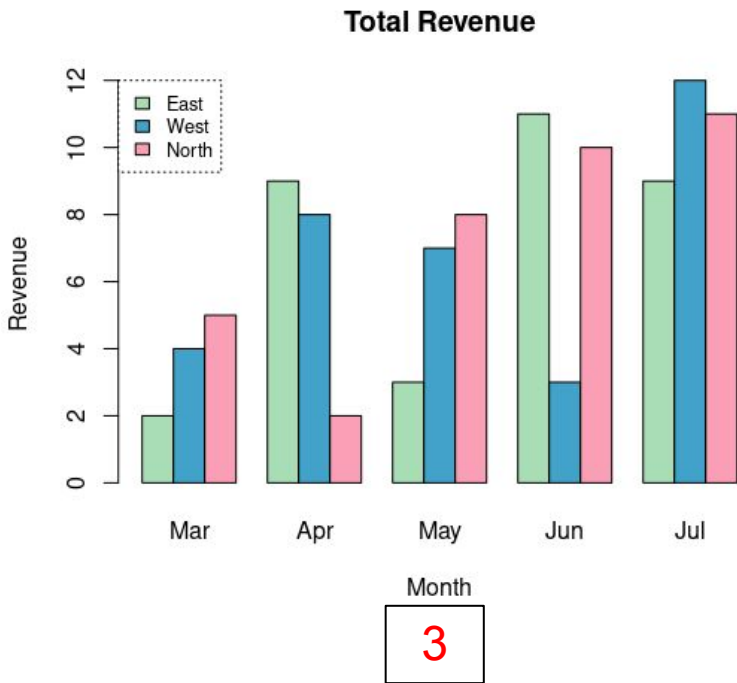
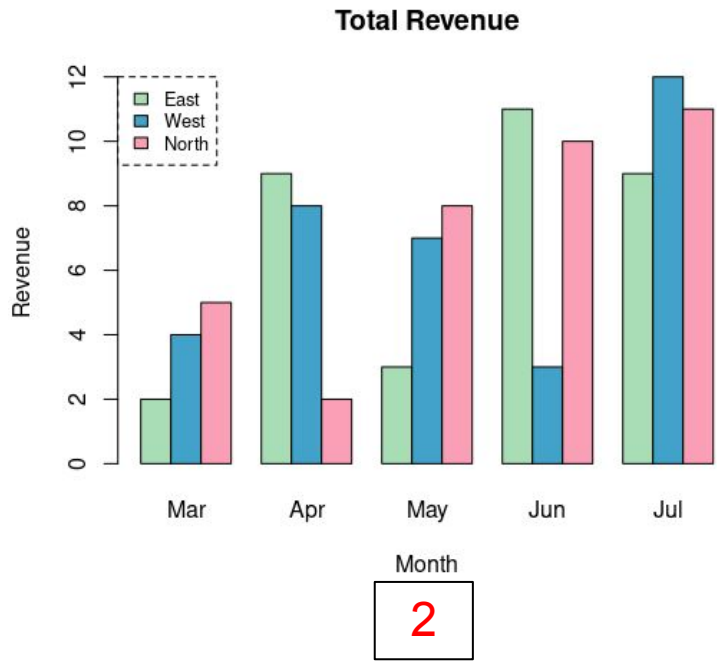
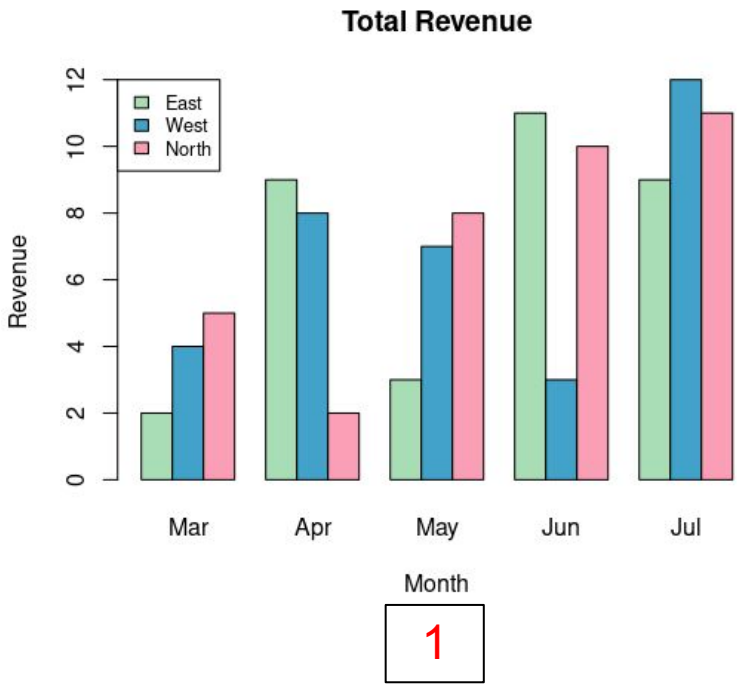
```
barplot(Values, main = "Total Revenue", names.arg = months,
        xlab = "Month", ylab = "Revenue",
        col = colors, beside = TRUE)
legend("topleft", regions, box.lty=0, cex = 0.8, fill = colors)
```

```
barplot(Values, main="Total Revenue", names.arg=months,
        xlab="Month", ylab="Revenue", col=colors)
legend("topleft", regions, box.lty=0, cex=0.8, fill=colors)
```


