

### Barplot

`barplot(h eight)` where height is vector or matrix

Options: `horiz=TRUE`, `main`, `xlab`, `ylab`, `names.arg`

If height is matrix, stacked and grouped bar plot is produced

Options: `beside =TRUE`, `col`, `legend`

If height is factor or ordered factor, use `plot()` function

### Spinograms

`spine()` function in `vcd` package

### Pie charts

```
par(mfrow=c(2, 2))
slices <- c(10, 12.4, 16, 8)
lbls <- c("US", "UK", "Australia", "Germany", "France")

pie(slices, labels = lbls,
    main="Simple Pie Chart")

pct <- round(slices/sum(slices)*100)
lbls2 <- paste(lbls, " ", pct, "%", sep="")
pie(slices, labels=lbls2, col=rainbow(length(lbls2)),
    main="Pie Chart with Percentages")

library(plotrix)
pie3D(slices, labels=lbls, explode=0.1,
    main="3D Pie Chart")

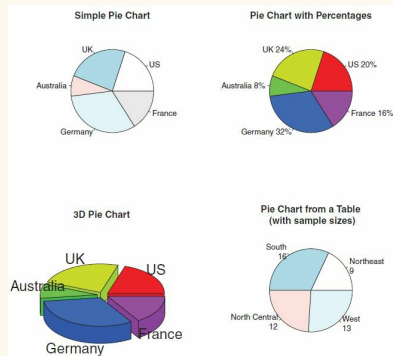
mytable <- table(states.region)
lbls3 <- paste(names(mytable), "\n", mytable, sep="")
pie(mytable, labels = lbls3,
    main="Pie Chart from a Table\n (with sample sizes)")
```

Combine four graphs into one

Add percentages to pie chart

Create chart from table

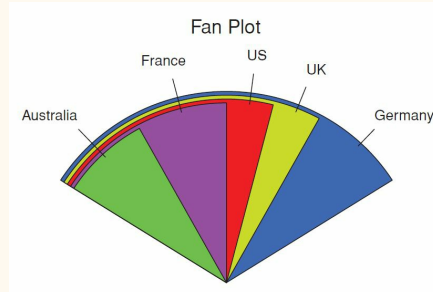
### Pie charts



### Fan plot

`fan.plot()` in `plotrix` package

### Fan plot



### Histogram

```
par(mfrow=c(2,2))
hist(mtcars$mpg)

hist(mtcars$mpg,
    breaks=12,
    col="red",
    xlab="Miles Per Gallon",
    main="Colored histogram with 12 bins")

hist(mtcars$mpg,
    freq=F, las=1,
    breaks=12,
    col="red",
    xlab="Miles Per Gallon",
    main="Histogram, rug plot, density curve")
rug(jitter(mtcars$mpg))
lines(density(mtcars$mpg), col="blue", lwd=2)

x <- mtcars$mpg
be=hist(x,
    breaks=12,
    col="red",
    xlab="Miles Per Gallon",
    main="Histogram with normal curve and box")
xfit<-seq(min(x), max(x), length=40)
yfit<-dnorm(xfit, mean=mean(x), sd=sd(x))
yfit <- yfit*diff(h$midas[1:2])^length(x)
lines(xfit, yfit, col="blue", lwd=2)
box()
```

Simple histogram

With specified bins and color

With rug plot and frame

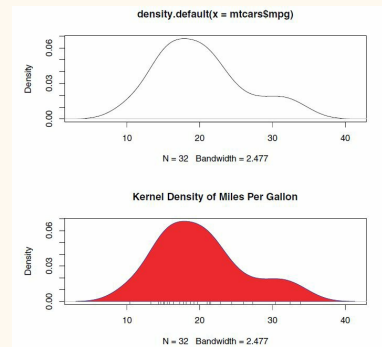
With normal curve

### Kernel density plot

```
par(mfrow=c(2,1))
d <- density(mtcars$mpg)
plot(d)

d <- density(mtcars$mpg)
plot(d, main="Kernel Density of Miles Per Gallon")
polygon(d, col="red", border="blue")
rug(mtcars$mpg, col="brown")
```

### Kernel density plot



### Kernel density plot

```
par(lwd=2)
library(sm)
attach(mtcars)

cyl.f <- factor(cyl, levels= c(4,6,8),
    labels = c("4 cylinder", "6 cylinder", "8 cylinder"))

sm.density.compare(mpg, cyl, xlab="Miles Per Gallon")
title(main="MPG Distribution by Car Cylinders")

colfill<-c(2,(1+length(levels(cyl.f))))
legend(locator(1), levels(cyl.f), fill=colfill)

detach(mtcars)
```

