
R Graphics Cookbook

Winston Chang

O'REILLY®

Beijing • Cambridge • Farnham • Köln • Sebastopol • Tokyo

Table of Contents

Preface	ix
1. R Basics	1
1.1. Installing a Package	1
1.2. Loading a Package	2
1.3. Loading a Delimited Text Data File	3
1.4. Loading Data from an Excel File	4
1.5. Loading Data from an SPSS File	5
2. Quickly Exploring Data	7
2.1. Creating a Scatter Plot	7
2.2. Creating a Line Graph	9
2.3. Creating a Bar Graph	11
2.4. Creating a Histogram	13
2.5. Creating a Box Plot	15
2.6. Plotting a Function Curve	17
3. Bar Graphs	19
3.1. Making a Basic Bar Graph	19
3.2. Grouping Bars Together	22
3.3. Making a Bar Graph of Counts	25
3.4. Using Colors in a Bar Graph	27
3.5. Coloring Negative and Positive Bars Differently	29
3.6. Adjusting Bar Width and Spacing	30
3.7. Making a Stacked Bar Graph	32
3.8. Making a Proportional Stacked Bar Graph	35
3.9. Adding Labels to a Bar Graph	38
3.10. Making a Cleveland Dot Plot	42
4. Line Graphs	49

4.1. Making a Basic Line Graph	49
4.2. Adding Points to a Line Graph	52
4.3. Making a Line Graph with Multiple Lines	53
4.4. Changing the Appearance of Lines	58
4.5. Changing the Appearance of Points	59
4.6. Making a Graph with a Shaded Area	62
4.7. Making a Stacked Area Graph	64
4.8. Making a Proportional Stacked Area Graph	67
4.9. Adding a Confidence Region	69
5. Scatter Plots.....	73
5.1. Making a Basic Scatter Plot	73
5.2. Grouping Data Points by a Variable Using Shape or Color	75
5.3. Using Different Point Shapes	77
5.4. Mapping a Continuous Variable to Color or Size	80
5.5. Dealing with Overplotting	84
5.6. Adding Fitted Regression Model Lines	89
5.7. Adding Fitted Lines from an Existing Model	94
5.8. Adding Fitted Lines from Multiple Existing Models	97
5.9. Adding Annotations with Model Coefficients	100
5.10. Adding Marginal Rugs to a Scatter Plot	103
5.11. Labeling Points in a Scatter Plot	104
5.12. Creating a Balloon Plot	110
5.13. Making a Scatter Plot Matrix	112
6. Summarized Data Distributions.....	117
6.1. Making a Basic Histogram	117
6.2. Making Multiple Histograms from Grouped Data	120
6.3. Making a Density Curve	123
6.4. Making Multiple Density Curves from Grouped Data	126
6.5. Making a Frequency Polygon	129
6.6. Making a Basic Box Plot	130
6.7. Adding Notches to a Box Plot	133
6.8. Adding Means to a Box Plot	134
6.9. Making a Violin Plot	135
6.10. Making a Dot Plot	139
6.11. Making Multiple Dot Plots for Grouped Data	141
6.12. Making a Density Plot of Two-Dimensional Data	143
7. Annotations.....	147
7.1. Adding Text Annotations	147
7.2. Using Mathematical Expressions in Annotations	150

7.3. Adding Lines	152
7.4. Adding Line Segments and Arrows	155
7.5. Adding a Shaded Rectangle	156
7.6. Highlighting an Item	157
7.7. Adding Error Bars	159
7.8. Adding Annotations to Individual Facets	162
8. Axes.....	167
8.1. Swapping X- and Y-Axes	167
8.2. Setting the Range of a Continuous Axis	168
8.3. Reversing a Continuous Axis	170
8.4. Changing the Order of Items on a Categorical Axis	172
8.5. Setting the Scaling Ratio of the X- and Y-Axes	174
8.6. Setting the Positions of Tick Marks	177
8.7. Removing Tick Marks and Labels	178
8.8. Changing the Text of Tick Labels	180
8.9. Changing the Appearance of Tick Labels	182
8.10. Changing the Text of Axis Labels	184
8.11. Removing Axis Labels	185
8.12. Changing the Appearance of Axis Labels	187
8.13. Showing Lines Along the Axes	189
8.14. Using a Logarithmic Axis	190
8.15. Adding Ticks for a Logarithmic Axis	196
8.16. Making a Circular Graph	198
8.17. Using Dates on an Axis	204
8.18. Using Relative Times on an Axis	207
9. Controlling the Overall Appearance of Graphs.....	211
9.1. Setting the Title of a Graph	211
9.2. Changing the Appearance of Text	213
9.3. Using Themes	216
9.4. Changing the Appearance of Theme Elements	218
9.5. Creating Your Own Themes	221
9.6. Hiding Grid Lines	222
10. Legends.....	225
10.1. Removing the Legend	225
10.2. Changing the Position of a Legend	227
10.3. Changing the Order of Items in a Legend	229
10.4. Reversing the Order of Items in a Legend	231
10.5. Changing a Legend Title	232
10.6. Changing the Appearance of a Legend Title	235