box.lty = (0,1,2,3,4,5,6)

The different line types

6.'twodash'	<div></div>
5.'longdash'	<div></div>
4.'dotdash'	<div></div>
3.'dotted'	<div></div>
2.'dashed'	<div></div>
1.'solid'	<div></div>
0.'blank'	

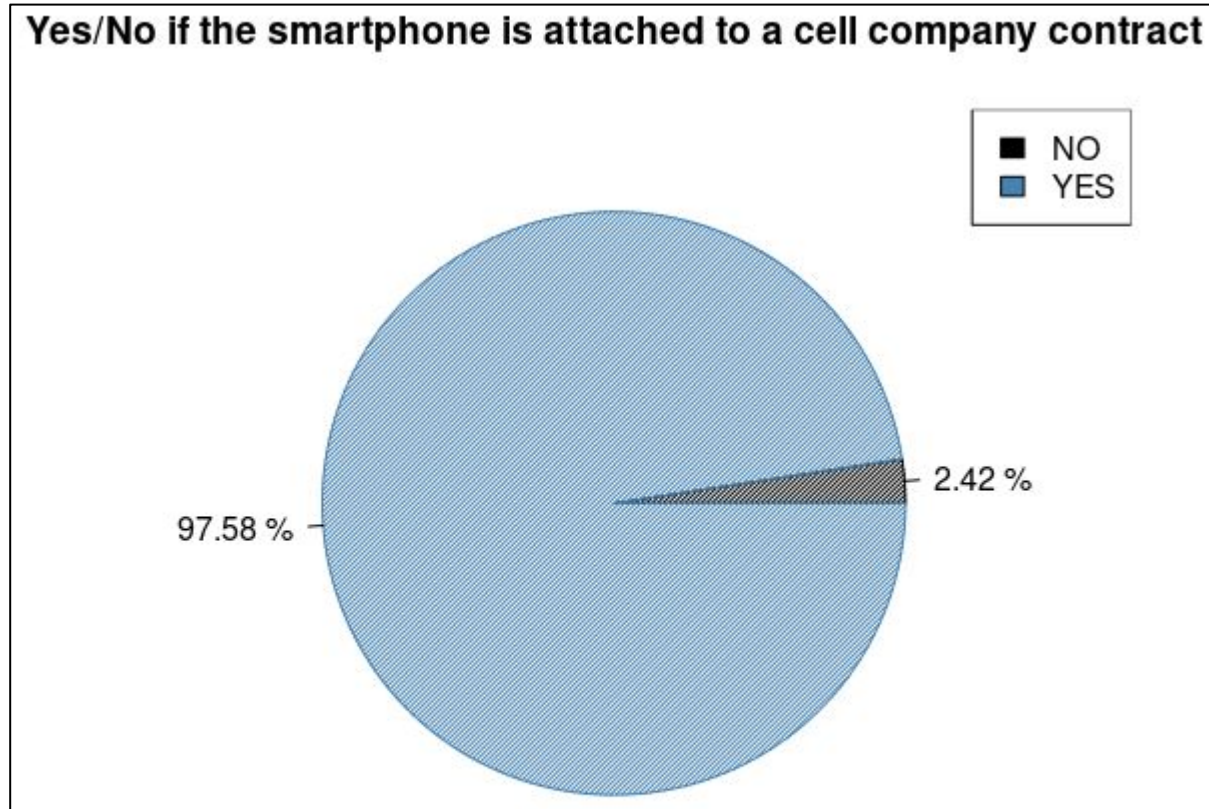




Pie charts

`pie(var, label, col, main, density)`

`legend(position, legend, cex, fill)`



```
> df <- table(data$Free)
> df

No  Yes
44 1772
> piepercent <- round((df*100/sum(df)),2)
> piepercent
```

```

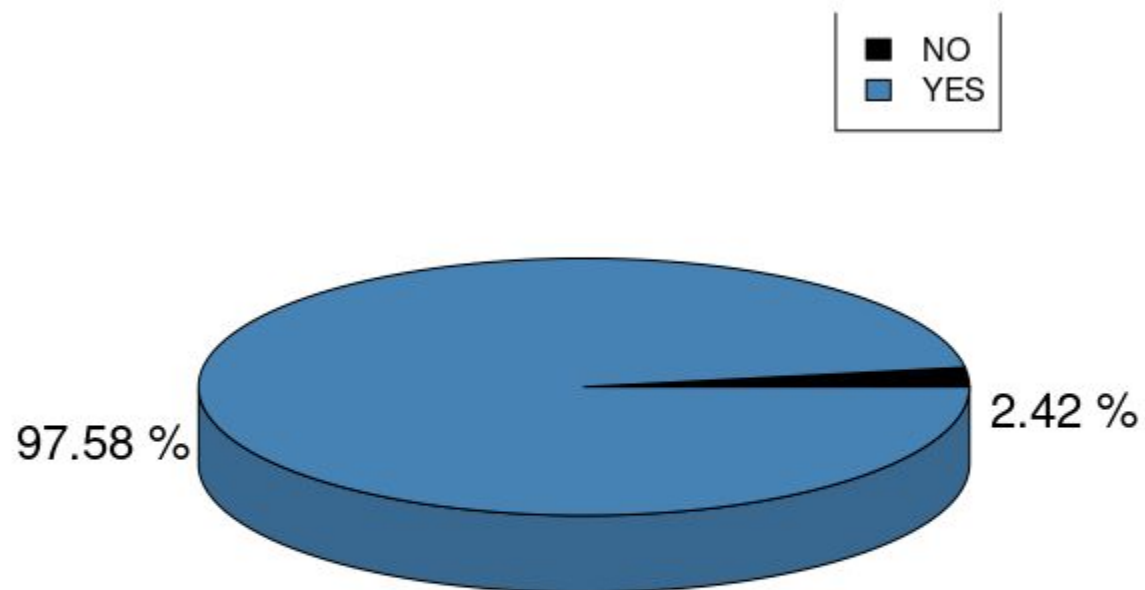
No  Yes
2.42 97.58
```

“bottomright”, “bottom”,
“bottomleft”, “left”, “topleft”,
“top”, “topright”, “right”,
“center”

```
pie(df, labels= paste(piepercent, "%"), col=c("black", "steelblue"), density=50,
main="Yes/No if the smartphone is attached to a cell company contract")
legend("topright", c("NO", "YES"), cex=1, fill=c("black", "steelblue"))
```




Yes/No if the smartphone is attached to a cell company contract



```
install.packages("plotrix")
library(plotrix)
pie3D(df, labels= paste(piepercent, "%"), col=c("black", "steelblue"),
      main="Yes/No if the smartphone is attached to a cell company contract")
legend("topright", c("NO", "YES"), cex=1, fill=c("black", "steelblue"))
```

