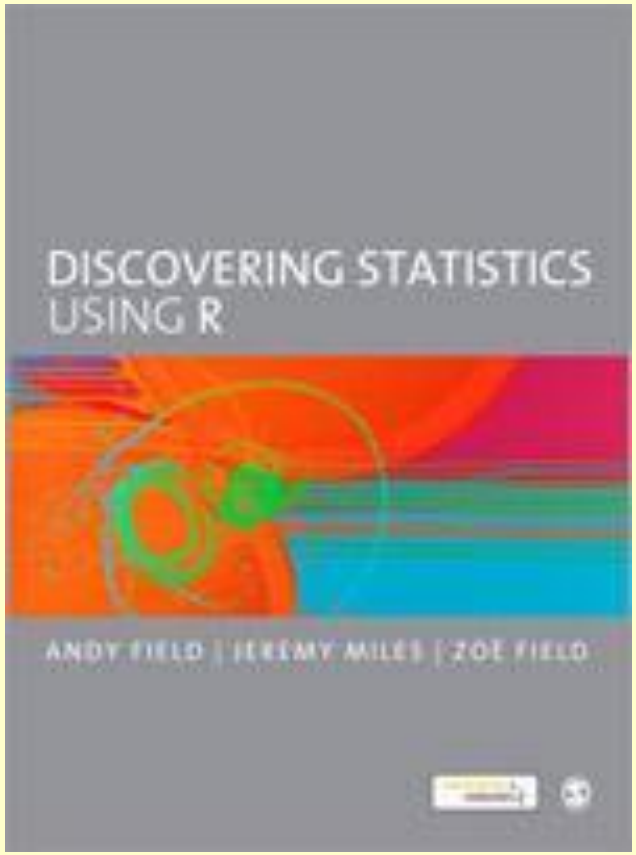
Graphical Exploration I:

R Commander

Exploring Data With Graphs

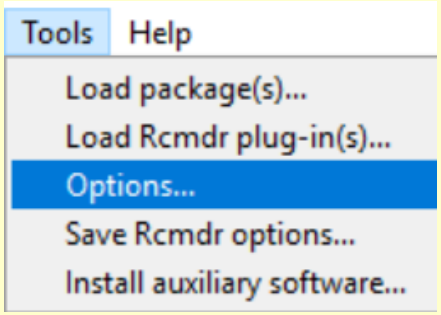


Chapter 4

- Aim: Provide overview of Rcmdr graphs
- The Basics:
  - Histograms
  - Density plots
  - Boxplots
  - Scatterplots
  - Line graphs

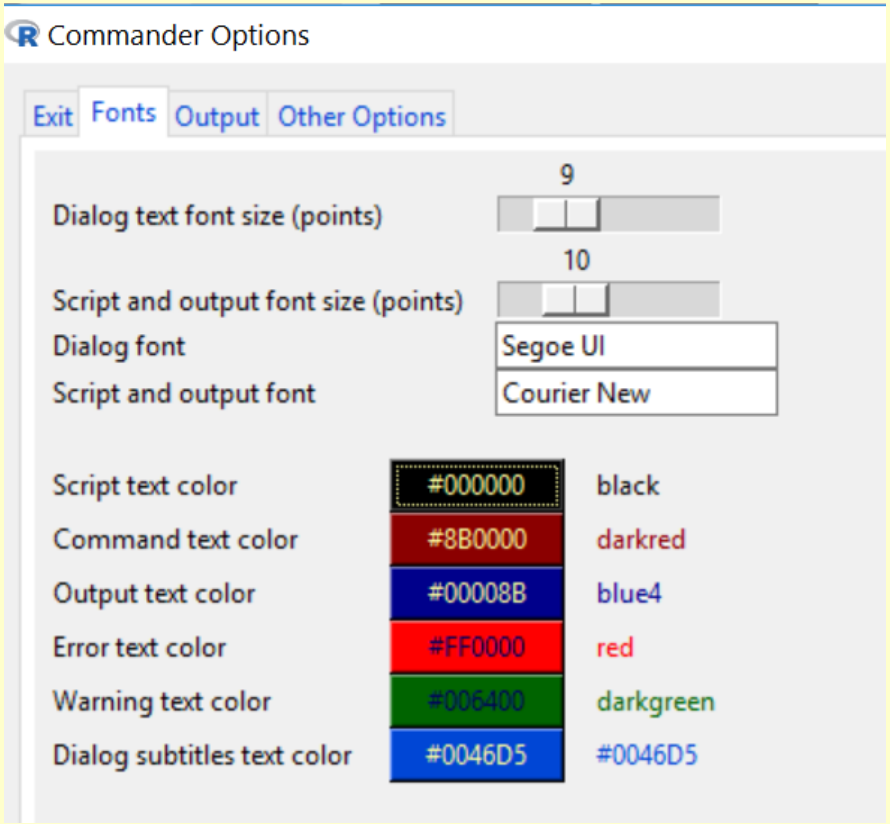
Options in Rcmdr

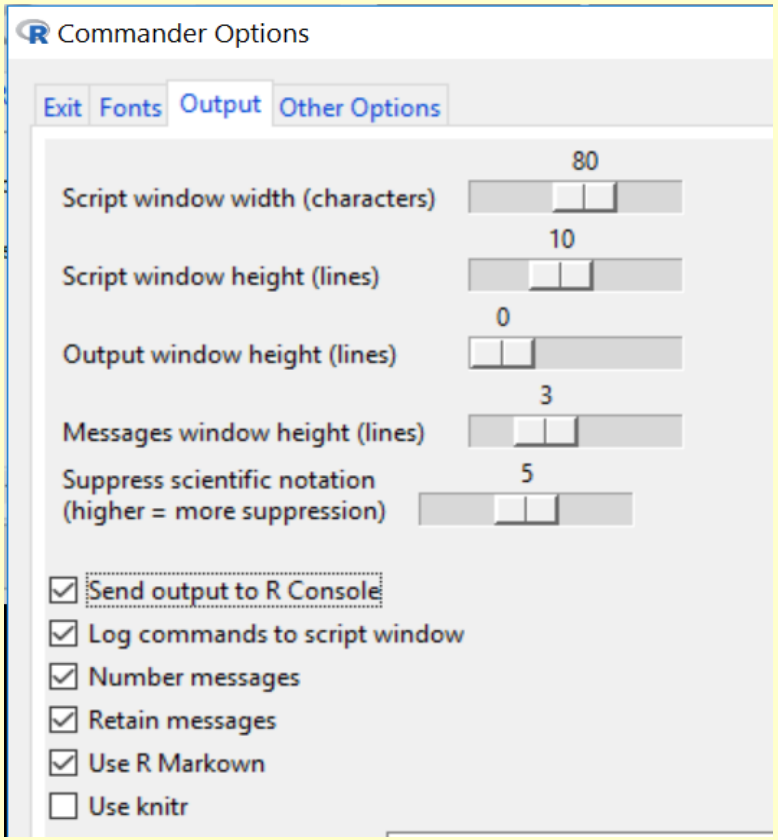
Rcmdr provides tool options



Font type, size, color

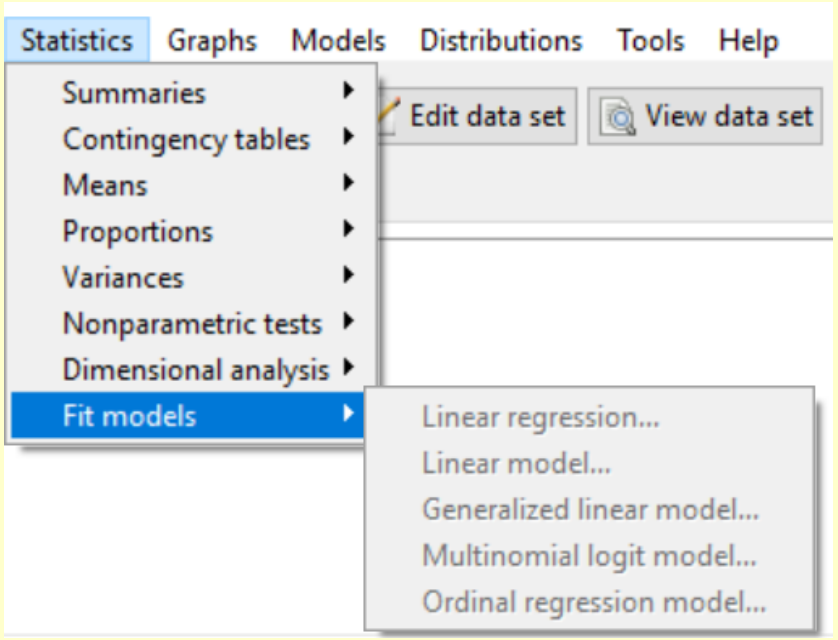
Output size



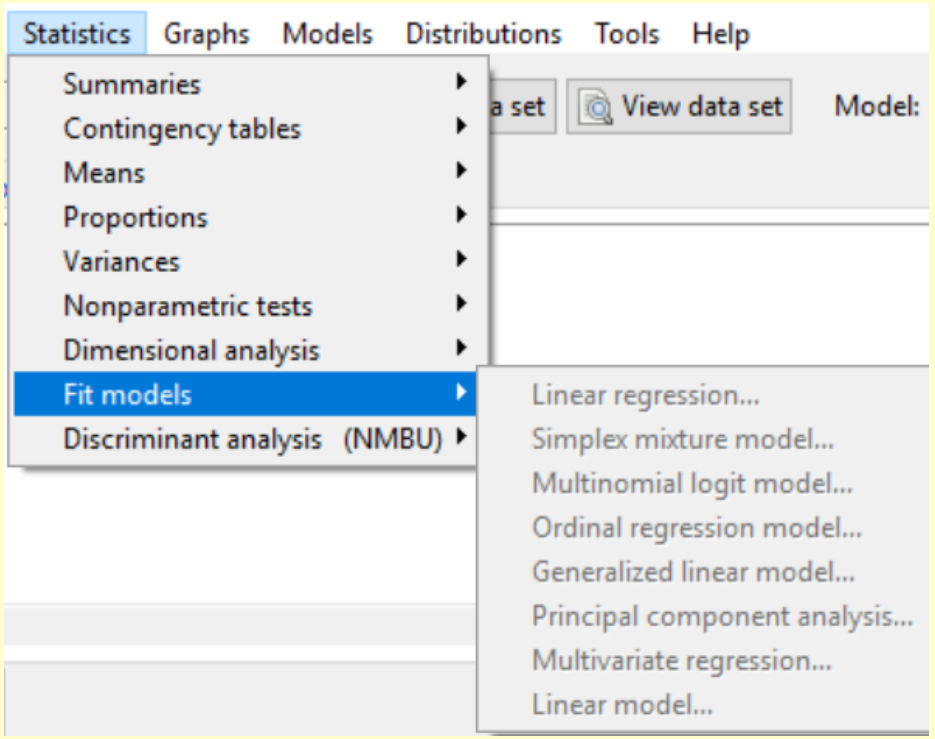


Rcmdr Toolkits

Rcmdr Statistics Menu



Expanded Functionality after installing package 'RcmdrPlugin.NMBU'



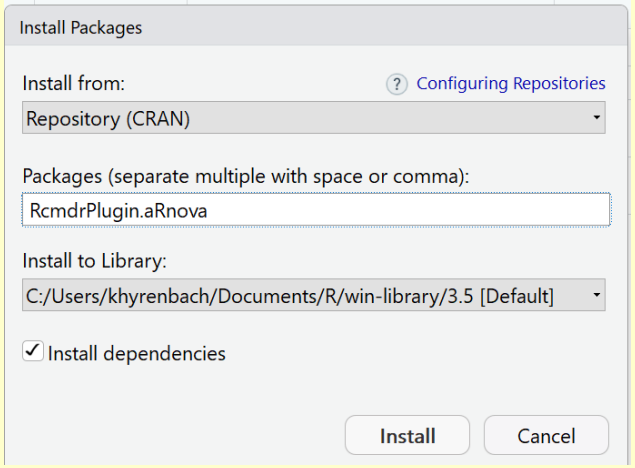
Rcmdr Plug-ins

Install package: 'RcmdrPlugin.NMBU'

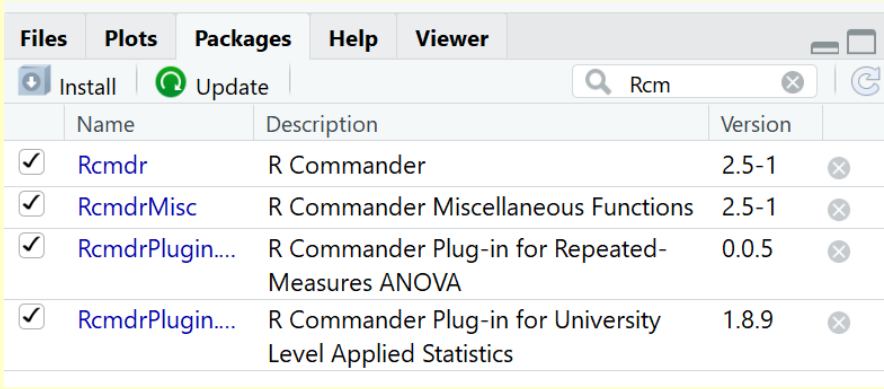
R Commander Plug-in for University Level Applied Statistics

