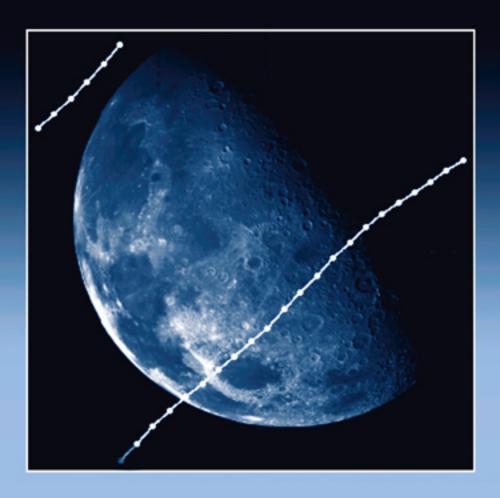
R Graphics



Paul Murrell

Contents

List of Figures

List of Tables

1 An Introduction to R Grap	hics
-----------------------------	------

- 1.1 R graphics examples
 - 1.1.1 Standard plots
 - 1.1.2 Trellis plots
 - 1.1.3 Special-purpose plots
 - 1.1.4 General graphical scenes
 - 1.2 The organization of R graphics
 - 1.2.1 Types of graphics functions
 - 1.2.2 Traditional graphics versus grid graphics
 - 1.3 Graphical output formats
 - 1.3.1 Graphics devices
 - 1.3.2 Multiple pages of output
 - 1.3.3 Display lists

I TRADITIONAL GRAPHICS

2 Simple Usage of Traditional Graphics

- 2.1 The traditional graphics model
- 2.2 Plots of one or two variables
 - 2.2.1 Arguments to graphics functions
 - 2.2.2 Standard arguments
- 2.3 Plots of multiple variables
- 2.4 Modern plots and specialized plots
- 2.5 Interactive graphics

3 Customizing Traditional Graphics

- 3.1 The traditional graphics model in more detail
 - 3.1.1 Plotting regions
 - 3.1.2 The traditional graphics state
- 3.2 Controlling the appearance of plots
 - 3.2.1 Colors
 - 3.2.2 Lines

	3.2.3	Text	
	3.2.4	Data symbols	
	3.2.5	Axes	
	3.2.6	Plotting regions	
	3.2.7	Clipping	
	3.2.8	Moving to a new plot	
3.3	Arrang	ging multiple plots	
	3.3.1	Using the traditional graphics state	
	3.3.2	Layouts	
	3.3.3	The split-screen approach	
3.4	Annot	ating plots	
	3.4.1	Annotating the plot region	
	3.4.2	Missing values and non-finite values	
	3.4.3	Annotating the margins	
	3.4.4	Legends	
	3.4.5	Axes	
	3.4.6	Mathematical formulae	
	3.4.7	Coordinate systems	
	3.4.8	Bitmap images	
	3.4.9	Special cases	
3.5	Creati	ng new plots	
	3.5.1	A simple plot from scratch	
	3.5.2	1 1	
	3.5.3	Writing traditional graphics functions	
GR	ND GE	RAPHICS	
0.		Willies	
Trel	lis Gra	phics: the Lattice Package	
4.1		ttice graphics model	
	4.1.1	Lattice devices	
4.2	Lattice	e plot types	
	4.2.1	The formula argument and multipanel conditioning	
	4.2.2	A nontrivial example	
4.3	Contro	olling the appearance of lattice plots	
4.4	Arranging lattice plots		
4.5	Annotating lattice plots		
	4.5.1	Panel functions and strip functions	
	4.5.2	Adding output to a lattice plot	
4.6	Creati	ng new lattice plots	

5 The Grid Graphics Model

П

4

- 5.1 A brief overview of grid graphics
 - 5.1.1 A simple example
- 5.2 Graphical primitives