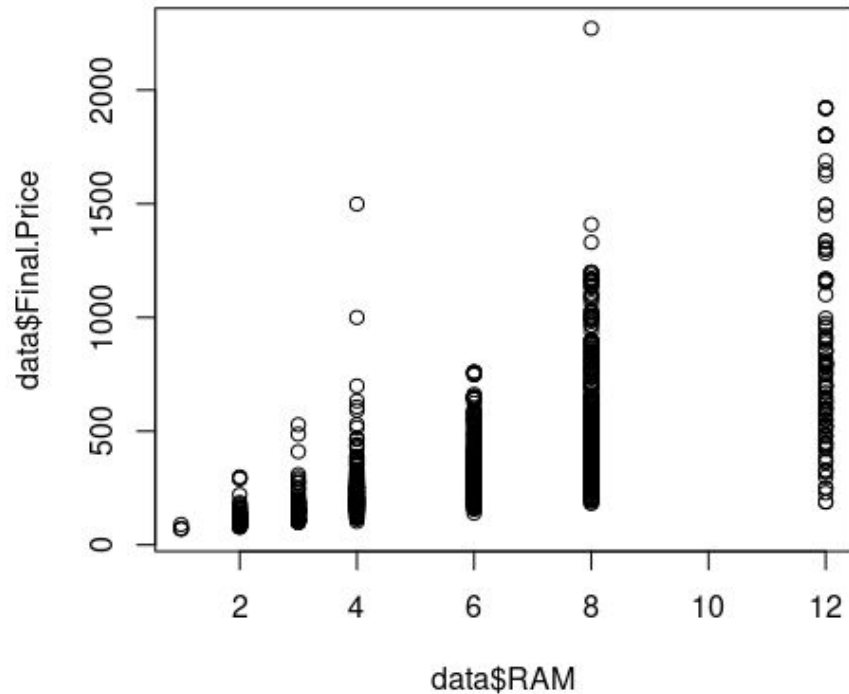


Plot and scatter plot

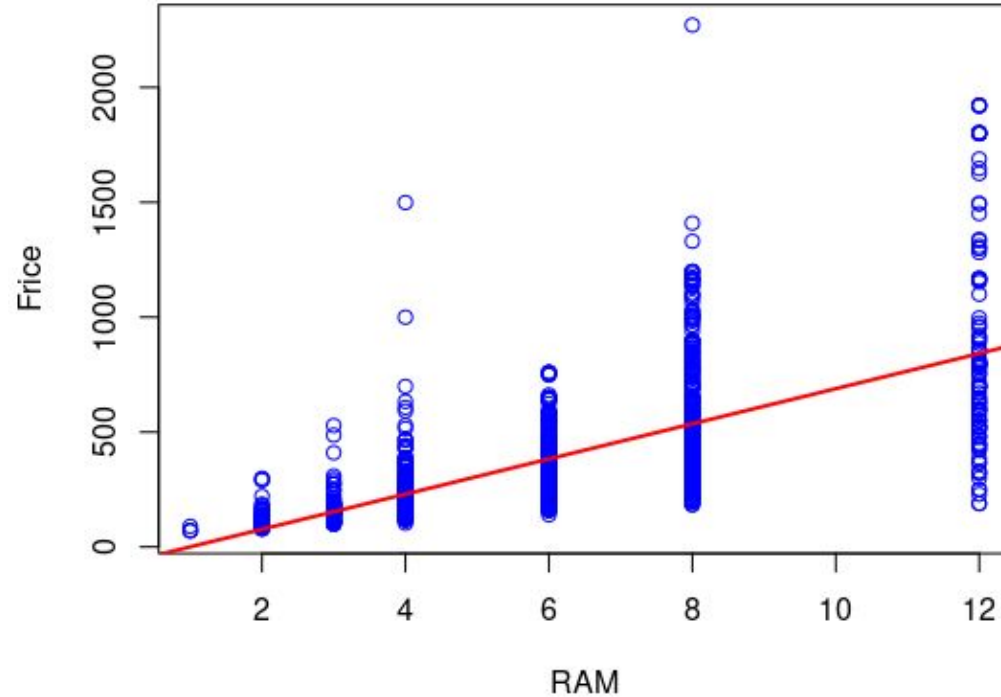
`plot(var1~var2, pch, col, xlab, ylab, main, xlim, ylim)`

`scatterplot(var1~ var2 | group, pch, col, smooth, grid, frame, xlab, ylab, main)`

Scatter Plot of the cost of the smartphone vs its RAM



```
plot(data$Final.Price ~ data$RAM)
```