Documentation for package 'RcmdrPlugin.NMBU' version 1.8.9

1) Install package and dependencies from CRAN

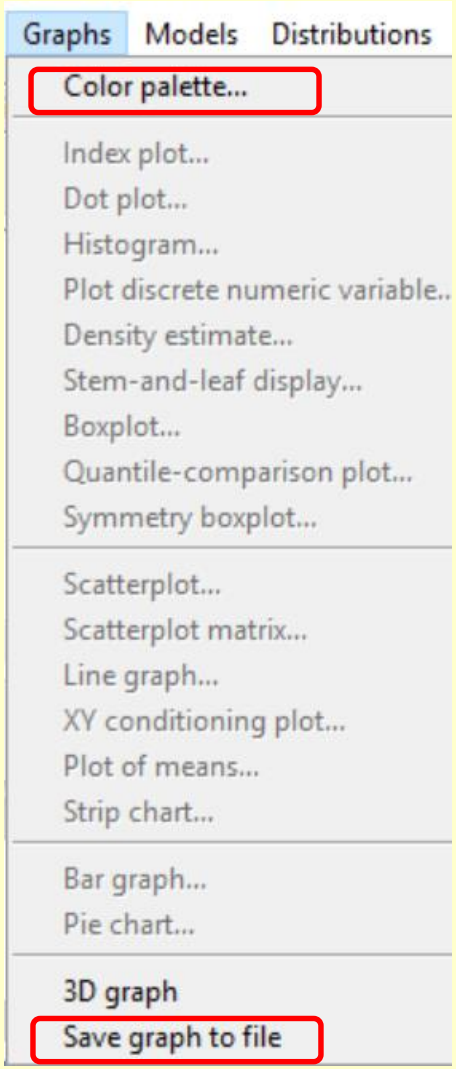


2) Activate package



Graphs in Rcmdr

Standard Rcmdr Menu



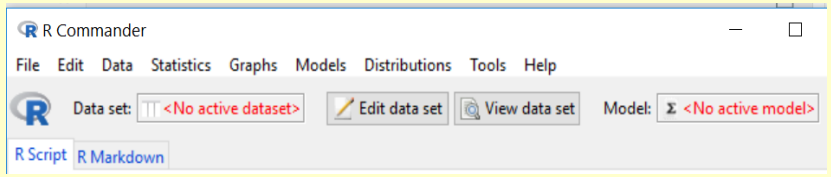
Set Color Palette

Greyed out buttons indicate they are not available:

Why not?

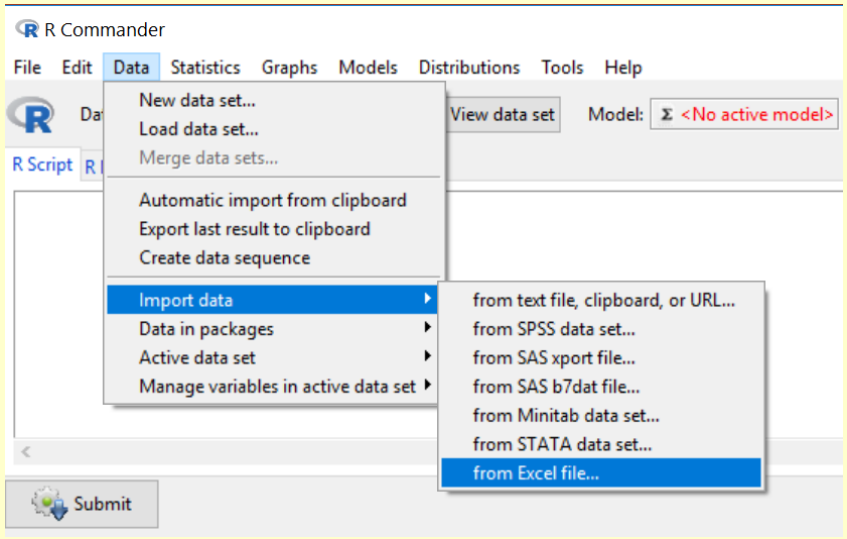
No data uploaded

Save Graph to File

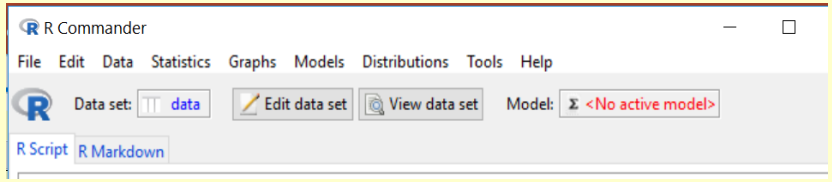


To Load a Dataset

1) Import xls file:



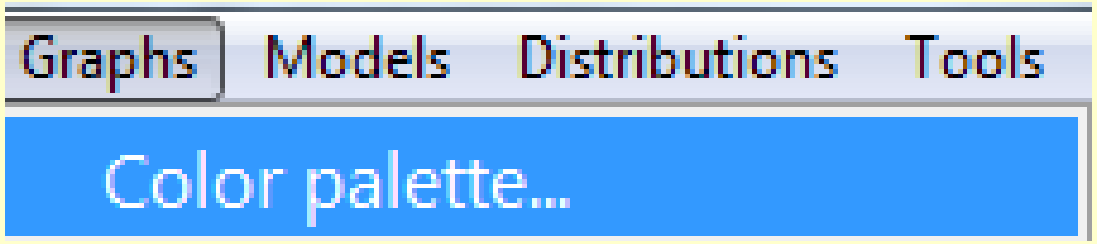
2) Select dataset:



Graphs in Rcmdr – Palette

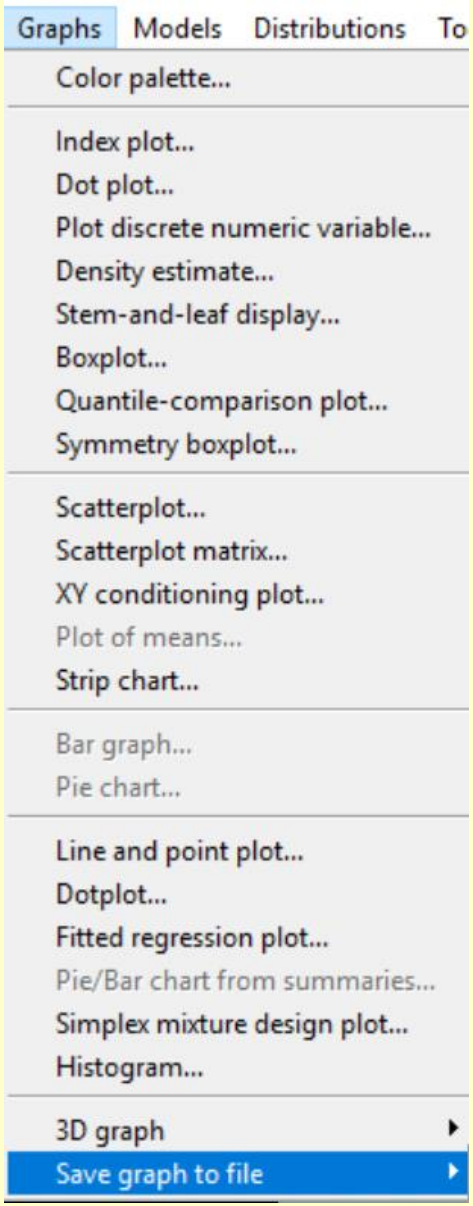
Graphs Tab Menu

Change the color options used in the figures

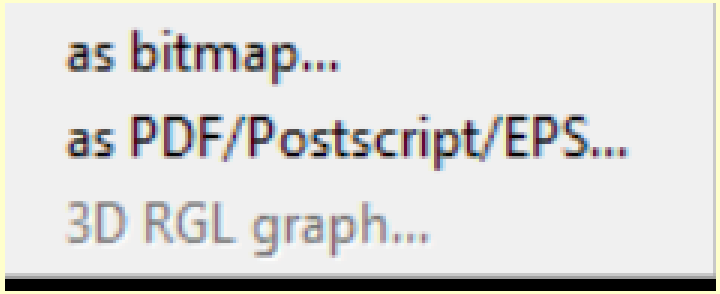


Graphs in Rcmdr – Save Figure

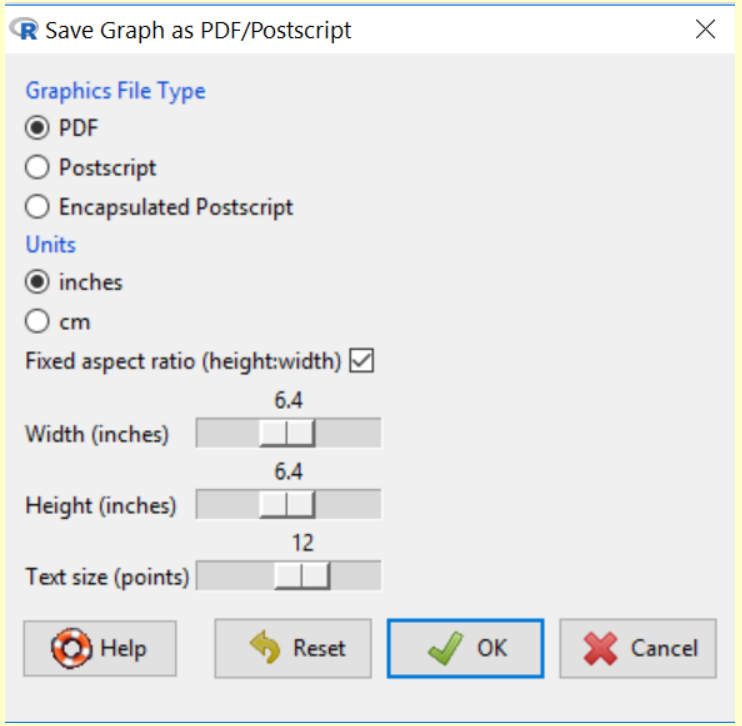
Graphs Tab Menu



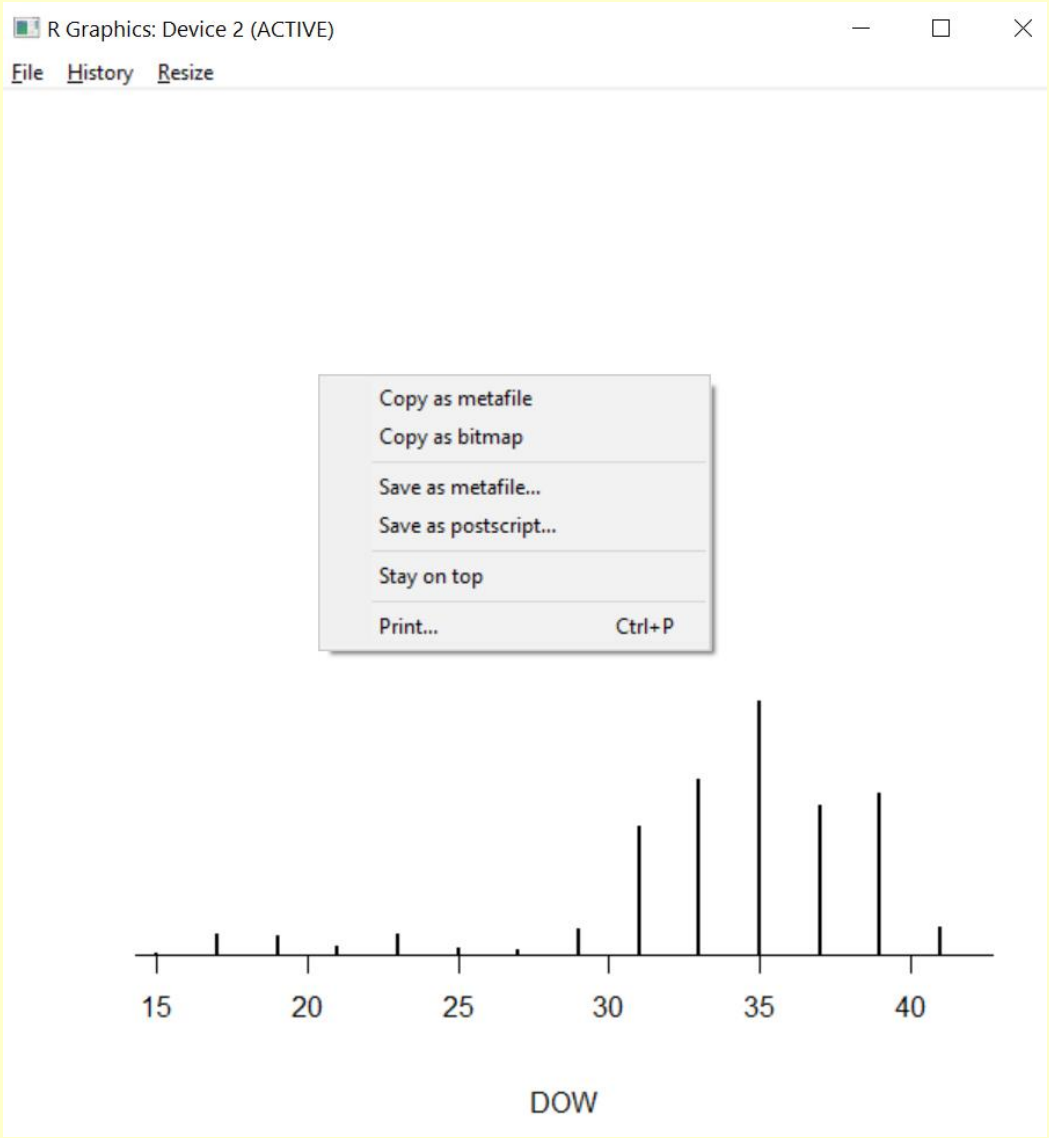
Change format of exported files



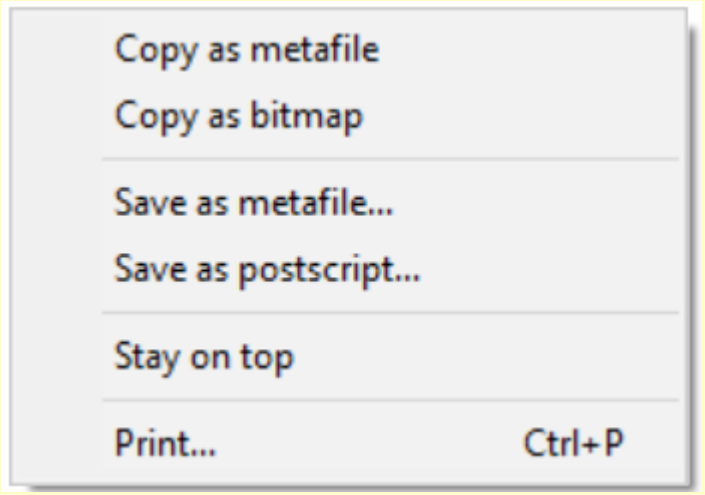
Select size of figure and text



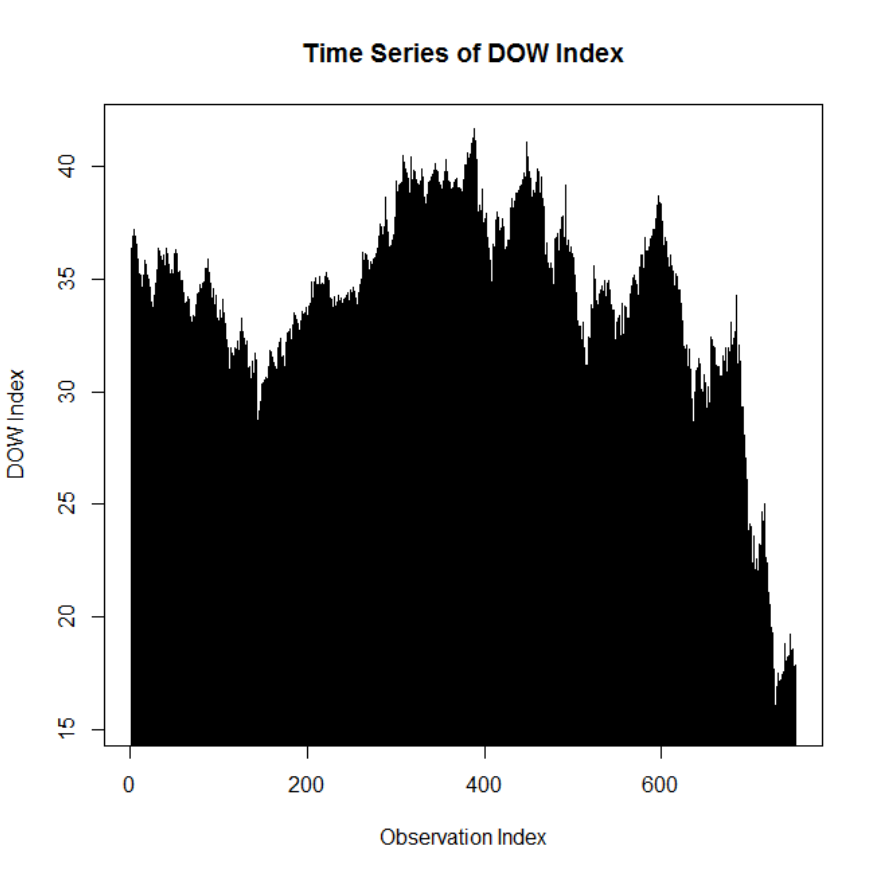
Graphs in Rcmdr - Save Figure

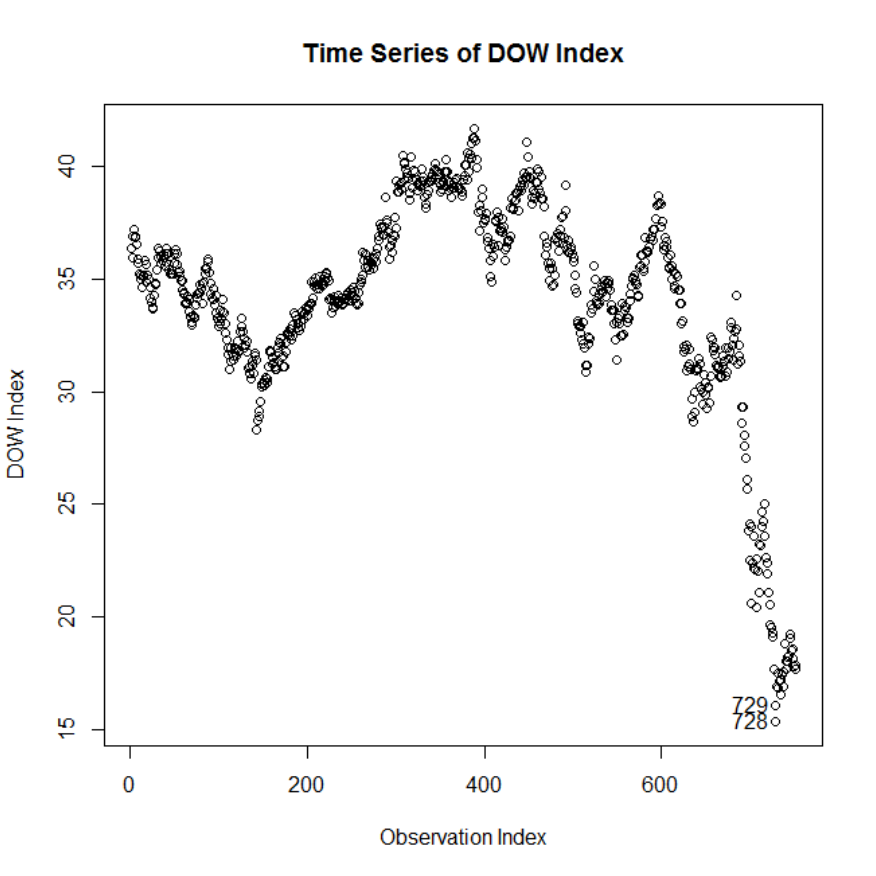


Copy and Save File



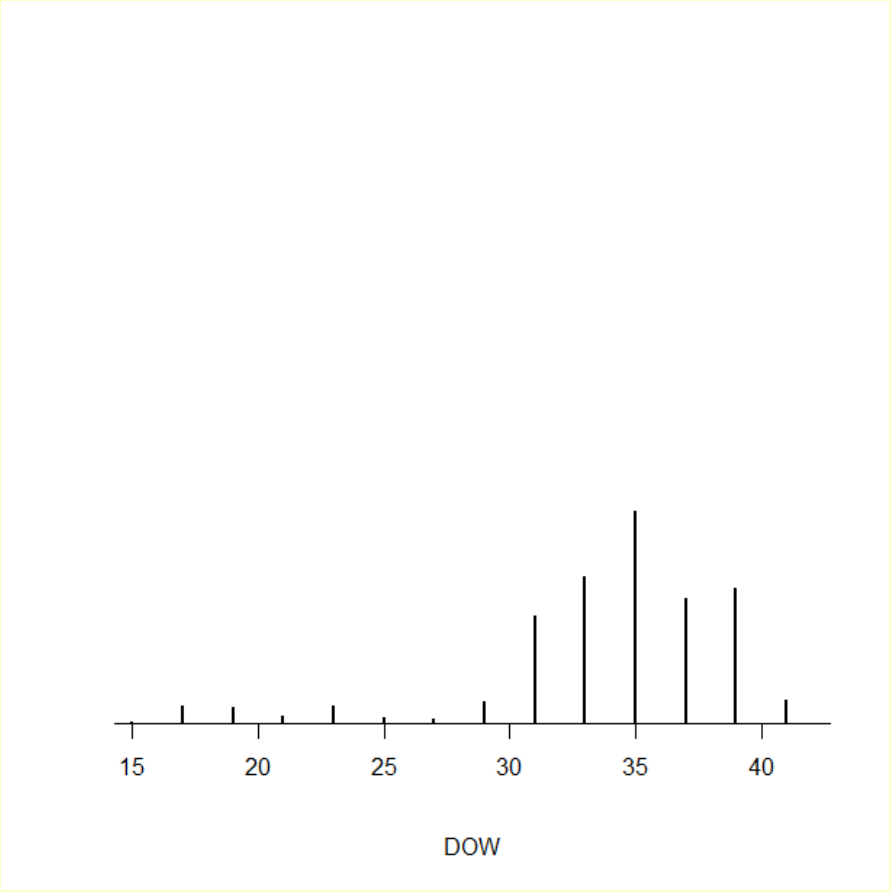
Graphs in Rcmdr – Index Plot





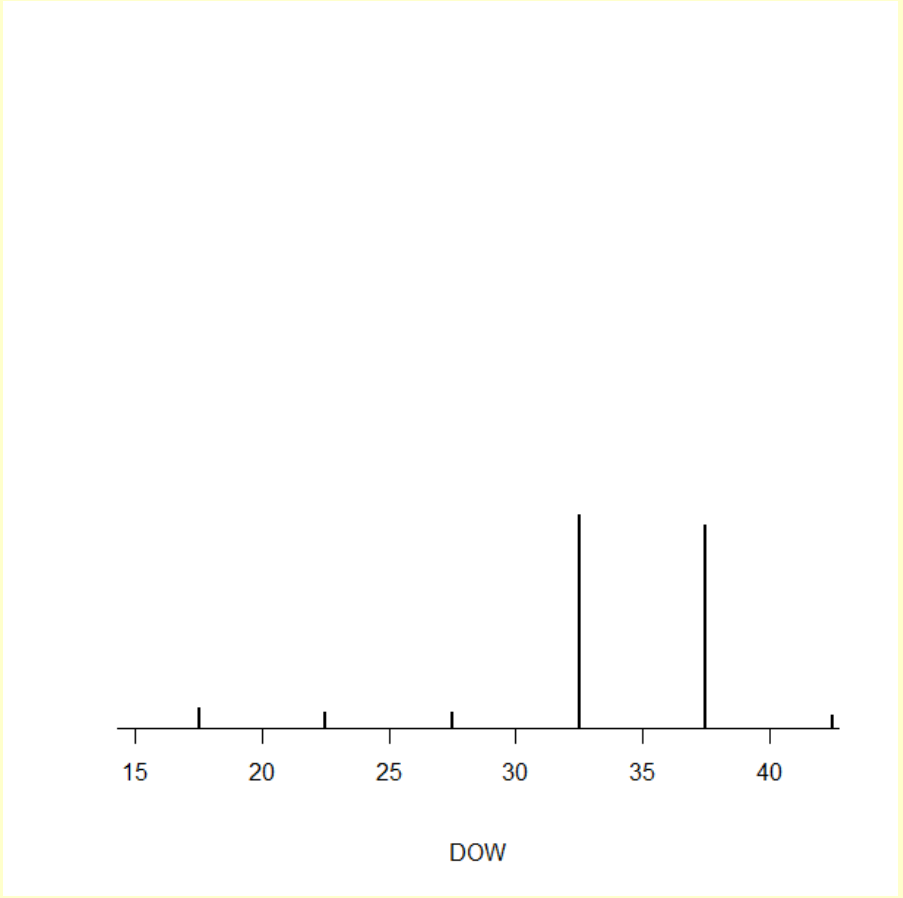
Plot all data values (as spikes or dots) sequentially