		5.2.1 Standard arguments			
	5.3	Coordinate systems			
		5.3.1 Conversion functions			
		5.3.2 Complex units			
	5.4	Controlling the appearance of output			
		5.4.1 Specifying graphical parameter settings			
		5.4.2 Vectorized graphical parameter settings			
	5.5	Viewports			
		5.5.1 Pushing, popping, and navigating between viewports			
		5.5.2 Clipping to viewports			
		5.5.3 Viewport lists, stacks, and trees			
		5.5.4 Viewports as arguments to graphical primitives			
		5.5.5 Graphical parameter settings in viewports			
		5.5.6 Layouts			
	5.6	Missing values and non-finite values			
	5.7	Interactive graphics			
	5.8	Customizing lattice plots			
		5.8.1 Adding grid output to lattice output			
		5.8.2 Adding lattice output to grid output			
6	The	Grid Graphics Object Model			
	6.1	Working with graphical output			
		6.1.1 Standard functions and arguments			
	6.2	Grob lists, trees, and paths			
		6.2.1 Graphical parameter settings in gTrees			
		6.2.2 Viewports as components of gTrees			
		6.2.3 Searching for grobs			
	6.3 Working with graphical objects off-screen				
		6.3.1 Capturing output			
	6.4	Placing and packing grobs in frames			
		6.4.1 Placing and packing off-screen			
	6.5	Other details about grobs			
		6.5.1 Calculating the sizes of grobs			
		6.5.2 Editing graphical context			
	6.6	Saving and loading grid graphics			
	6.7	Working with lattice grobs			
7	Developing New Graphics Functions and Objects				
	7.1	An example			
		7.1.1 Modularity			
	7.2	Simple graphics functions			
		7.2.1 Embedding graphical output			
		7.2.2 Facilitating annotation			
		7.2.3 Editing output			
		7.2.4 Absolute versus relative sizes			

- 7.3 Graphical objects
 - 7.3.1 Overview of creating a new graphical class
 - 7.3.2 Defining a new graphical class
 - 7.3.3 Validating grobs
 - 7.3.4 Drawing grobs
 - 7.3.5 Editing grobs
 - 7.3.6 Sizing grobs
 - 7.3.7 Pre-drawing and post-drawing
 - 7.3.8 Completing the example
 - 7.3.9 Reusing graphical elements
 - 7.3.10 Other details
- 7.4 Querying grid

A A Brief Introduction to R

- A.1 Obtaining and installing R
- A.2 An environment for statistical computing and graphics
 - A.2.1 Batch processing
 - A.2.2 Data types
 - A.2.3 Variables
 - A.2.4 Indexing
 - A.2.5 Data structures
 - A.2.6 Formulae
 - A.2.7 Expressions
 - A.2.8 Packages
 - A.2.9 Accessing data sets
 - A.2.10 Getting help
- A.3 A programming language
 - A.3.1 Debugging
- A.4 An object-oriented language

B Combining Traditional Graphics and Grid Graphics

- B.1 The gridBase package
 - B.1.1 Annotating base graphics using grid
 - B.1.2 Embedding base graphics plots in grid viewports
 - B.1.3 Problems and limitations

Bibliography

List of Figures

- 1.1 A simple scatterplot
- 1.2 Some standard plots
- 1.3 A customized scatterplot
- 1.4 A Trellis dotplot
- 1.5 A map of New Zealand produced using R
- 1.6 Some polar-coordinate plots
- 1.7 A novel decision tree plot
- 1.8 A table-like plot
- 1.9 Didactic diagrams
- 1.10 A music score
- 1.11 A piece of clip art
- 1.12 The structure of the R graphics system
- 2.1 Four variations on a scatterplot
- 2.2 Plotting an 1m object
- 2.3 Plotting an agnes object
- 2.4 Modifying default barplot() and boxplot() output
- 2.5 Standard arguments for high-level functions
- 2.6 Plotting three variables
- 2.7 Plotting multivariate data
- 2.8 Some modern and specialized plots
- 3.1 The plot regions in traditional graphics
- 3.2 Multiple figure regions in traditional graphics
- 3.3 The user coordinate system in the plot region
- 3.4 Figure margin coordinate systems
- 3.5 Outer margin coordinate systems
- 3.6 Predefined and custom line types
- 3.7 Line join and line ending styles
- 3.8 Alignment of text in the plot region
- 3.9 Font families and font faces
- 3.10 Data symbols available in R
- 3.11 Basic plot types
- 3.12 Different axis styles
- 3.13 Graphics state settings controlling plot regions
- 3.14 Some basic layouts

