Gráficos con R

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Base y grid

- En `R` existen dos formas de generar gráficos:
  - Base graphics
  - Grid graphics
- Los gráficos base sólo producen un resultado gráfico, pero no un objeto.
- Los gráficos `grid` generan un resultado gráfico **y** un objeto.
- Dentro del conjunto `grid` existen dos grandes paquetes: `lattice` y `ggplot2`.

Gráficos `lattice`

- Implementación de los gráficos *trellis, The Elements of Graphing Data* de Cleveland)
- Estructura matricial de paneles definida a través de una fórmula.

```
library(lattice)

xyplot(wt ~ mpg | am, data = mtcars, groups = cyl)
```

- Documentación: Código y Figuras del libro

Gráficos ggplot2

- Implementación de *The Grammar of Graphics* de Wilkinson.
- Combinación de funciones que proporcionan los componentes (capas) del gráfico.

```
library(ggplot2)

ggplot(mtcars, aes(mpg, wt)) +
   geom_point(aes(colour=factor(cyl))) +
   facet_grid(. ~ am)
```

- Documentación de ggplot2
- Codigo del libro
- ggplot2 desde lattice (PDF)

Leemos desde el archivo local

```
aranjuez <- read.csv('data/aranjuez.csv')

summary(aranjuez)
```

Añadimos algunas columnas

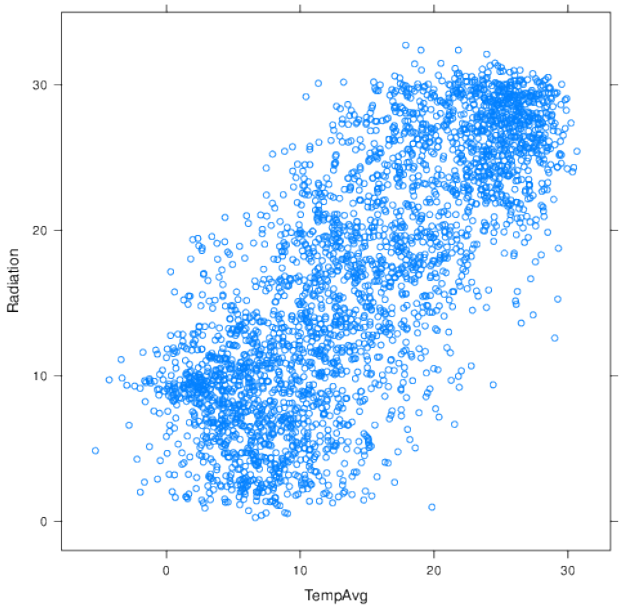
```
aranjuez$date <- as.Date(aranjuez$X)
```

```
aranjuez$month <- as.numeric(
   format(aranjuez$date, '%m'))

aranjuez$year <- as.numeric(
   format(aranjuez$date, '%Y'))

aranjuez$day <- as.numeric(
   format(aranjuez$date, '%j'))

aranjuez$quarter <- quarters(aranjuez$date)
```

Gráfico de dispersión de puntos

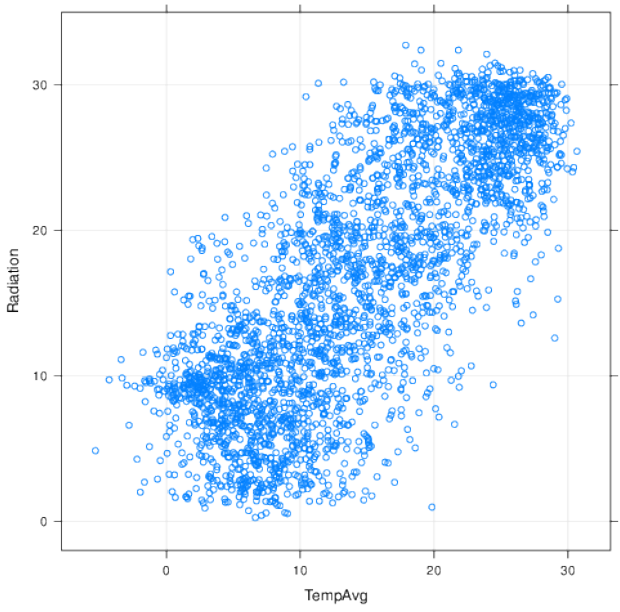
```
xyplot(Radiation ~ TempAvg, data=aranjuez)
```

```
ggplot(aranjuez, aes(TempAvg, Radiation)) +
   geom_point()
```