Graphs in Rcmdr – Dot Plot



Raw Data

OR



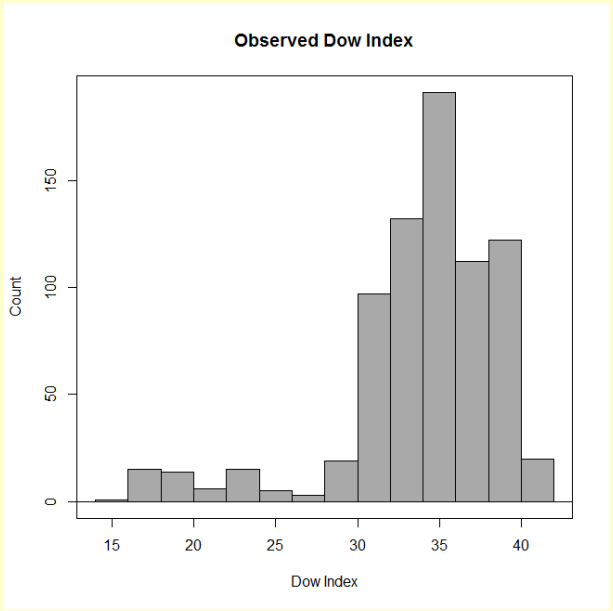
Binned Data
(bin = 5)

Graphs in Rcmdr – Histogram

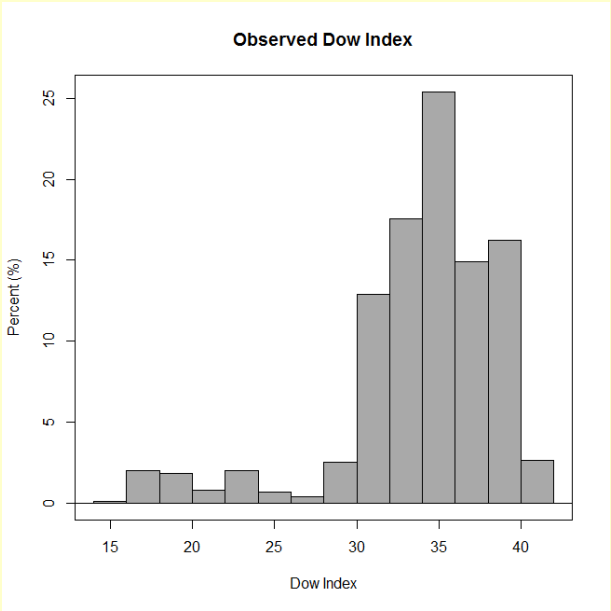
Plot all data values (binned) in histograms

Define the number of bins (or use "auto" option)

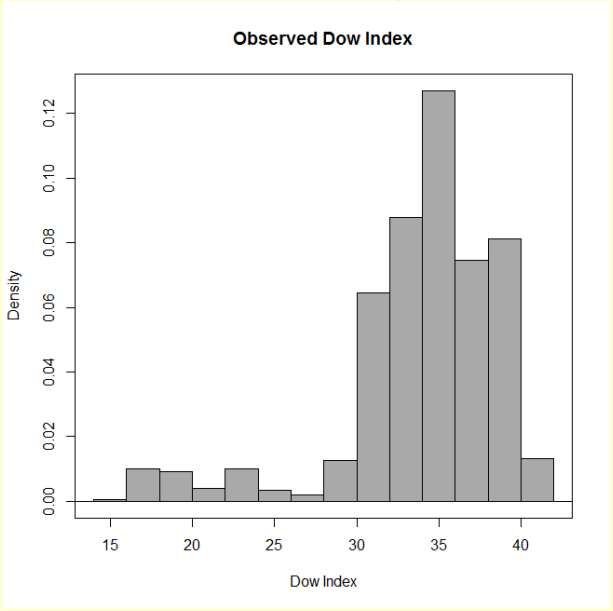
Count



Percent



Density

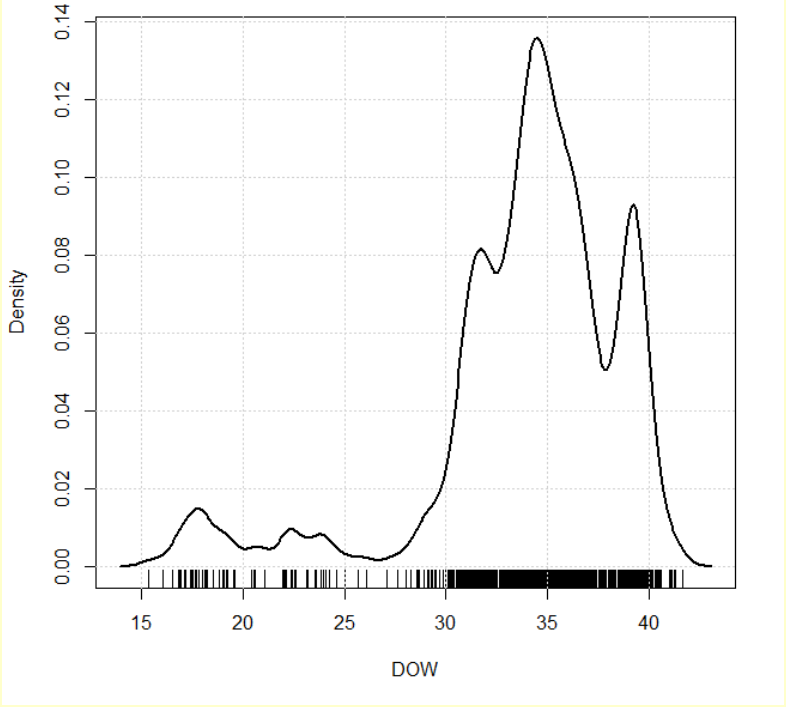


Frequency

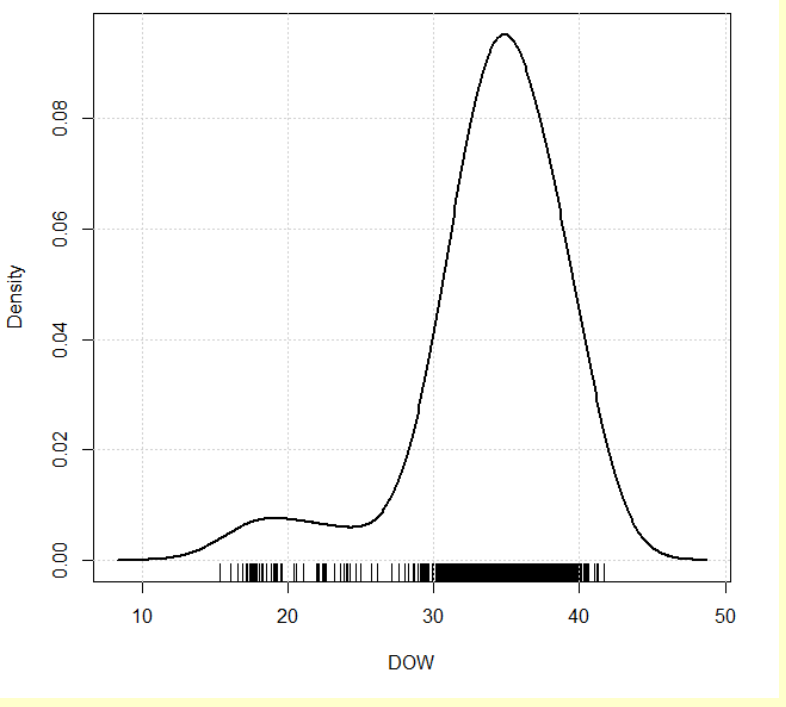
Graphs in Rcmdr – Density

Plot a non-parametric estimate of the data, based on different methods and various smoothing parameters

Bandwidth = 1



Bandwidth = 5

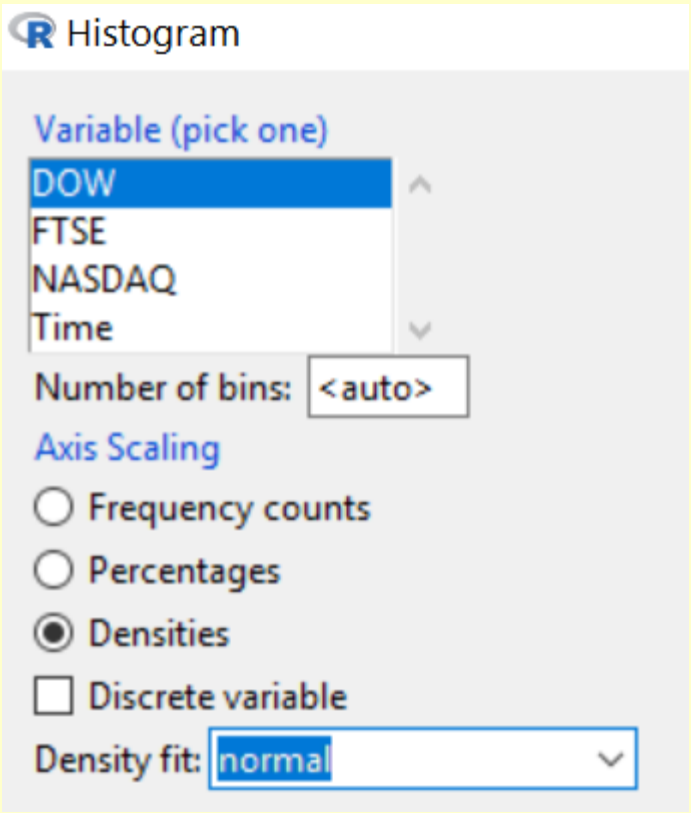


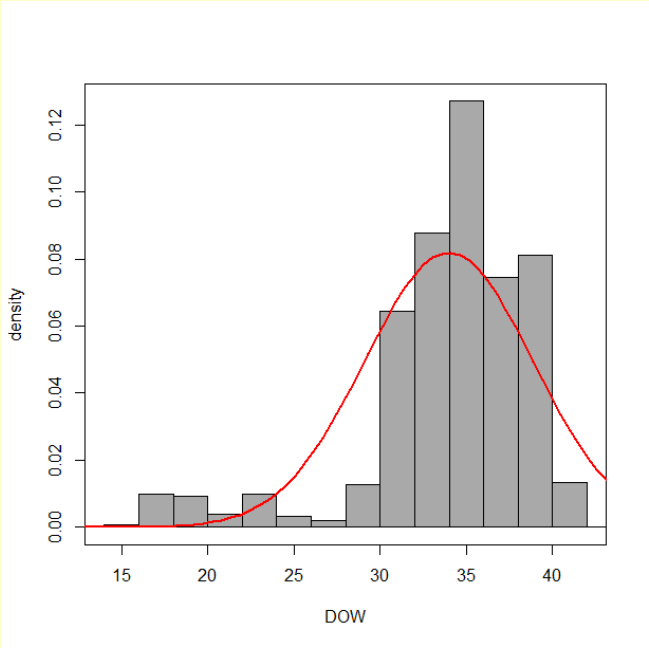
The Rug = shows location of observed X values

Graphs in Rcmdr – Histogram

Plot all data values (binned) in histograms

Add a density distribution fit – for reference:



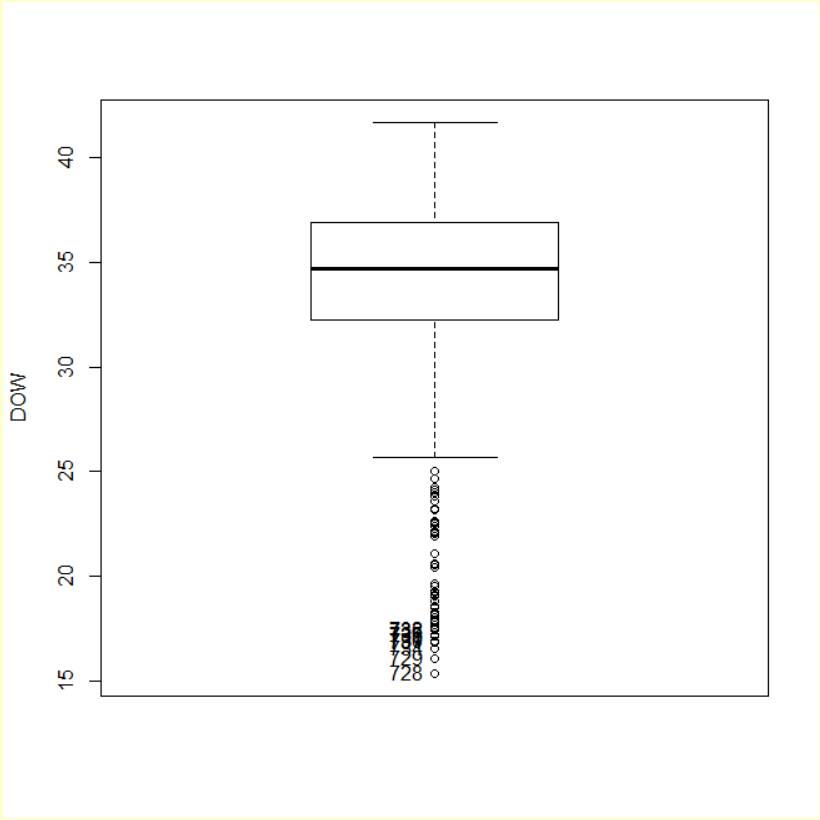


Normal Distribution (same mean and SD)