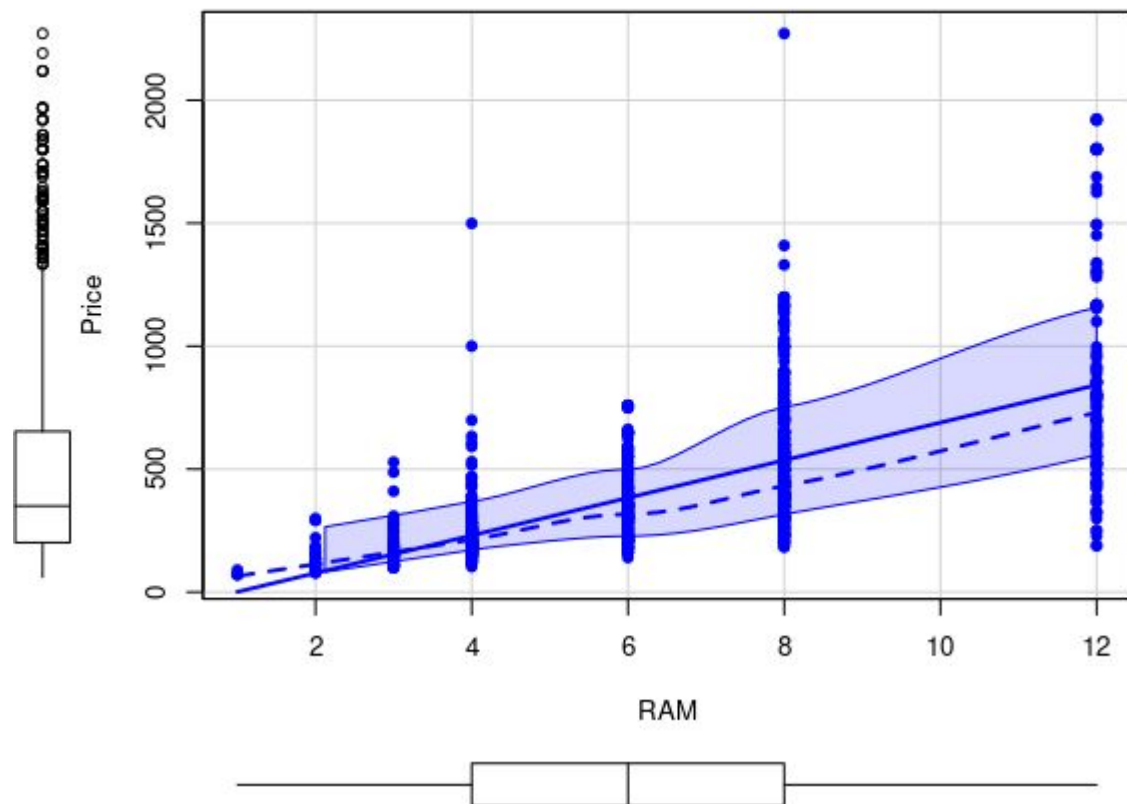


```
plot(data$Final.Price ~ data$RAM, col="blue", pch=1,  
      xlab="RAM", ylab="Price",  
      main="Scatter Plot of the cost of the smartphone vs its RAM")  
abline(lm(data$Final.Price~data$RAM), col="red", lwd=2)
```

0	□	1	○	2	△	3	+	4	×
5	◇	6	▽	7	⊠	8	✱	9	⬠
10	⊕	11	⊗	12	⊞	13	⊗	14	⊠
15	■	16	●	17	▲	18	◆	19	●
20	●	21	○	22	□	23	◇	24	△
25	▽								