- 3.15 Some complex layouts
- 3.16 Annotating the plot region
- 3.17 More examples of annotating the plot region
- 3.18 Drawing polygons
- 3.19 Annotating the margins
- 3.20 Some simple legends
- 3.21 Customizing axes
- 3.22 Mathematical formulae in plots
- 3.23 Custom coordinate systems
- 3.24 Overlaying plots
- 3.25 Overlaying output
- 3.26 Adding a bitmap to a plot
- 3.27 Special-case annotations
- 3.28 A panel function example
- 3.29 Annotating a 3D surface
- 3.30 A back-to-back barplot
- 3.31 A graphics function template
- 4.1 A scatterplot using lattice
- 4.2 The result of modifying a lattice object
- 4.3 Plot types available in lattice
- 4.4 A lattice multipanel conditioning plot
- 4.5 A complex lattice plot
- 4.6 Some default lattice settings
- 4.7 Controlling the layout of lattice panels
- 4.8 Arranging multiple lattice plots
- 4.9 Annotating a lattice plot
- 5.1 A simple scatterplot using grid
- 5.2 Primitive grid output
- 5.3 Drawing arrows
- 5.4 Drawing polygons
- 5.5 A demonstration of grid units
- 5.6 Graphical parameters for graphical primitives
- 5.7 Recycling graphical parameters
- 5.8 Recycling graphical parameters for polygons
- 5.9 A diagram of a simple viewport
- 5.10 Pushing a viewport
- 5.11 Pushing several viewports
- 5.12 Popping a viewport
- 5.13 Navigating between viewports
- 5.14 Clipping output in viewports
- 5.15 The inheritance of viewport graphical parameters
- 5.16 Layouts and viewports
- 5.17 Layouts and units

- 5.18 Nested layouts
- 5.19 Non-finite values for line-tos, polygons, and arrows
- 5.20 Controlling the size of lattice panels
- 5.21 Adding grid output to a lattice plot
- 5.22 Embedding a lattice plot within grid output
- 6.1 Modifying a circle grob
- 6.2 Editing grobs
- 6.3 The structure of a gTree
- 6.4 Editing a gTree
- 6.5 Using a gTree to group grobs
- 6.6 Packing grobs by hand
- 6.7 Calculating the size of a grob
- 6.8 Grob dimensions by reference
- 6.9 Editing the graphical context
- 6.10 Editing the grobs in a lattice plot
- 7.1 A plot of oceanographic data
- 7.2 A grid.imageFun() function
- 7.3 Output from the grid.imageFun() function
- 7.4 A grid.ozFun() function
- 7.5 Example output from grid.ozFun()
- 7.6 Annotating grid.ozFun() output
- 7.7 Editing grid.ozFun() output
- 7.8 An "imageGrob" class
- 7.9 Some validDetails() methods
- 7.10 An "ozGrob" class
- 7.11 An "ozImage" class
- 7.12 Some editDetails() methods
- 7.13 Editing an imageGrob
- 7.14 Low-level editing of an imageGrob
- 7.15 Helper functions for a "ribbonLegend" class
- 7.16 A "ribbonLegend" class
- 7.17 An "ozKey" class
- 7.18 A plot of temperature data
- 7.19 A splitString() function
- 7.20 Performing calculations before drawing
- 7.21 A "splitText" class
- 7.22 Drawing faces
- 7.23 Some face functions
- 7.24 Some face objects
- B.1 Annotating a traditional plot with grid
- B.2 Embedding a traditional plot within lattice output

List of Tables

- 1.1 Graphical output formats
- 3.1 High-level traditional graphics state settings
- 3.2 Low-level traditional graphics state settings
- 3.3 Read-only traditional graphics state settings
- 3.4 Functions to generate color sets
- 3.5 Font faces
- 3.6 Font families
- 4.1 Plotting functions in lattice
- 5.1 Graphical primitives in grid
- 5.2 Coordinate systems in grid
- 5.3 Graphical parameters in grid
- 5.4 Grid font faces
- 6.1 Functions for working with grobs