An Introduction to R

Notes on R: A Programming Environment for Data Analysis and Graphics Version 4.0.2 (2020-06-22)

W. N. Venables, D. M. Smith and the R Core Team

This manual is for R, version 4.0.2 (2020-06-22).

Copyright © 1990 W. N. Venables

Copyright © 1992 W. N. Venables & D. M. Smith

Copyright © 1997 R. Gentleman & R. Ihaka

Copyright © 1997, 1998 M. Maechler

Copyright © 1999–2018 R Core Team

Permission is granted to make and distribute verbatim copies of this manual provided the copyright notice and this permission notice are preserved on all copies.

Permission is granted to copy and distribute modified versions of this manual under the conditions for verbatim copying, provided that the entire resulting derived work is distributed under the terms of a permission notice identical to this one.

Permission is granted to copy and distribute translations of this manual into another language, under the above conditions for modified versions, except that this permission notice may be stated in a translation approved by the R Core Team.

Table of Contents

P	refa	ace	
1	Ir	ntroduction and preliminaries	2
	1.1	The R environment	
	1.2	Related software and documentation	
	1.3	R and statistics	
	1.4	R and the window system	
	1.5	Using R interactively	
	1.6	An introductory session	
	1.7	Getting help with functions and features	4
	1.8	R commands, case sensitivity, etc	4
	1.9	Recall and correction of previous commands	5
	1.10	0 1	
	1.11	Data permanency and removing objects	5
2	Simple manipulations; numbers and vectors		
	2.1	Vectors and assignment	
	2.2	Vector arithmetic	
	2.3	Generating regular sequences	8
	2.4	Logical vectors	
	2.5	Missing values	9
	2.6	Character vectors	
	2.7	Index vectors; selecting and modifying subsets of a data set	
	2.8	Other types of objects	11
3	O	Objects, their modes and attributes	13
	3.1	Intrinsic attributes: mode and length	
	3.2	Changing the length of an object	
	3.3	Getting and setting attributes	
	3.4	The class of an object	14
4	Ordered and unordered factors		16
	4.1	A specific example	
	4.2	The function tapply() and ragged arrays	
	4.3	Ordered factors	
5	A	arrays and matrices	18
_	5.1	Arrays	
	5.1	Array indexing. Subsections of an array	
	5.2	Index matrices	
	5.4	The array() function	
		5.4.1 Mixed vector and array arithmetic. The recycling rule	
	5.5	The outer product of two arrays	
	5.6	Generalized transpose of an array	
	5.7	Matrix facilities	
	5	5.7.1 Matrix multiplication	22