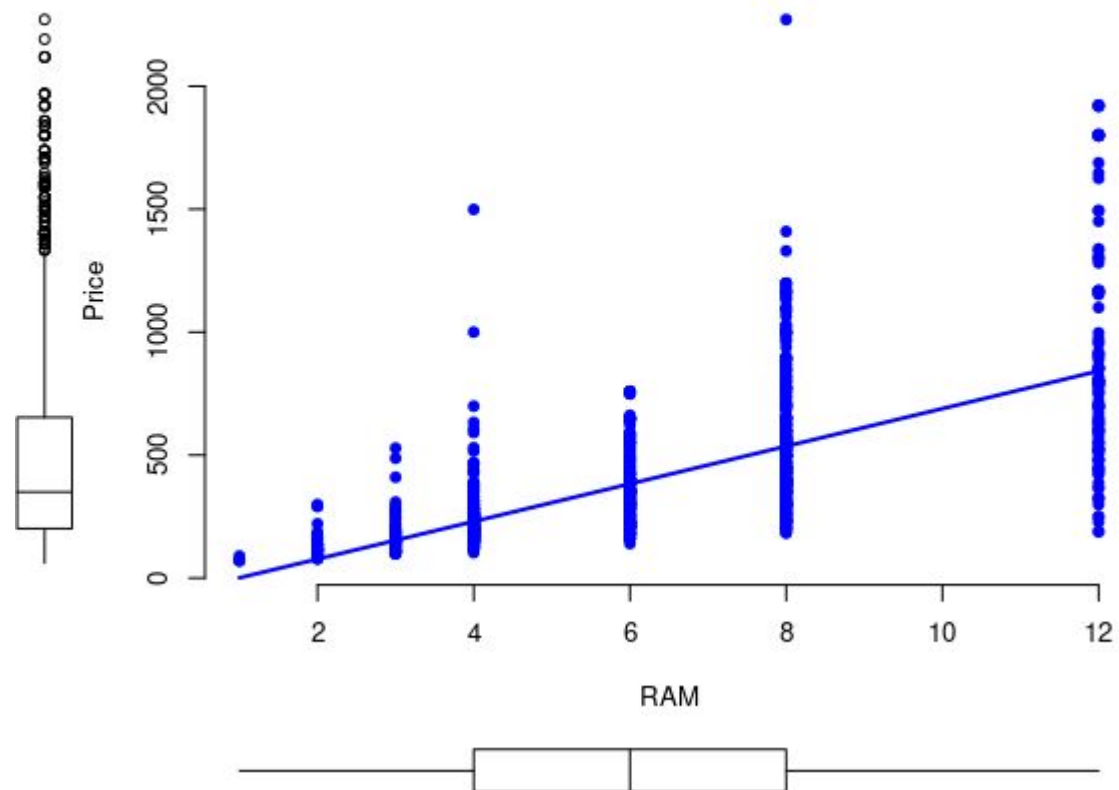


Scatter Plot of RAM vs. Final Price



```
install.packages("car")  
library(car)  
scatterplot(Final.Price ~ RAM, data=data,  
            col="blue", pch=19,  
            xlab="RAM", ylab="Price",  
            main="Scatter Plot of RAM vs. Final Price")
```