Graphs in Rcmdr – Box Plots

Plots quantiles of the distribution: 5, 25, 50, 75, 95

Identifies outliers: values too far from the median



Identify Points: Automatic or Interactively

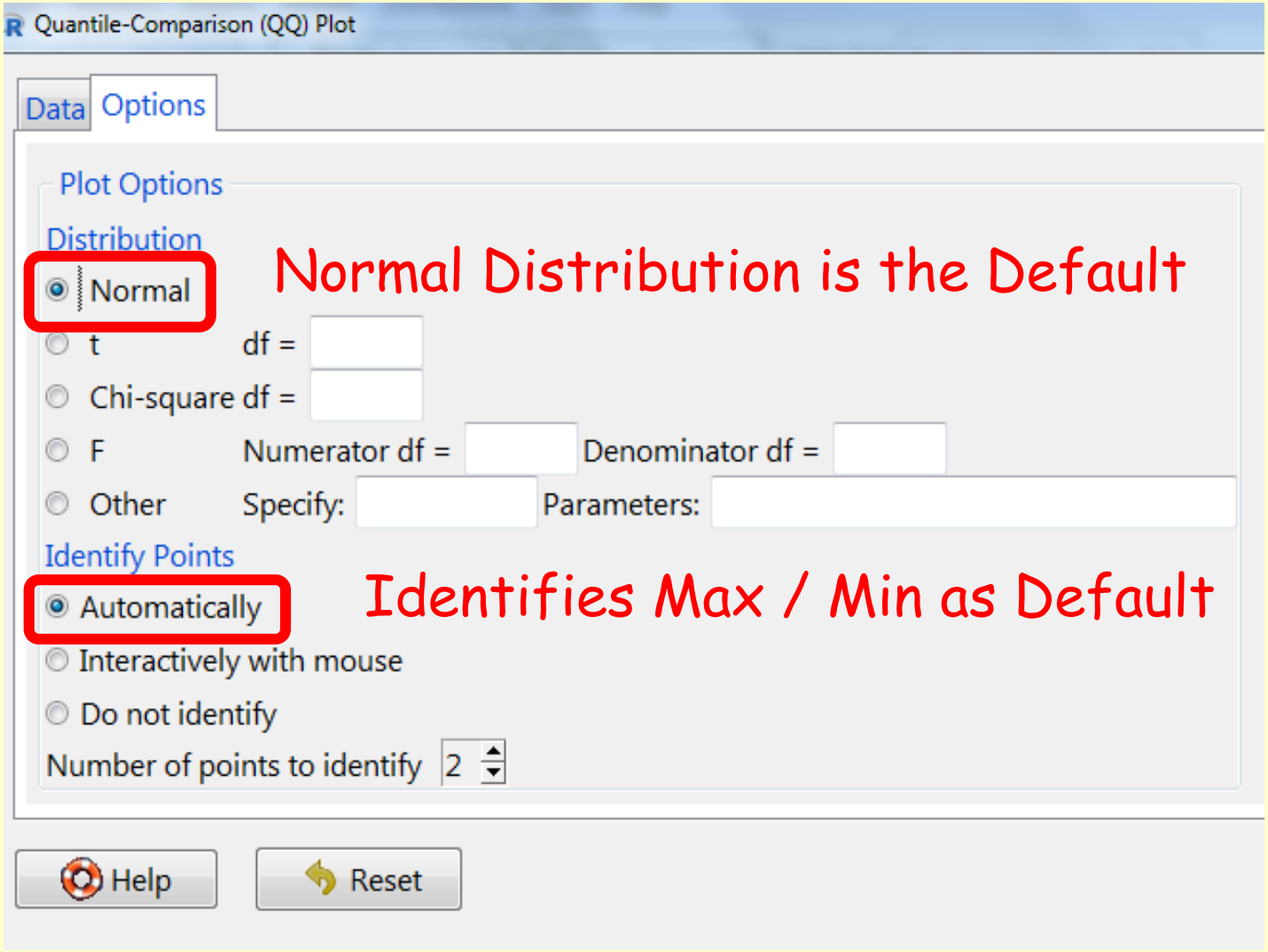
Graphs in Rcmdr – Quantiles

The quantile-quantile (q-q) plot is a graphical technique for determining if two data sets come from populations with a common distribution. It shows the quantiles of the first data set against the quantiles of the second data set.

By a quantile, we mean the percent of data points below the given value. That is, the 30% quantile is the point at which 30% percent of the data fall below and 70% fall above that value. The median is the 50% quantile.

If the two sets come from a population with the same distribution, the points will fall along a 45 degree line. The greater the departure from this reference line, the stronger the evidence that the two data sets come from populations with different distributions.

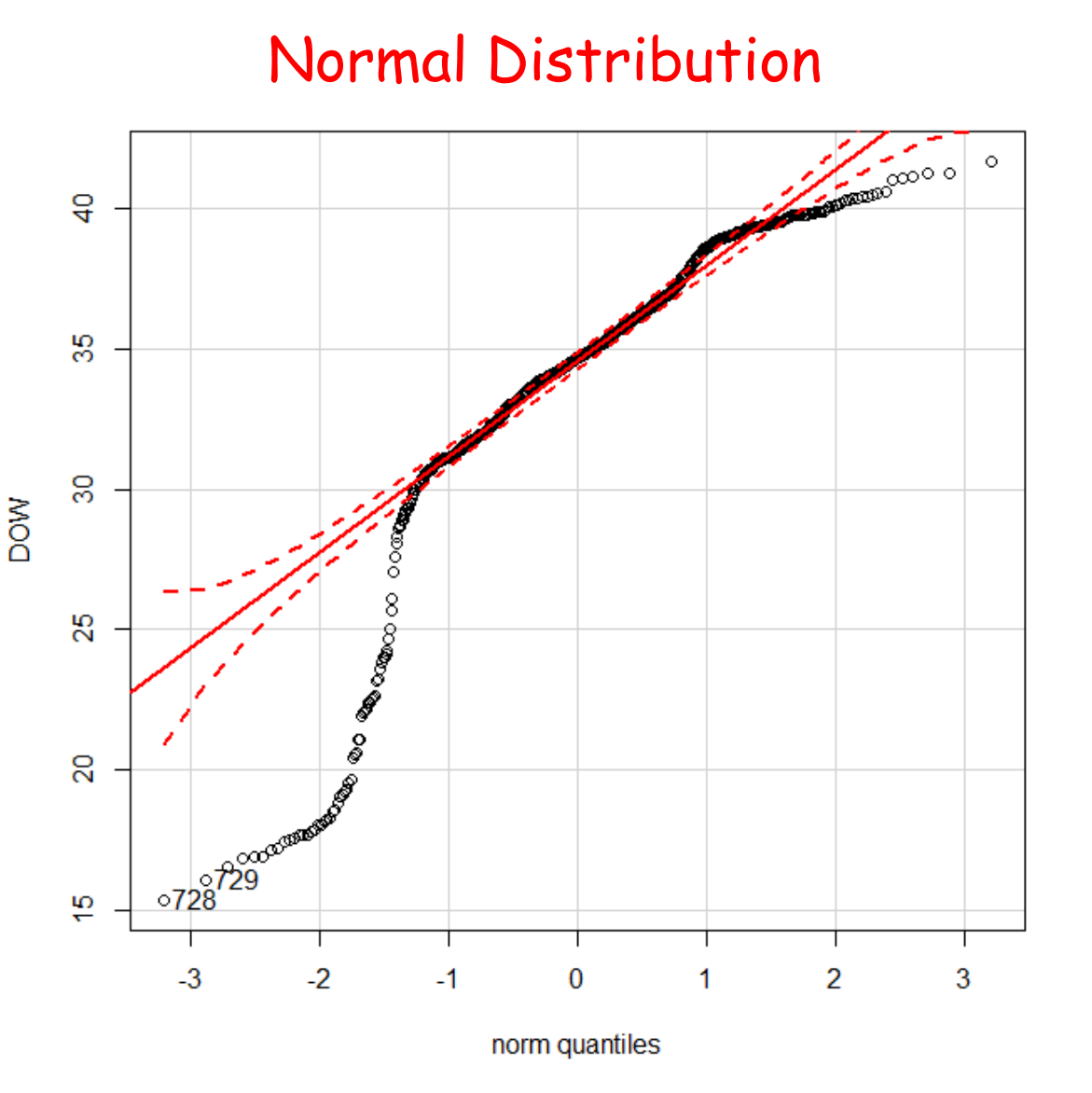
Graphs in Rcmdr – Quantiles



Graphically compares an observed (empirical) distribution (points) with a chosen theoretical expectation (line)

Identify Points: Automatic or Interactively

Graphs in Rcmdr – Quantiles



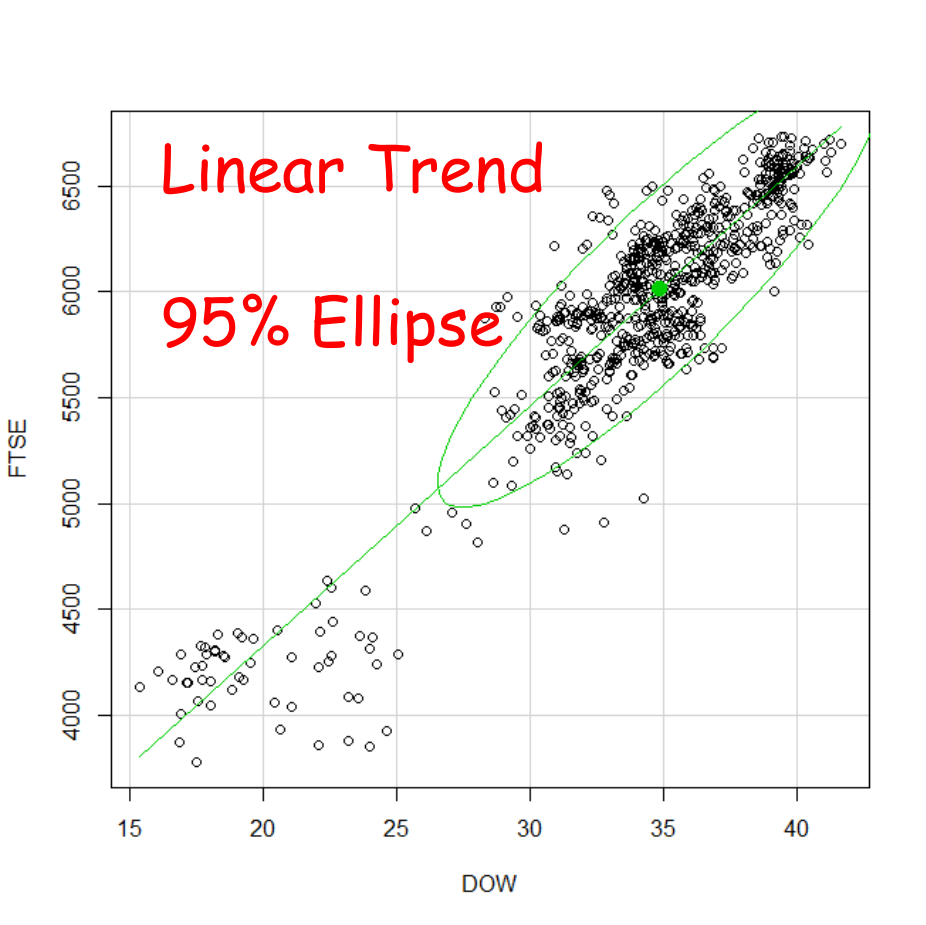
The solid red line is the expected pattern a normal distribution with the same mean and SD and the sampled data.