Radiation
30
20
10
0
0
10
20
30
TempAvg

Añadimos rejilla

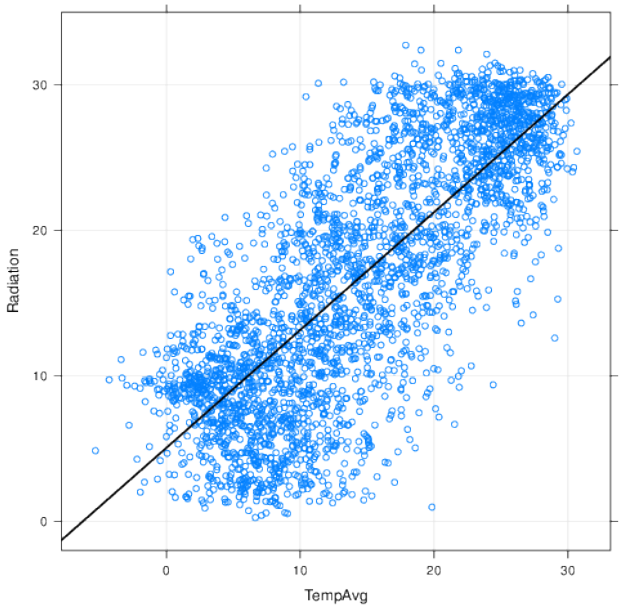
```
xyplot(Radiation ~ TempAvg, data=aranjuez,
      grid = TRUE)
```


Radiation
30
20
10
0
0
10
20
30
TempAvg

Añadimos regresión lineal

```
xyplot(Radiation ~ TempAvg, data=aranjuez,
      type=c('p', 'r'), grid = TRUE,
      lwd=2, col.line='black')
```

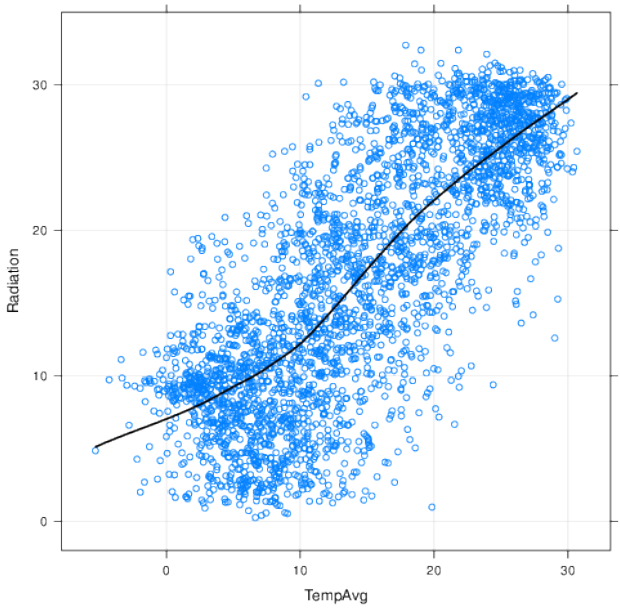
```
ggplot(aranjuez, aes(TempAvg, Radiation)) +
   geom_point() +
   geom_smooth(method = "lm")
```


Radiation
TempAvg
0
10
20
30
0
10
20
30

Añadimos ajuste local

```
xyplot(Radiation ~ TempAvg, data=aranjuez,
      type=c('p', 'smooth'), grid = TRUE,
      lwd=2, col.line='black')
```

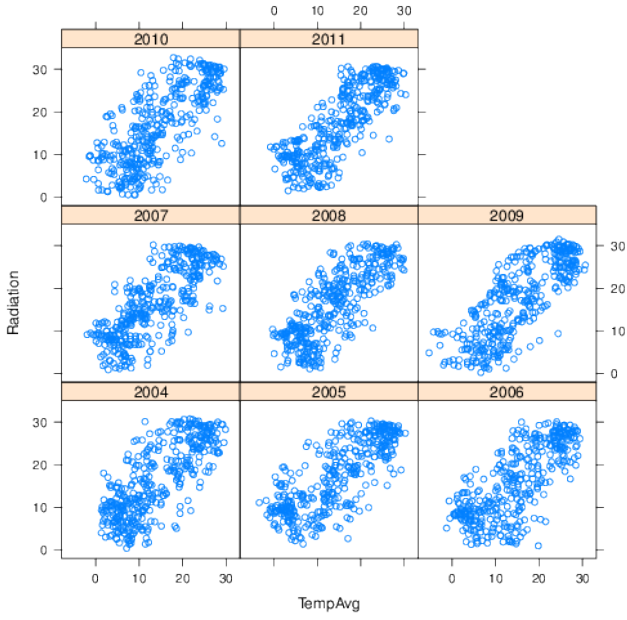
```
ggplot(aranjuez, aes(TempAvg, Radiation)) +
   geom_point() +
   geom_smooth()
```


Radiation
30
20
10
0
0
10
20
30
TempAvg

Paneles

```
xyplot(Radiation ~ TempAvg|factor(year),
      data=aranjuez)
```

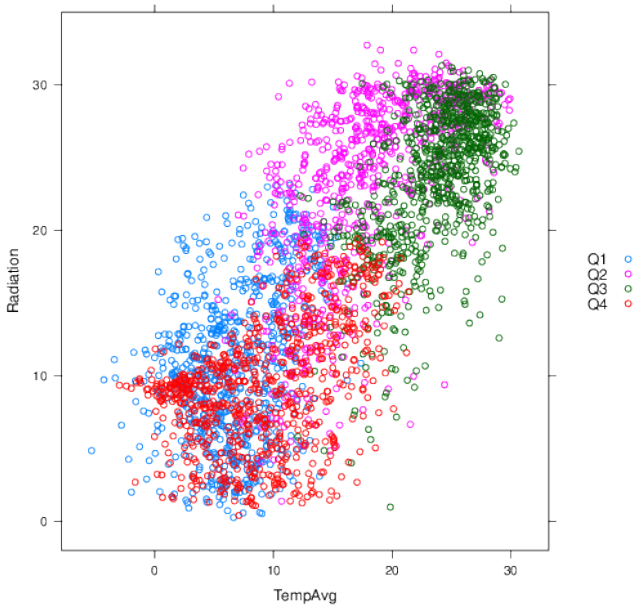
```
ggplot(aranjuez, aes(TempAvg, Radiation)) +
   geom_point() +
   facet_wrap(~factor(year))
```