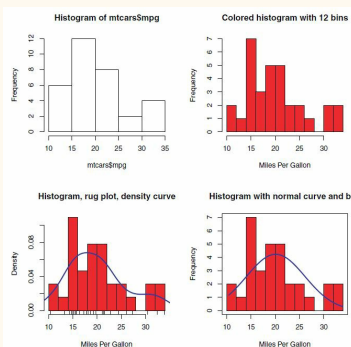
Double width of plotted lines

Create grouping factor

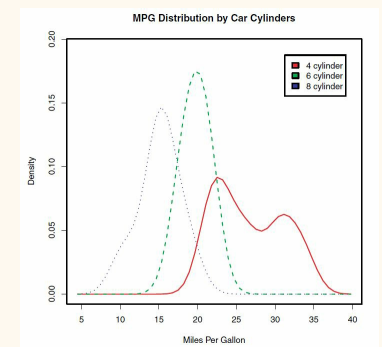
Plot densities

Add legend via mouse click

### Histogram



### Kernel density plot



### Box plots

#### Five-number summary

Minimum, lower quartile (25th percentile), median (50th percentile), maximum

#### Outliers

Values outside the range of  $\pm 1.5 \cdot \text{IQR}$

#### Example

```
boxplot(mtcars$mpg, main="Box plot", ylab="mpg")
```

```
boxplot(mtcars$mpg ~ mtcars$cyl)
```

#### Parallel box plots for comparison

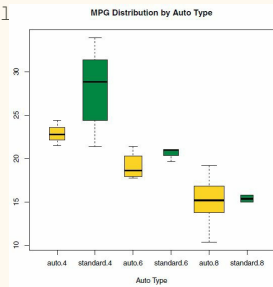
```
boxplot(formula, data=data.frame)
```

### Box plots (2 crossed factors)

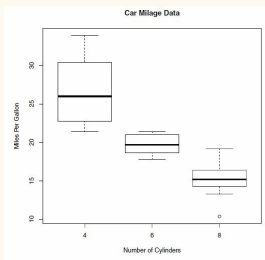
```
mtcars$cyl.f <- factor(mtcars$cyl,
  levels=c(4, 6, 8),
  labels=c("4", "6", "8"))
mtcars$am.f <- factor(mtcars$am,
  levels=c(0,1),
  labels=c("auto", "standard"))
boxplot(mpg ~ am.f * cyl.f,
  data=mtcars,
  varwidth=TRUE,
  col=c("red", "darkgreen"),
  main="MPG Distribution by Auto Type",
  xlab="Auto Type")
```

- Create factor for # of cylinders
- Create factor for transmission type
- Generate box plot

### Box plots (2 crossed factors)

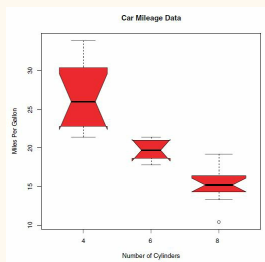


### Box plots



```
boxplot(mpg ~ cyl, data=mtcars,
  main="Car Mileage Data", xlab="Number of Cylinders", ylab="Miles per Gallon")
```

### Box plots



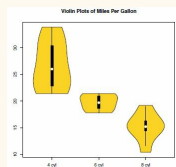
```
boxplot(mpg ~ cyl, data=mtcars,
  notch=TRUE, varwidth=TRUE,
  col="red", main="Car Mileage Data",
  xlab="Number of Cylinders",
  ylab="Miles per Gallon")
```

### Violin plots

Violin plots are kernel density plots superimposed in a mirror image fashion over box plots

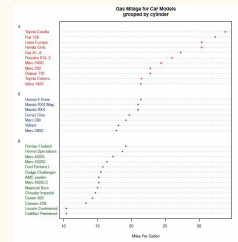
```
vioplot(x1, x2, ..., names=, col=)
```

### Violin plots



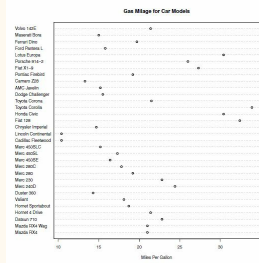
```
library(vioplot)
x1 <- mtcars$mpg[mtcars$cyl == 4]
x2 <- mtcars$mpg[mtcars$cyl == 6]
x3 <- mtcars$mpg[mtcars$cyl == 8]
vioplot(x1, x2, x3, names=c("4 cyl", "6 cyl", "8 cyl"), col="gold")
title("Violin Plots of Miles Per Gallon")
```

### Dot plots - grouped, sorted and colored



```
x <- mtcars[order(mtcars$mpg),]
x$cyl <- factor(x$cyl)
x$color[x$cyl==4] <- "red"
x$color[x$cyl==6] <- "blue"
x$color[x$cyl==8] <- "darkgreen"
dotchart(x$mpg, labels=rownames(x), cex=.7, groups=x$cyl,
  gcolor="black", color=x$color, pch=19, main="Gas Mileage for Car Models \ngrouped by cylinder",
  xlab="Miles Per Gallon")
```

### Dot plots



```
dotchart(mtcars$mpg, labels = rownames(mtcars), cex=.7,
main="Gas Mileage for Car Models", xlab="Miles Per Gallon")
```



By **xeonkai**  
[cheatography.com/xeonkai/](http://cheatography.com/xeonkai/)

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