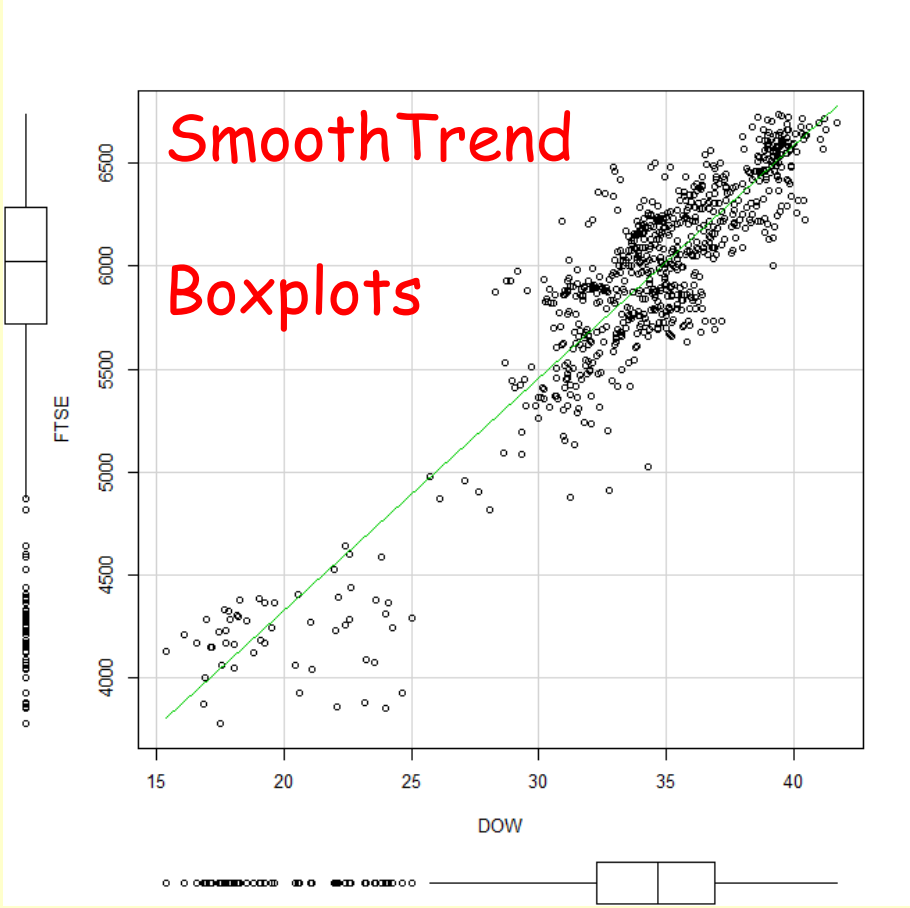
Points outside of the dashed line envelope suggest significant deviations

Graphs in Rcmdr – Scatterplots

Plots two samples on the same coordinates

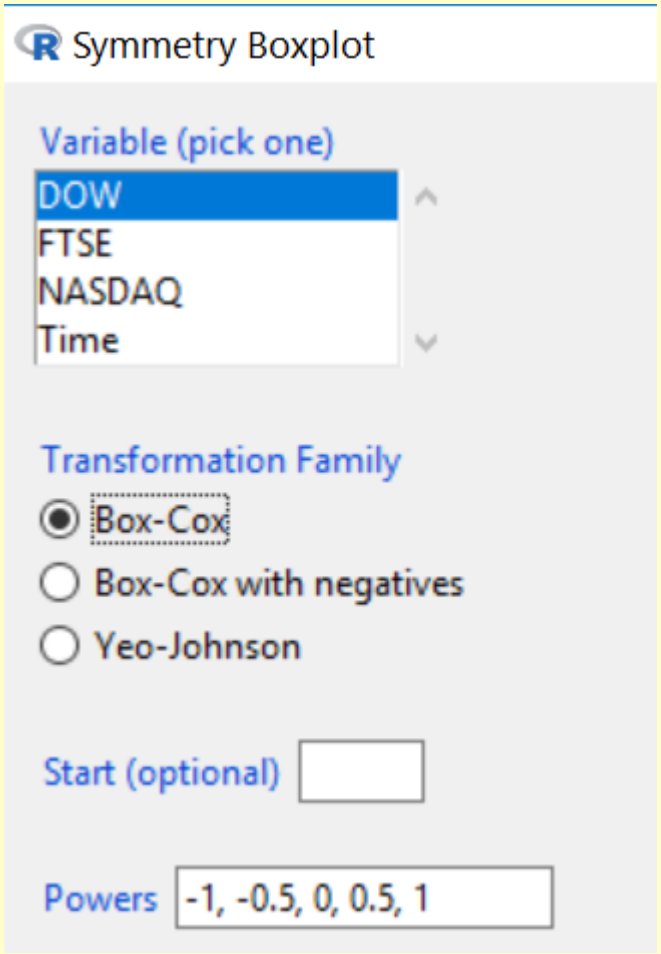
Can add a linear relationship or a smooth trend

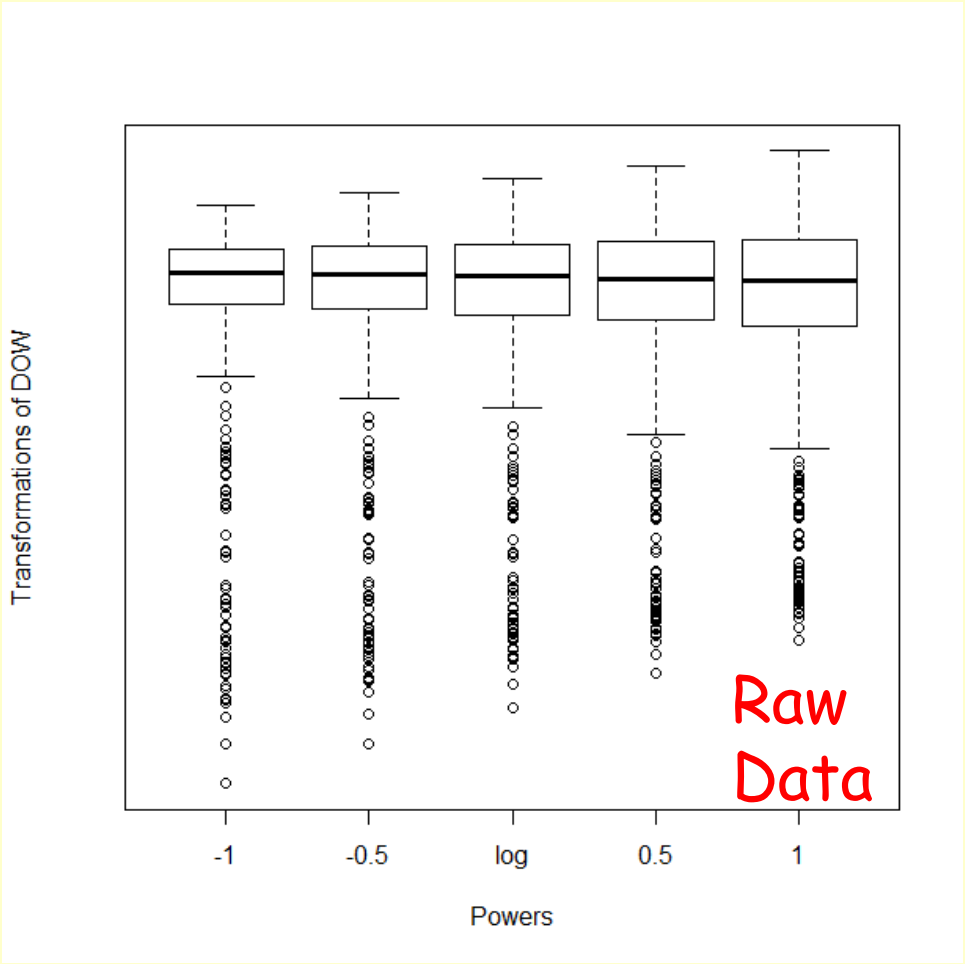




Graphs in Rcmdr – Symmetry

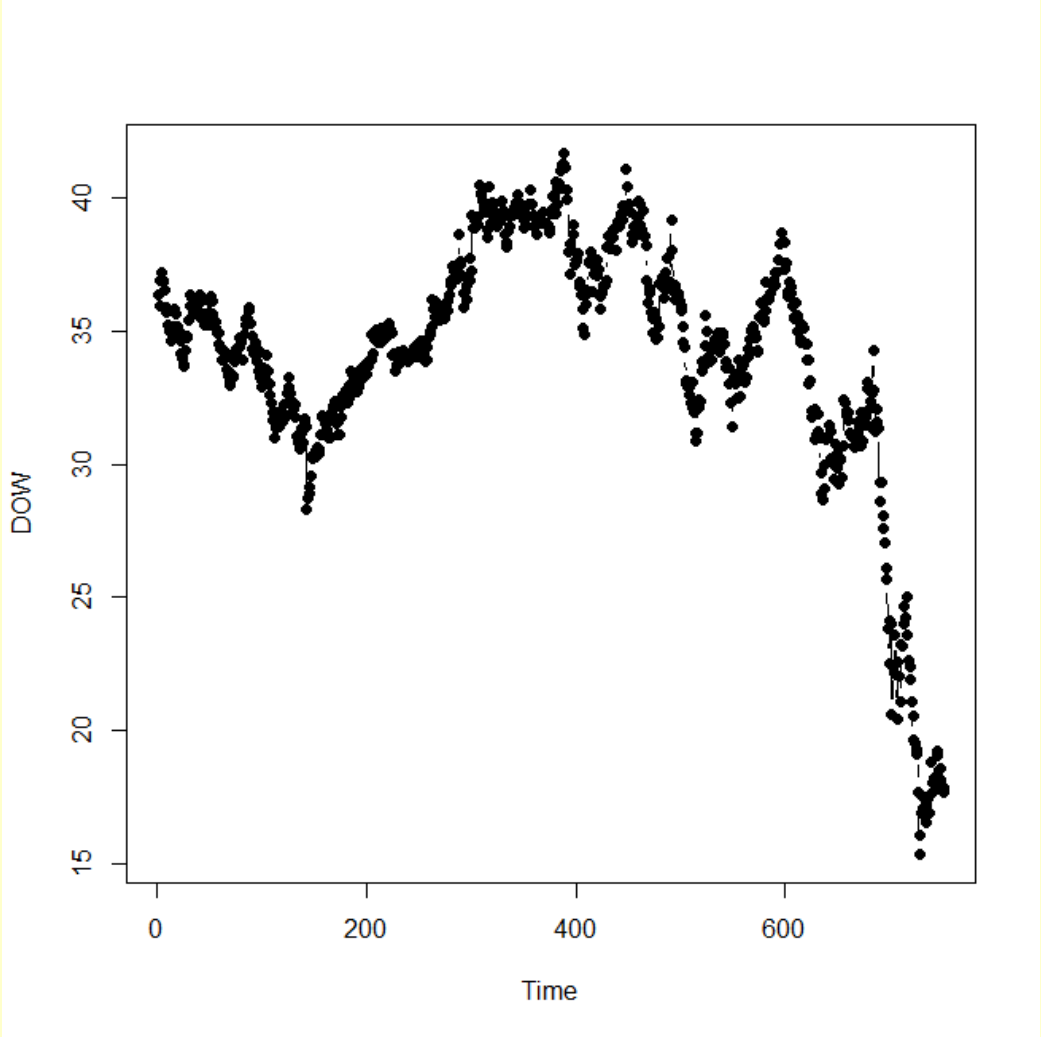
Plots boxplots of data after several transformations
Can add a linear relationship or a smooth trend