2010
2011
2007
2008
2009
2004
2005
2006
Radiation
TempAvg
0
10
20
30

Grupos

```
xyplot(Radiation ~ TempAvg, groups=quarter,
     data=aranjuez, auto.key=list(space='right'))
```

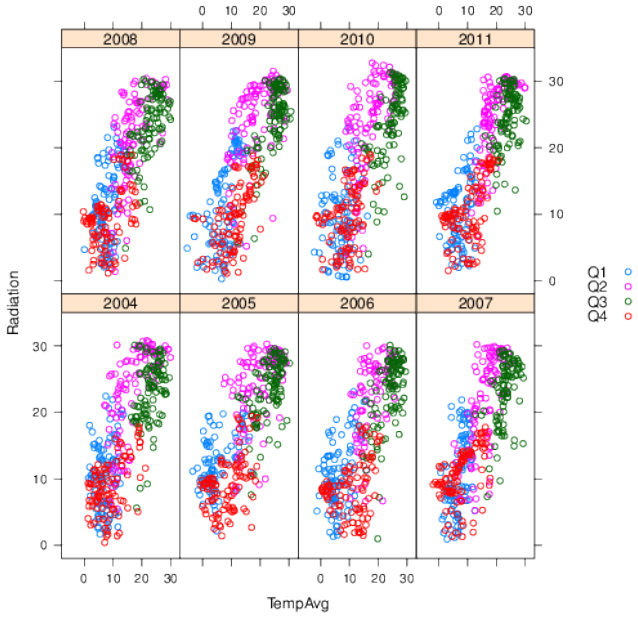
```
ggplot(aranjuez, aes(TempAvg, Radiation,
                 color = quarter)) +
   geom_point()
```


Radiation
TempAvg
0
10
20
30
Q1
Q2
Q3
Q4

Paneles y grupos

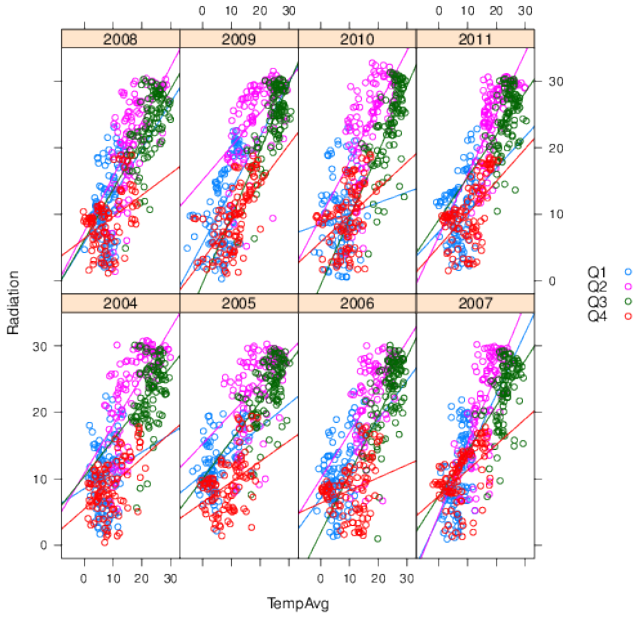
```
xyplot(Radiation ~ TempAvg|factor(year),
      groups=quarter,
      data=aranjuez,
      layout=c(4, 2),
      auto.key=list(space='right'))
```

```
ggplot(aranjuez, aes(TempAvg, Radiation,
                     color = quarter)) +
   geom_point() +
   facet_wrap(~factor(year))
```


2008
2009
2010
2011
2004
2005
2006
2007
Radiation
TempAvg
0
10
20
30
Q1
Q2
Q3
Q4

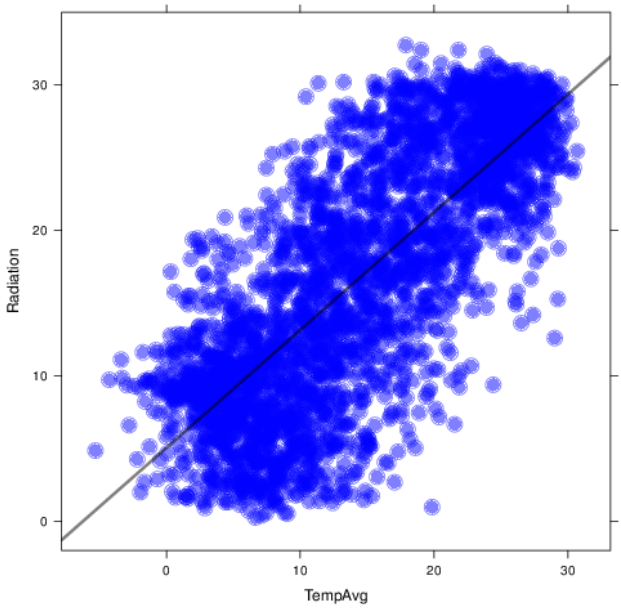
Paneles y grupos

```
xyplot(Radiation ~ TempAvg|factor(year),
      groups=quarter,
      data=aranjuez,
      layout=c(4, 2),
      type=c('p', 'r'),
      auto.key=list(space='right'))
```