10.7. Removing a Legend Title	236
10.8. Changing the Labels in a Legend	237
10.9. Changing the Appearance of Legend Labels	239
10.10. Using Labels with Multiple Lines of Text	240
11. Facets.....	243
11.1. Splitting Data into Subplots with Facets	243
11.2. Using Facets with Different Axes	246
11.3. Changing the Text of Facet Labels	246
11.4. Changing the Appearance of Facet Labels and Headers	250
12. Using Colors in Plots.....	251
12.1. Setting the Colors of Objects	251
12.2. Mapping Variables to Colors	252
12.3. Using a Different Palette for a Discrete Variable	254
12.4. Using a Manually Defined Palette for a Discrete Variable	259
12.5. Using a Colorblind-Friendly Palette	261
12.6. Using a Manually Defined Palette for a Continuous Variable	263
12.7. Coloring a Shaded Region Based on Value	264
13. Miscellaneous Graphs.....	267
13.1. Making a Correlation Matrix	267
13.2. Plotting a Function	271
13.3. Shading a Subregion Under a Function Curve	272
13.4. Creating a Network Graph	274
13.5. Using Text Labels in a Network Graph	278
13.6. Creating a Heat Map	281
13.7. Creating a Three-Dimensional Scatter Plot	283
13.8. Adding a Prediction Surface to a Three-Dimensional Plot	285
13.9. Saving a Three-Dimensional Plot	289
13.10. Animating a Three-Dimensional Plot	291
13.11. Creating a Dendrogram	291
13.12. Creating a Vector Field	294
13.13. Creating a QQ Plot	299
13.14. Creating a Graph of an Empirical Cumulative Distribution Function	301
13.15. Creating a Mosaic Plot	302
13.16. Creating a Pie Chart	307
13.17. Creating a Map	309
13.18. Creating a Choropleth Map	313
13.19. Making a Map with a Clean Background	317

13.20. Creating a Map from a Shapefile	319
14. Output for Presentation	323
14.1. Outputting to PDF Vector Files	323
14.2. Outputting to SVG Vector Files	325
14.3. Outputting to WMF Vector Files	325
14.4. Editing a Vector Output File	326
14.5. Outputting to Bitmap (PNG/TIFF) Files	327
14.6. Using Fonts in PDF Files	330
14.7. Using Fonts in Windows Bitmap or Screen Output	332
15. Getting Your Data into Shape	335
15.1. Creating a Data Frame	336
15.2. Getting Information About a Data Structure	337
15.3. Adding a Column to a Data Frame	338
15.4. Deleting a Column from a Data Frame	338
15.5. Renaming Columns in a Data Frame	339
15.6. Reordering Columns in a Data Frame	340
15.7. Getting a Subset of a Data Frame	341
15.8. Changing the Order of Factor Levels	343
15.9. Changing the Order of Factor Levels Based on Data Values	344
15.10. Changing the Names of Factor Levels	345
15.11. Removing Unused Levels from a Factor	347
15.12. Changing the Names of Items in a Character Vector	348
15.13. Recoding a Categorical Variable to Another Categorical Variable	349
15.14. Recoding a Continuous Variable to a Categorical Variable	351
15.15. Transforming Variables	352
15.16. Transforming Variables by Group	354
15.17. Summarizing Data by Groups	357
15.18. Summarizing Data with Standard Errors and Confidence Intervals	361
15.19. Converting Data from Wide to Long	365
15.20. Converting Data from Long to Wide	368
15.21. Converting a Time Series Object to Times and Values	369
A. Introduction to ggplot2	373
Index	385