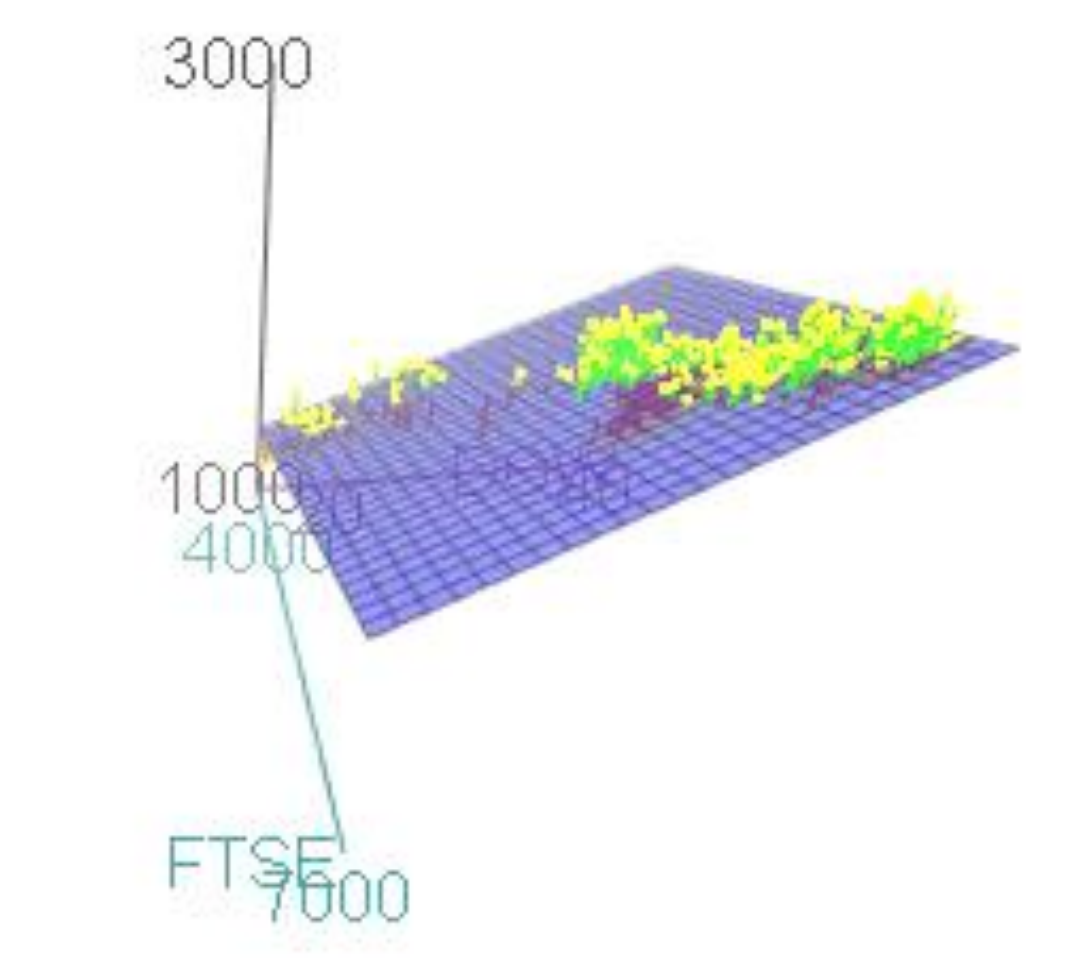
Graphs in Rcmdr – Line Plots

Plots data points linked with a line

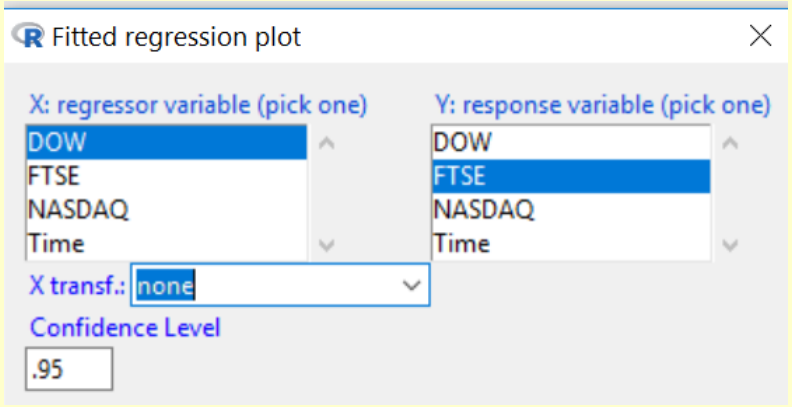


Graphs in Rcmdr – 3D Scatterplots

Plots three variables (one response and two drivers) and adds a response surface and the deviations

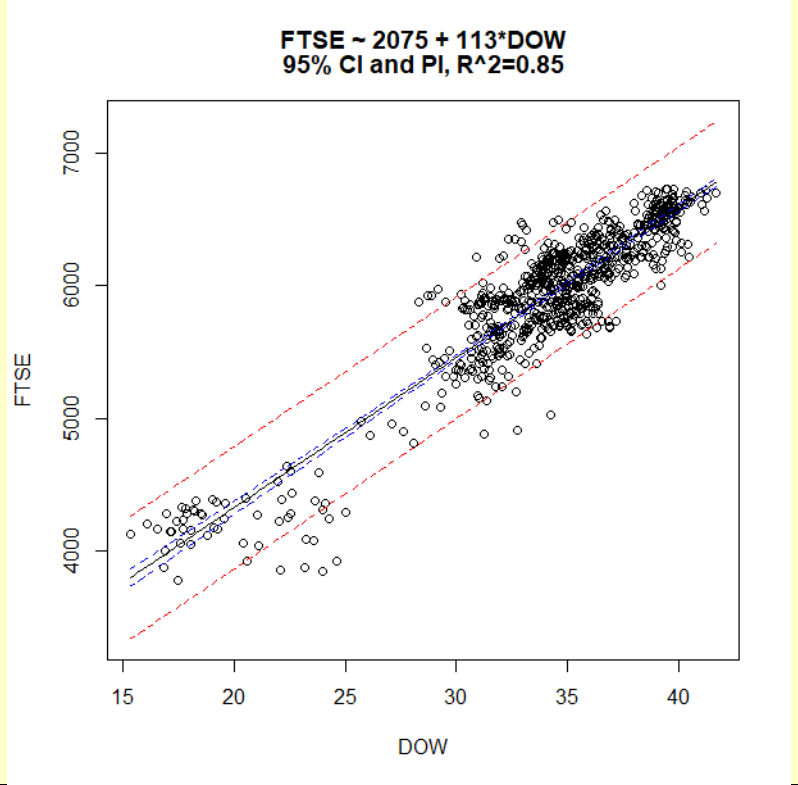


Graphs in Rcmdr – Regression Fit



Plots two variables (response and driver), adds best-fit line and desired C.L.

Allows to transform X variable



Plots C.I. and P.I.

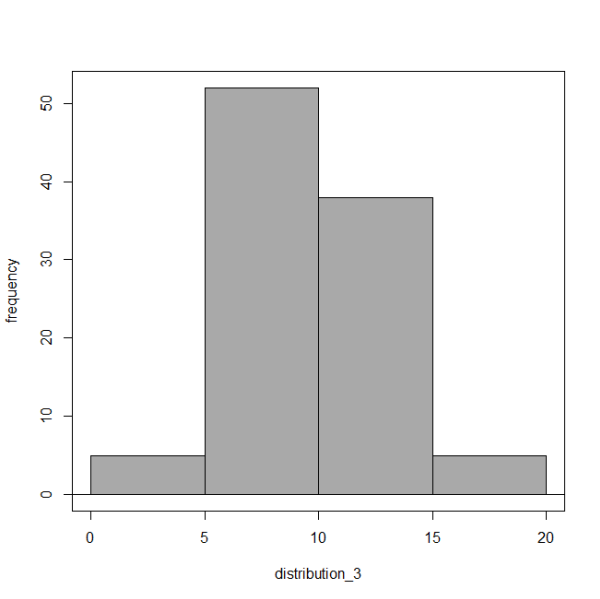
Calculates R-squared

PSA-1: Histograms

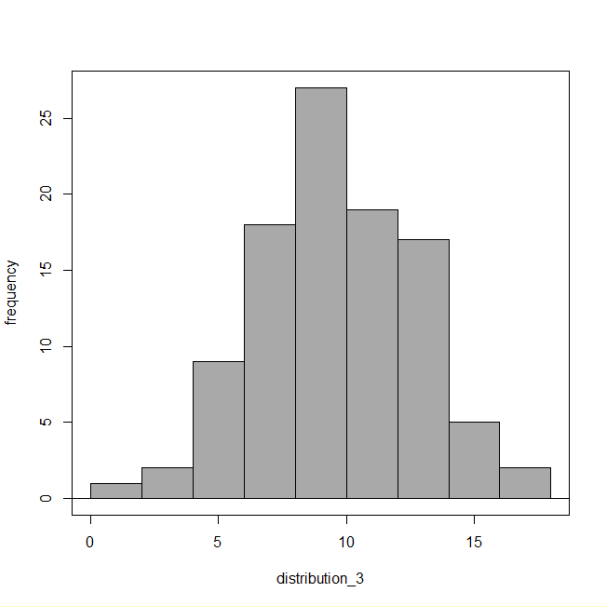
- Number of bins affects:
  "shape" of distribution & number / location of modes
- Even when plotting a Normal Distribution:

	mean	sd	5%	50%	95%	n
dist_3	9.705097	3.033430	5.113512	9.761769	14.40838	100

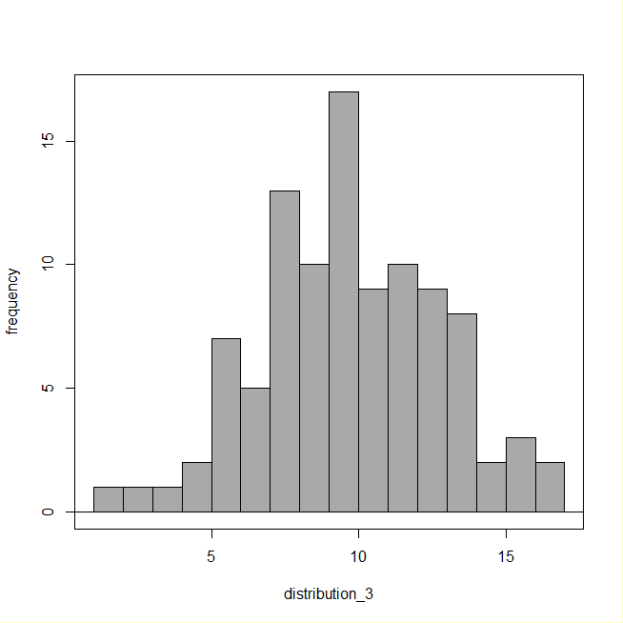
5 bins



9 bins (default)