2008
2009
2010
2011
2004
2005
2006
2007
Radiation
TempAvg
0
10
20
30
Q1
Q2
Q3
Q4

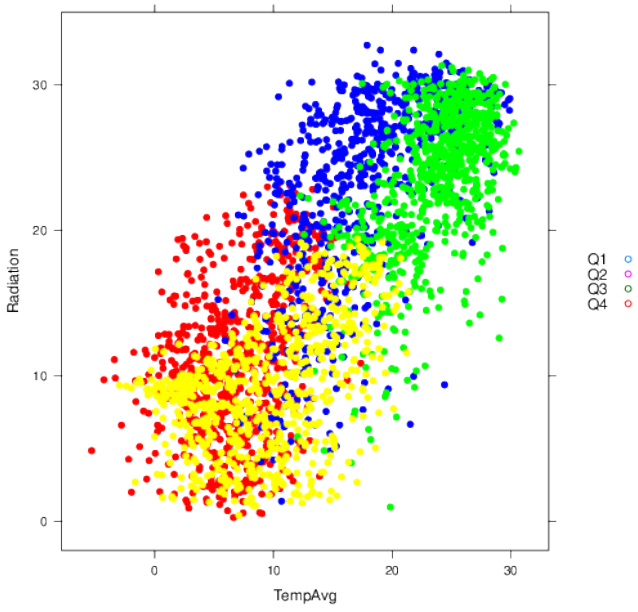
Colores y tamaños

```
xyplot(Radiation ~ TempAvg,
      type=c('p', 'r'),
      cex=2, col='blue',
      alpha=.5, pch=19,
      lwd=3, col.line='black',
      data=aranjuez)
```


Radiation
TempAvg
0
10
20
30
0
10
20
30

Colores con grupos

```
xyplot(Radiation ~ TempAvg,
      group=quarter,
      col=c('red', 'blue', 'green', 'yellow'),
      pch=19,
      auto.key=list(space='right'),
      data=aranjuez)
```


Radiation
TempAvg
0
10
20
30
Q1
Q2
Q3
Q4

Colores con grupos: `par.settings` y `simpleTheme`

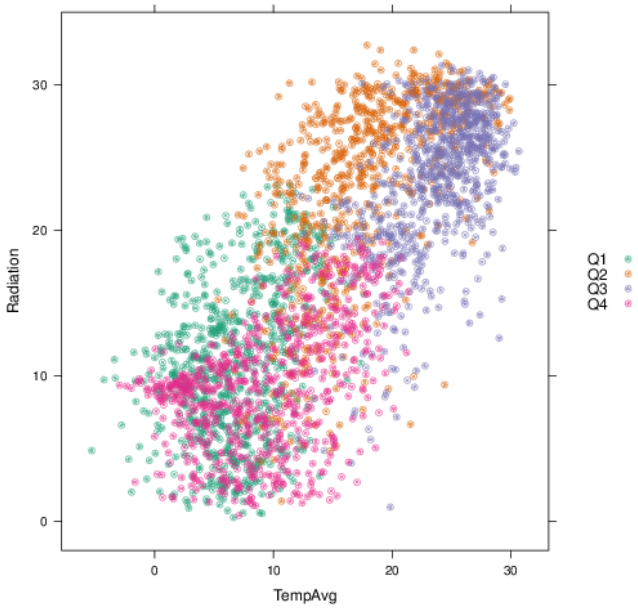
- Primero definimos el tema con `simpleTheme`

```
myTheme <- simpleTheme(col=c('red', 'blue',
                             'green', 'yellow'),
                       pch=19, alpha=.6)
```

Colores con grupos: par.settings y simpleTheme

- Aplicamos el resultado en par.settings

```
xyplot(Radiation ~ TempAvg,
      groups=quarter,
      par.settings=myTheme,
      auto.key=list(space='right'),
      data=aranjuez)
```