Scatter Plot of RAM vs. Final Price



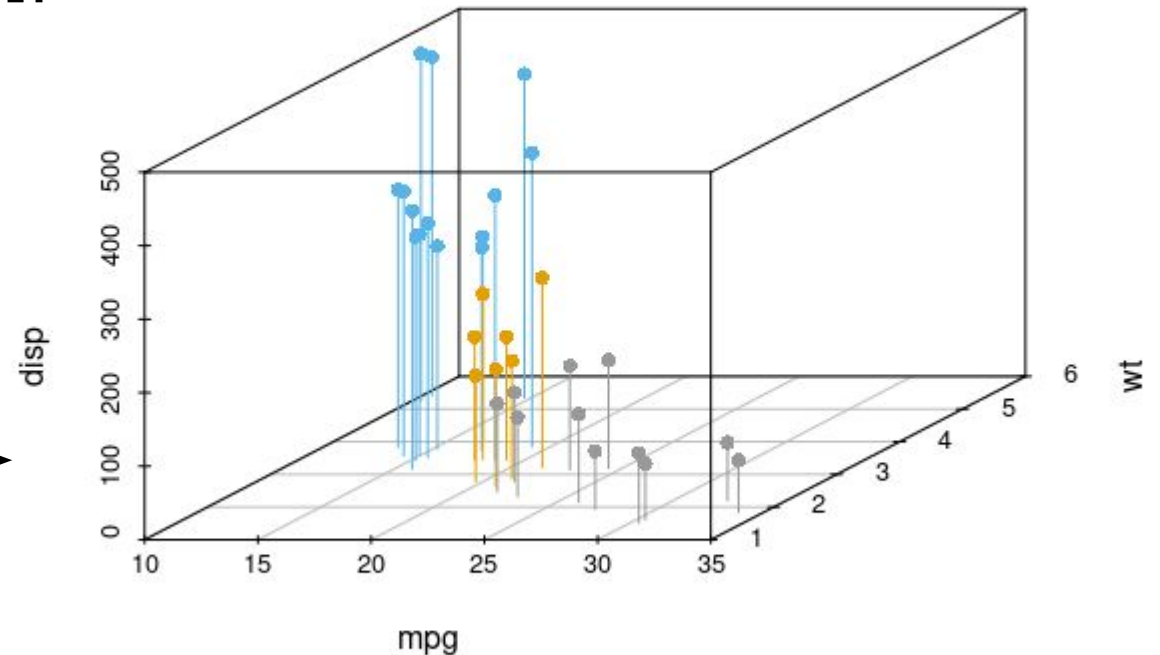
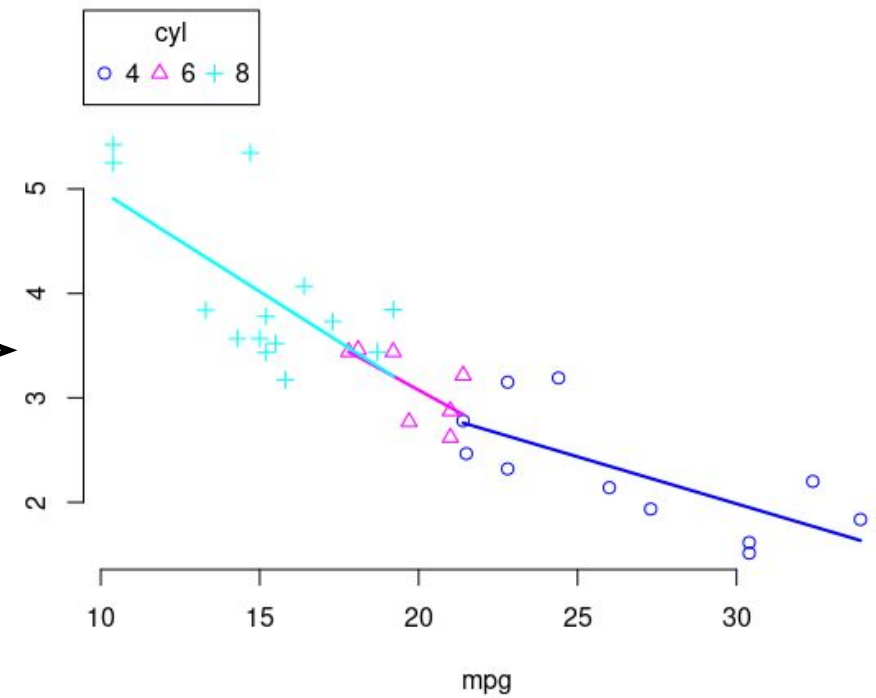
```
scatterplot(Final.Price ~ RAM, data=data,  
            smooth=F, grid=F, frame=F,  
            col="blue", pch=19,  
            xlab="RAM", ylab="Price",  
            main="Scatter Plot of RAM vs. Final Price")
```