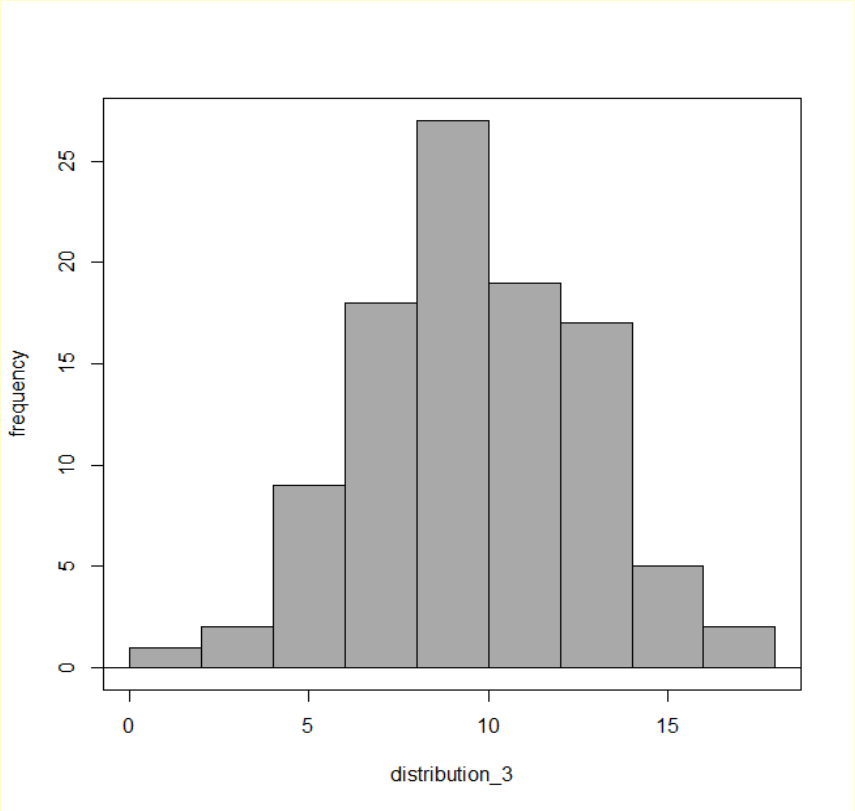


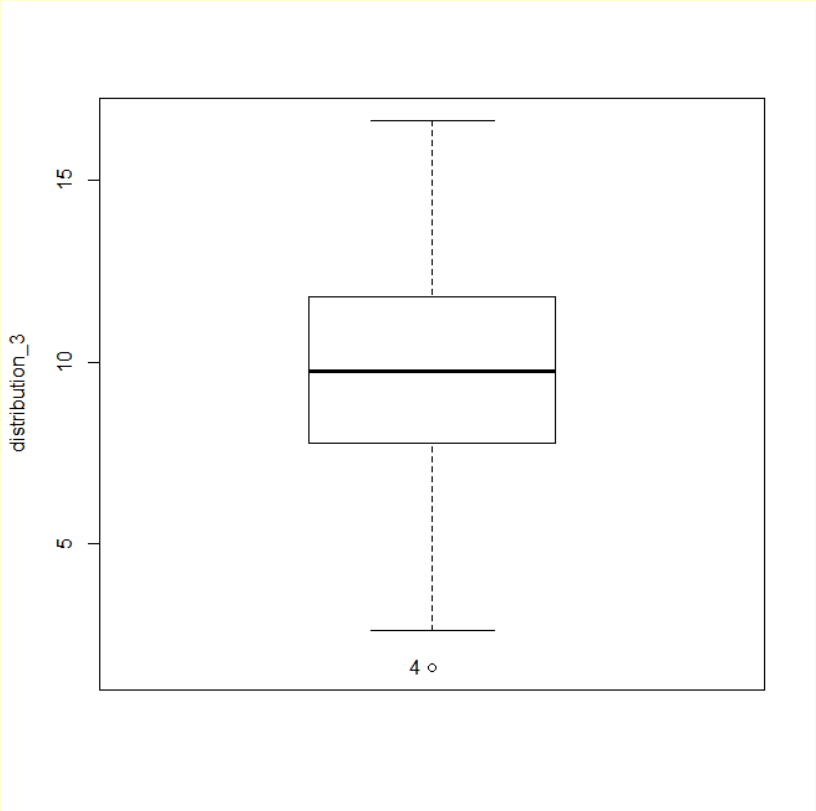
20 bins



PSA-2: Boxplots

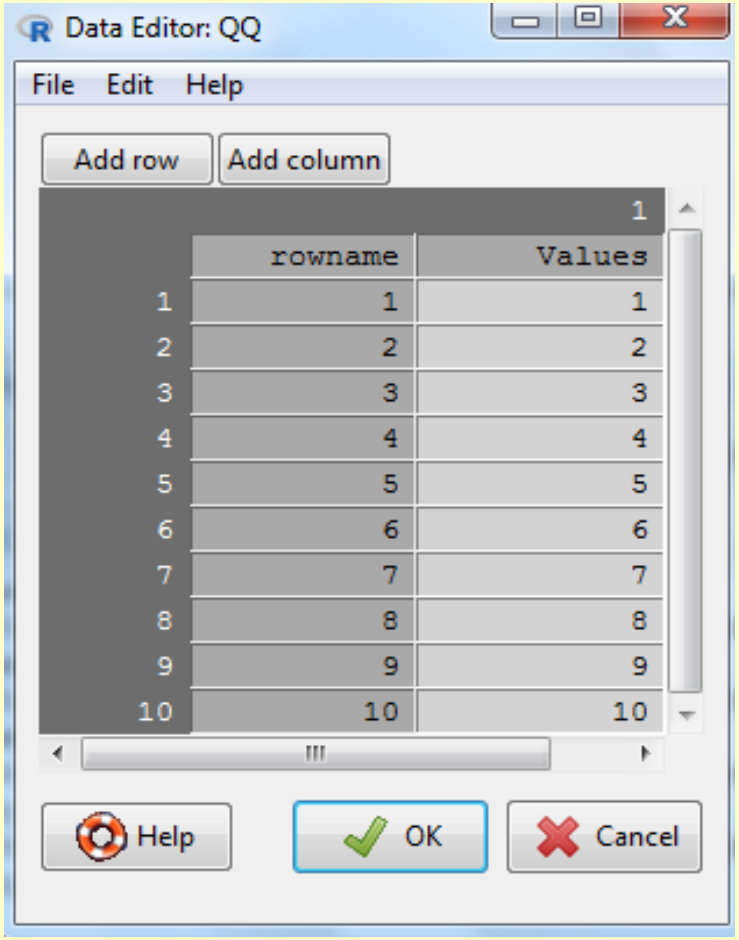
- "Shape" of distribution does not depend on binning
- Highlights the percentiles and outliers

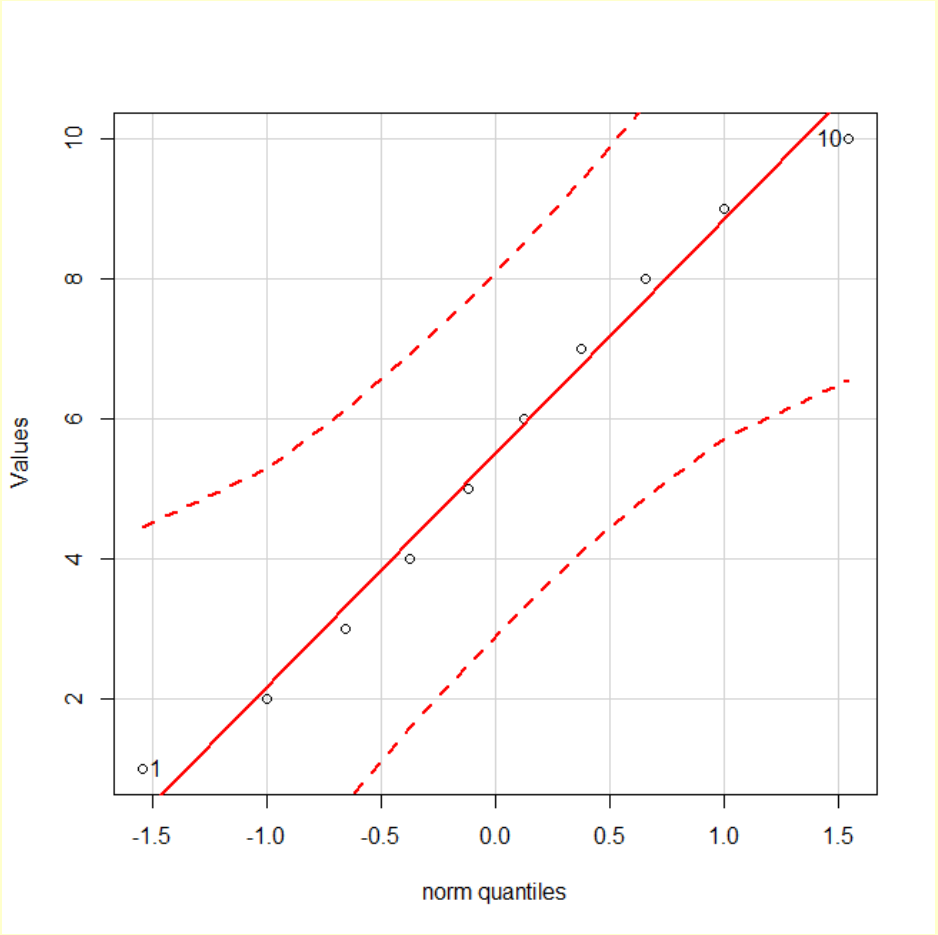




PSA-3: Q-Q Plots

NOTE: Each value in the distribution is plotted.
What are the x and the y coordinates ?
X axis are quartiles of "normal distribution"





PSA-3: Q-Q Plots

NOTE: What are the normalized quantiles?

```
Rcmdr>
summary(QQ)

Values
Min.   : 1.00
1st Qu.: 3.25
Median : 5.50
Mean   : 5.50
3rd Qu.: 7.75
Max.   :10.00
```

```
Rcmdr> numSummary
(QQ[,"Values",drop=FALSE],
statistics=c("IQR","quantiles"),
quantiles=c(.05,0.95))

IQR:   4.5

5%:    1.45
95%:   9.55
N:    10
```

IQR = (3^{rd} Qu) – (1^{st} Qu): 7.75 – 3.25 = 4.5

Graphs in Rcmdr

Package Rcmdr provides basic graphing tools (Fox 2005):

Journal of Statistical Software

September 2005, Volume 14, Issue 9. *http://www.jstatsoft.org/*

The R Commander: A Basic-Statistics Graphical User Interface to R

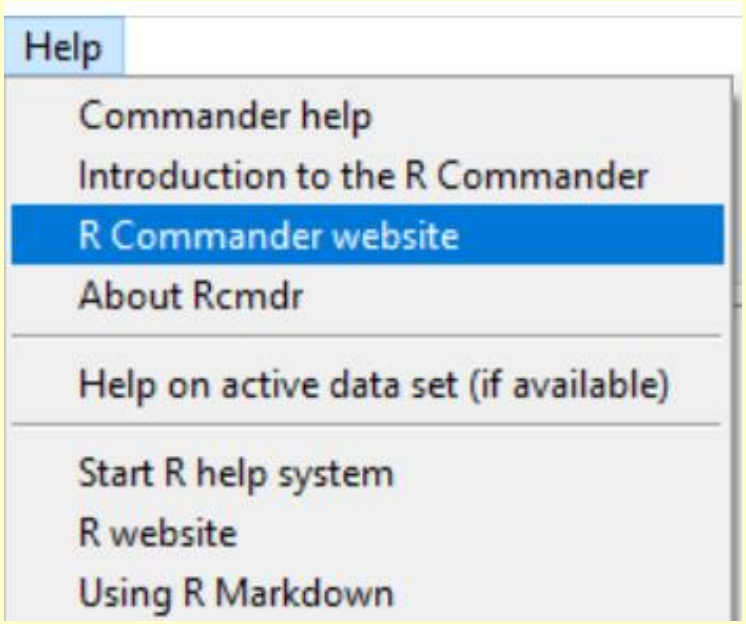
John Fox
McMaster University

- Index plot
- Histogram
- Density plot
- Box plot
- Q-Q plots
- Scatterplots
- Line plots
- 3D Scatterplots

Remember: The help files for the current version of the Rcmdr package are available on the CRAN website at http://CRAN.R-project.org/doc/packages/Rcmdr.pdf.

Help in Rcmdr

Package Rcmdr provides online help:



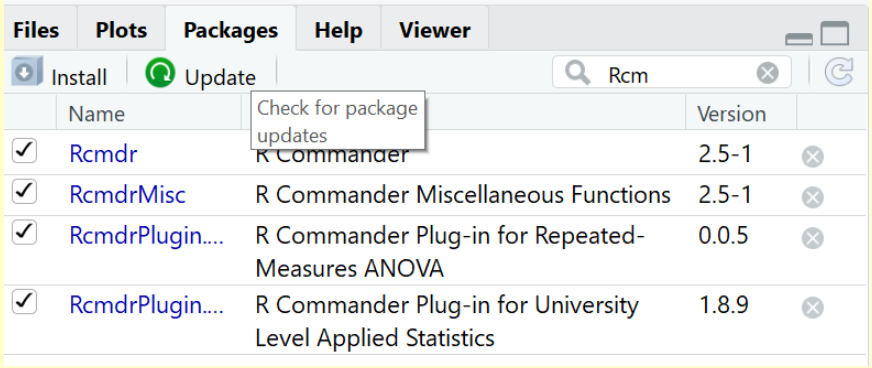
Remember:

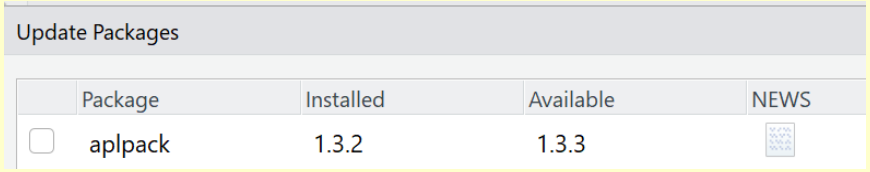
Newer versions will be posted. Make sure you update regularly.

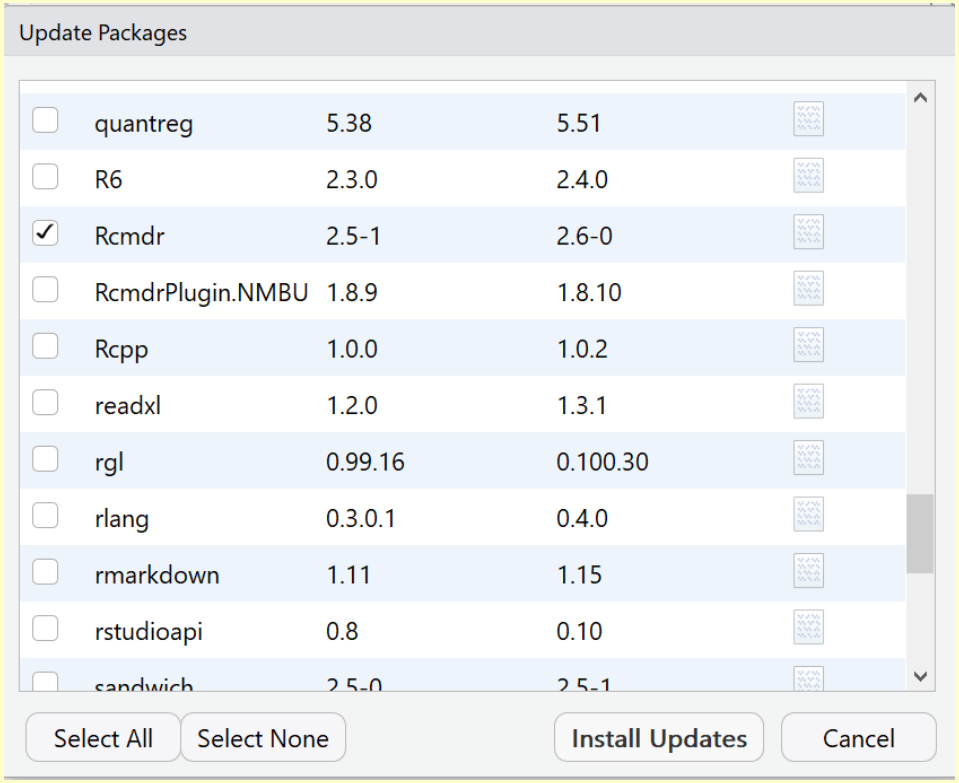
Check your Version:

Updating Rcmdr

Update Packages in Rstudio:







Update Options:

Compare Installed / Available versions.
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Update packages manually or select "all" updates available.