Radiation
TempAvg
0
10
20
30
Q1
Q2
Q3
Q4

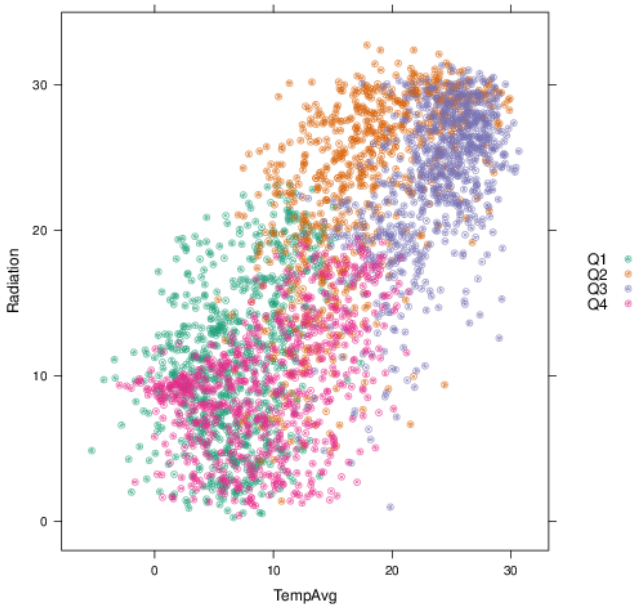
Colores: brewer.pal

```
library(RColorBrewer)

myPal <- brewer.pal(n = 4, 'Dark2')

myTheme <- simpleTheme(col = myPal,
                       pch=19, alpha=.6)
```

ColorBrewer: http://colorbrewer2.org/

Asignamos paleta con par.settings

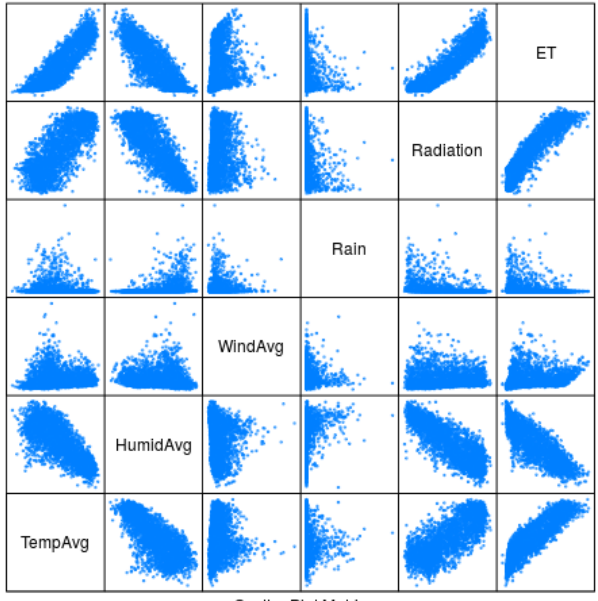
```
xyplot(Radiation ~ TempAvg,
      groups=quarter,
      par.settings=myTheme,
      auto.key=list(space='right'),
      data=aranjuez)
```


Radiation
TempAvg
0
10
20
30
Q1
Q2
Q3
Q4

Matriz de gráficos de dispersión

```
splom(aranjuez[,c("TempAvg", "HumidAvg", "WindAvg",
                  "Rain", "Radiation", "ET")],
      pscale=0, alpha=0.6, cex=0.3, pch=19)
```

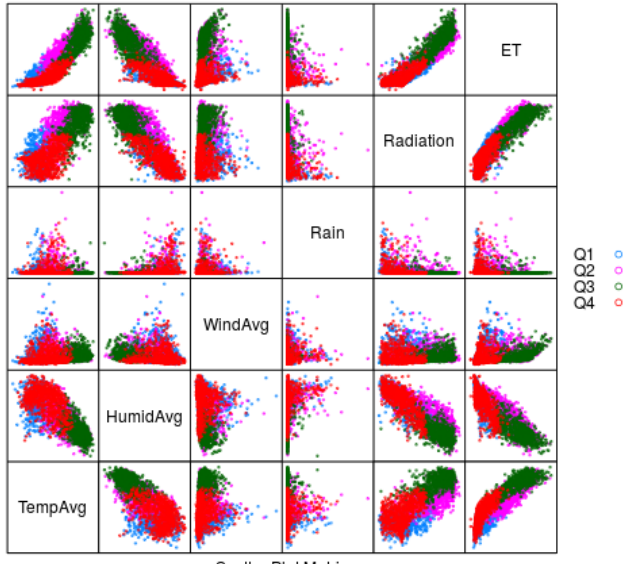
```
library(GGally)
ggpairs(aranjuez)
```



Scatter Plot Matrix

Matriz de gráficos de dispersión

```
splom(aranjuez[,c("TempAvg", "HumidAvg", "WindAvg",
                  "Rain", "Radiation", "ET")],
      groups=aranjuez$quarter,
      auto.key=list(space='right'),
      pscale=0, alpha=0.6, cex=0.3, pch=19)
```