Scatterplot with new dataset

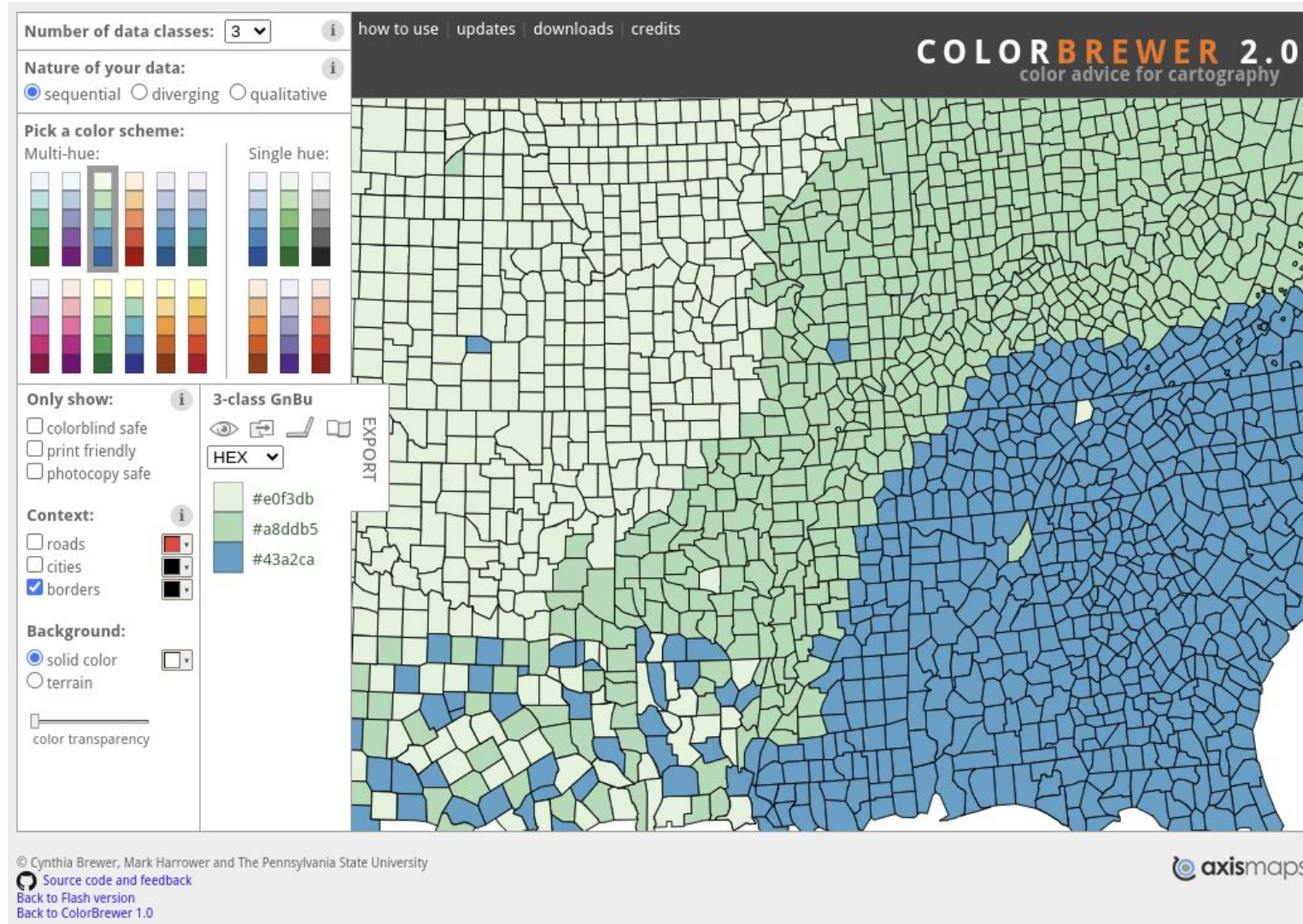
```
> dt <- mtcars
> dim(mtcars)
[1] 32 11
> head(mtcars)
```

	mpg	cyl	dis	hp	drat	wt	qsec	vs	am	gear	carb
Mazda RX4	21.0	6	160	110	3.90	2.620	16.46	0	1	4	4
Mazda RX4 Wag	21.0	6	160	110	3.90	2.875	17.02	0	1	4	4
Datsun 710	22.8	4	108	93	3.85	2.320	18.61	1	1	4	1
Hornet 4 Drive	21.4	6	258	110	3.08	3.215	19.44	1	0	3	1
Hornet Sportabout	18.7	8	360	175	3.15	3.440	17.02	0	0	3	2
Valiant	18.1	6	225	105	2.76	3.460	20.22	1	0	3	1

```
> scatterplot(wt ~ mpg | cyl, data=dt,
+             smooth=F, grid=F, frame=F)
> ### Scatter plot 3D
> library("scatterplot3d")
> gr=as.factor(dt$cyl)
> colors <- c("#999999", "#E69F00", "#56B4E9")
> scatterplot3d(dt$mpg, dt$wt, dt$dis,
+               grid=T, box=T, pch=16, color=colors[gr], type="h",
+               xlab="mpg", ylab="wt", zlab="disp")
> |
```



Color palette: ColorBrewer



<https://colorbrewer2.org/#type=sequential&scheme=BuGn&n=3>

**Thank you for your
attention!**