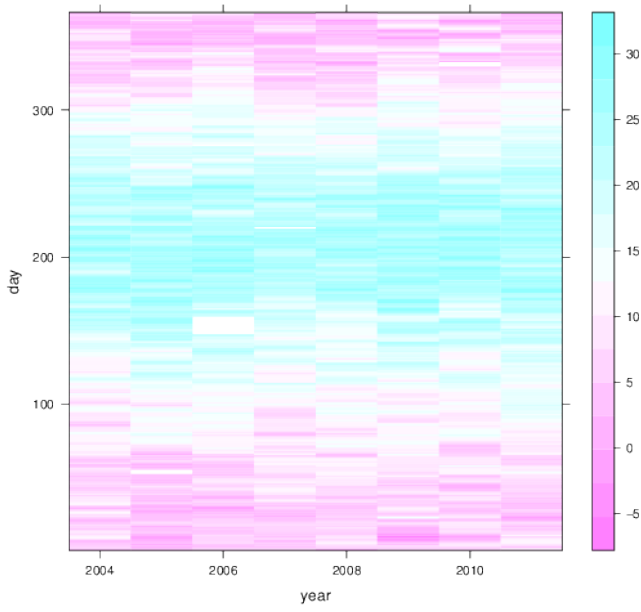


Scatter Plot Matrix

Mapa de niveles

```
levelplot(TempAvg ~ year * day, data = aranjuez)
```

```
ggplot(aranjuez, aes(year, day)) +
   geom_raster(aes(fill = TempAvg))
```


day
300
200
100
2004
2006
2008
2010
year
30
25
20
15
10
5
0
−5

`levelplot` con una paleta mejor

- Usamos `colorRampPalette` para generar una función que interpola colores a partir de una paleta

```
levelPal <- colorRampPalette(
   brewer.pal(n = 9, 'Oranges'))
```

- Comprobamos que es una función generadora de colores

```
levelPal(14)
```

- Usamos esta función con `col.regions`

```
 levelplot(TempAvg ~ year * day,
         col.regions = levelPal,
         data = aranjuez)
```

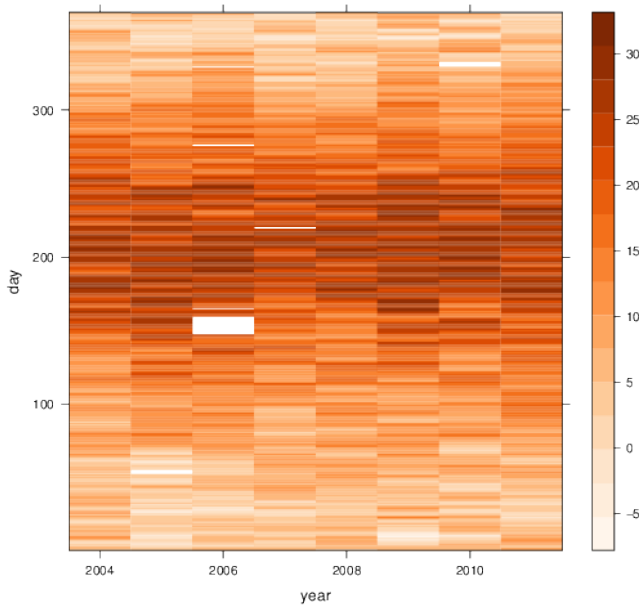
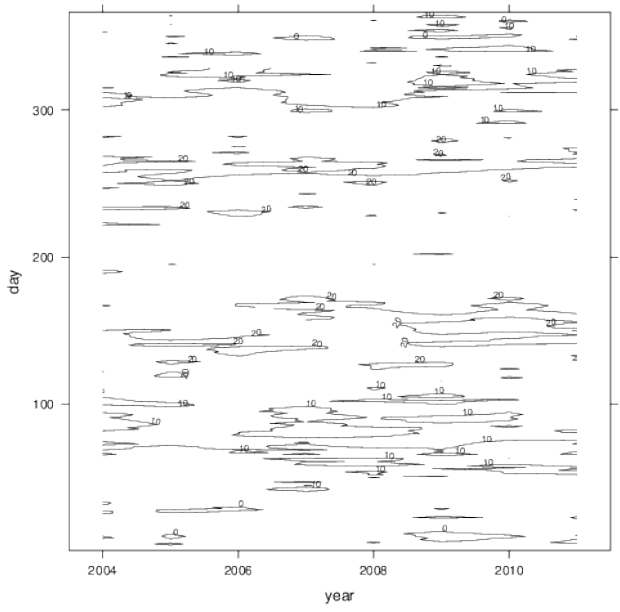

day
300
200
100
2004
2006
2008
2010
year
30
25
20
15
10
5
0
−5

Gráfico de contornos

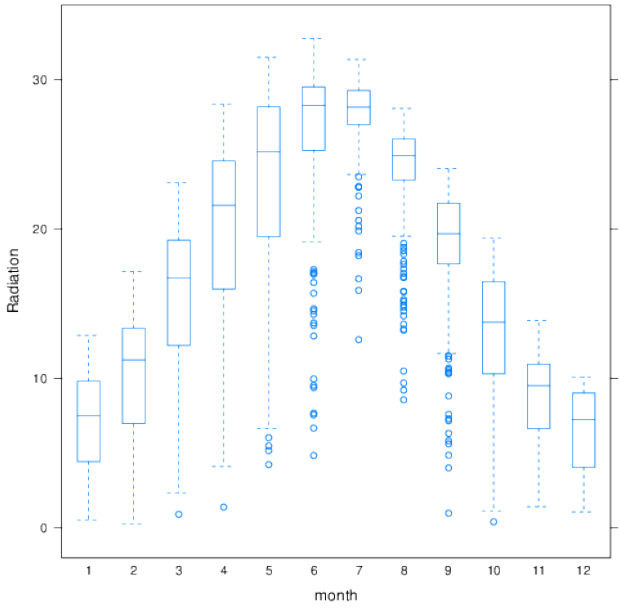
```
contourplot(TempAvg ~ year * day,
          data = aranjuez,
          lwd = .5,
          labels = list(cex = 0.6),
          label.style = 'align',
          cuts = 5)
```


day
300
200
100
2004
2006
2008
2010
year

Box-and-Whiskers

```
bwplot(Radiation ~ month, data=aranjuez,
     horizontal = FALSE, pch='|')
```

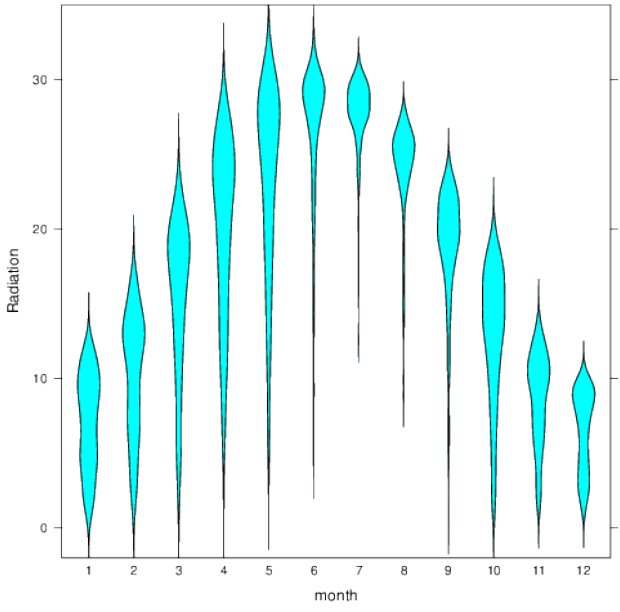
```
ggplot(aranjuez, aes(factor(month), Radiation)) +
   geom_boxplot()
```


Radiation
30
20
10
0
1
2
3
4
5
6
7
8
9
10
11
12
month

Box-and-Whiskers

```
bwplot(Radiation ~ month, data=aranjuez,
      horizontal=FALSE,
      panel=panel.violin)
```

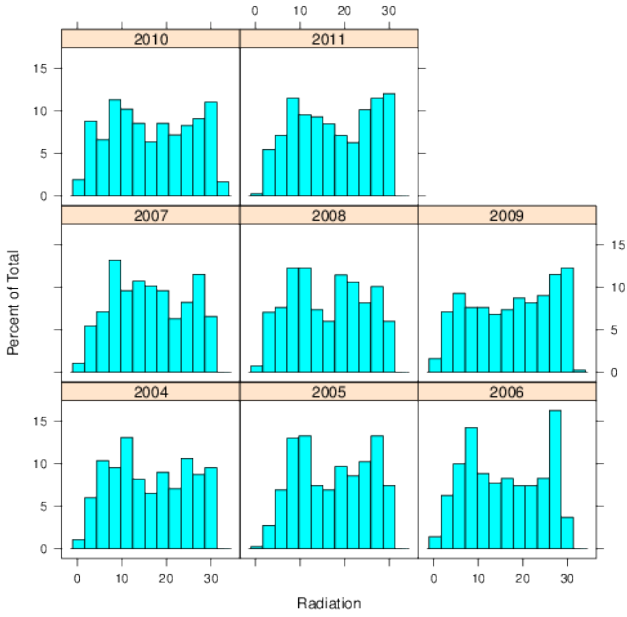
```
ggplot(aranjuez, aes(factor(month), Radiation)) +
   geom_violin()
```


Radiation
30
20
10
0
1
2
3
4
5
6
7
8
9
10
11
12
month

Histogramas

```
histogram(~ Radiation|factor(year), data=aranjuez)
```

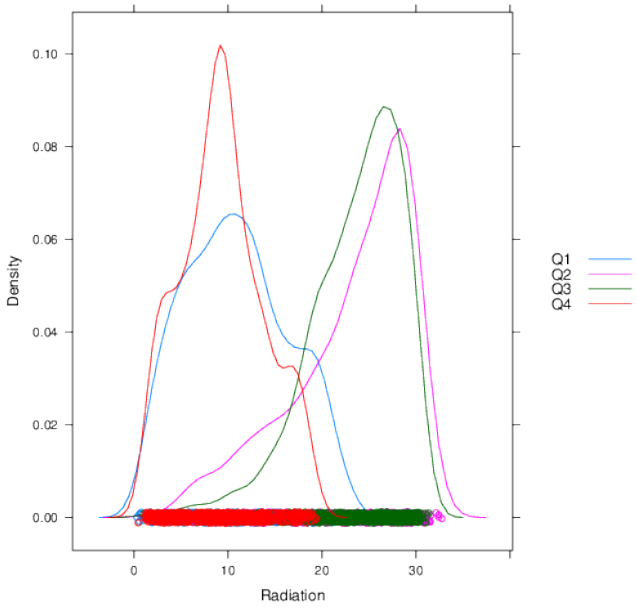
```
ggplot(aranjuez, aes(Radiation)) +
   geom_histogram() +
   facet_wrap(~factor(year))
```


2010
2011
2007
2008
2009
2004
2005
2006
Percent of Total
Radiation
0
5
10
15
20
30

Gráficos de densidad

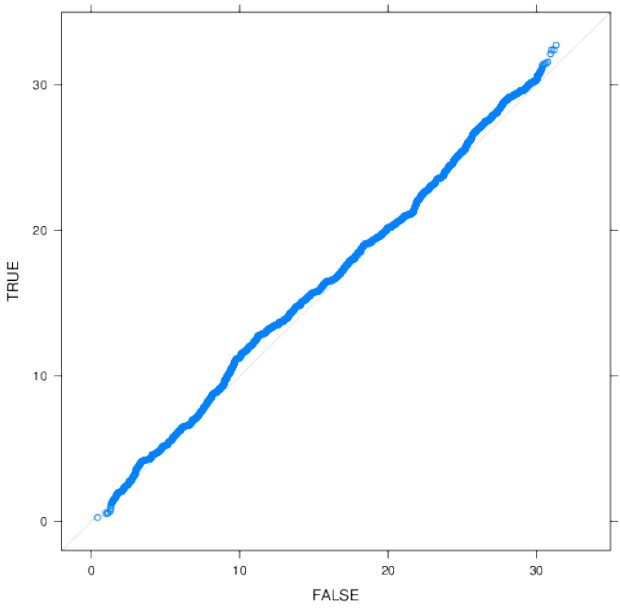
```
densityplot(~ Radiation, groups=quarter,
          data=aranjuez,
          auto.key=list(space='right'))
```

```
ggplot(aranjuez, aes(Radiation, color = quarter)) +
   geom_density()
```


0.10
0.08
0.06
0.04
0.02
0.00
Density
0
10
20
30
Radiation
Q1
Q2
Q3
Q4

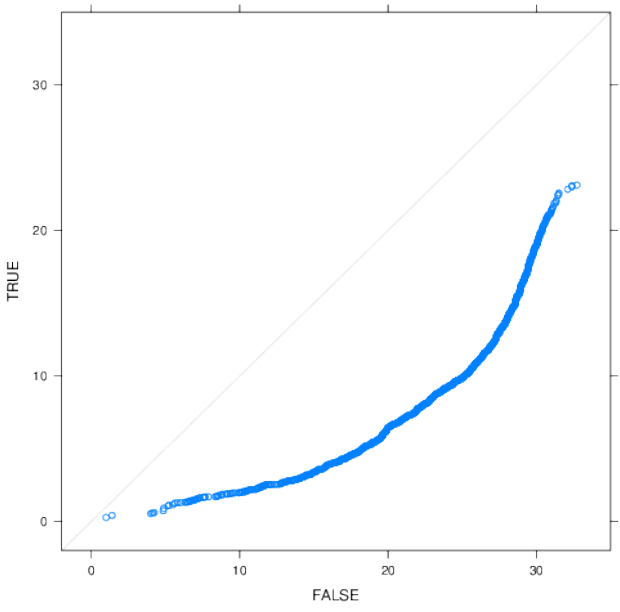
Quantile-Quantile

```
firstHalf <- aranjuez$quarter %in% c('Q1', 'Q2')

qq(firstHalf ~ Radiation, data=aranjuez)
```


TRUE
FALSE
0
10
20
30
0
10
20
30

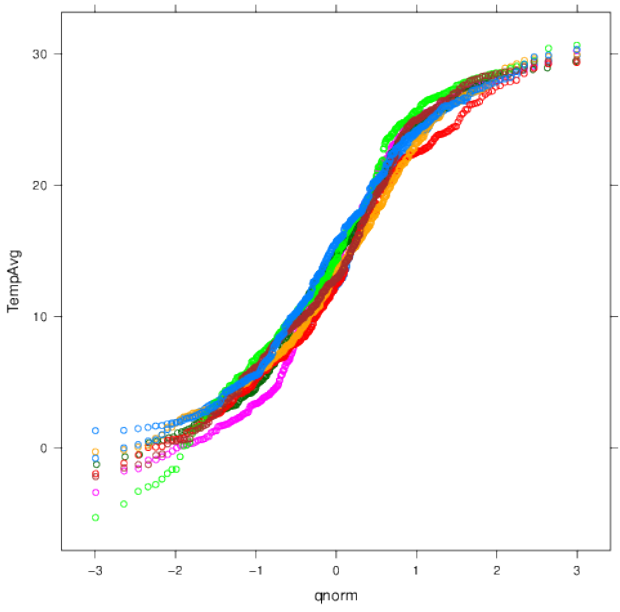
Quantile-quantile

```
winter <- aranjuez$quarter %in% c('Q1', 'Q4')

qq(winter ~ Radiation, data=aranjuez)
```


30
20
10
0
TRUE
0
10
20
30
FALSE

Quantile-Quantile

```
qqmath(~TempAvg, data=aranjuez,
      groups=year, distribution=qnorm)
```


30
20
10
0
TempAvg
−3
−2
−1
0
1
2
3
qnorm