

APPENDIX A

R Functions

Here we list the R functions used in this book. Some of the functions are used “behind the scenes” and are available on the book’s Web site.

Table A.1 R functions used in this book.

<i>Function</i> { <i>Package</i> }	<i>Application</i>	<i>Chapters</i>
abline {graphics}	add straight lines to plot	2 4 5 8–10 12 13
abs {base}	absolute value	3 12
acf {stats}	autocorrelation function	12
add.grid {datasupport.R}	add coastal regions to best.use	6
all {base}	are all values true?	8
apply {base}	apply functions over array margins	6
apropos {utils}	find objects by name	2
ar {stats}	fit autoregressive (AR) models	10
arima {stats}	fit ARIMA models	10
arrows {graphics}	add arrows to plot	5 6
as {methods}	force object to belong to class	5 9
as.array {base}	coerce to array	4
as.character {base}	convert to character vector	5
as.data.frame {base}	convert to data frame	6
as.Date {base}	date conversion to/from character	4 5 10
as.integer {base}	convert to integer	7 9
as.matrix {base}	convert to matrix	5 10 12
as.numeric {base}	convert to numeric	4 6 8 10–12
as.POSIXct {base}	date/time conversion functions	5
as.ppp {spatstat}	convert to spatial point pattern	11
as.psp {spatstat}	convert to spatial lines	11
as.sociomatrix {network}	coerce network to socio matrix	10
as.vector {base}	convert to vector	5 6 10
as.windrose {oce}	create wind rose object	13
attach {base}	attach object to search path	2 10
attr {base}	object attributes	5 11
axis {graphics}	add axis to plot	4–8 10 12

<i>Function {Package}</i>	<i>Application</i>	<i>Chapters</i>
barplot {graphics}	create bar plot	2 4 7 12
bbox {sp}	retrieve bounding box	9 12
beta.select {LearnBayes}	find beta prior given quantiles	4
betweenness {sna}	centrality scores of graph nodes	10
bic.glm {BMA}	Bayesian model averaging for GLM	12
bic.poisson {prediction.R}	Poisson prediction from BMA	12
blue2red {colorRamps}	create gradient color ramp	9 12
blue2yellow {colorRamps}	create gradient color ramp	9
boot {boot}	bootstrap resampling	3
boot.ci {boot}	bootstrap confidence interval	3
bootstrap {bootstrap}	bootstrap resampling	12
box {graphics}	draw box around plot	5 6 11 13
boxplot {graphics}	create box and whisker plot	5 8 9
brewer.pal {RColorBrewer}	create color palette	11
c {base}	create vector or list	2–13
cat {base}	concatenate and print	2
cbind {base}	combine objects by columns	4–6 11 12
ceiling {base}	smallest integer not less than x	5
cens {gamlss.cens}	fit GAM using censored data	8
choose {base}	n choose k	3
chooseCRANmirror {utils}	choose CRAN mirror site	2
citation {utils}	create citation for package	8 11
class {base}	object class	2 5 6
coda.samples {rjags}	samples in MCMC list format	4 12
coefficients {stats}	extract model coefficients	11 13
colMeans {base}	column means	11
colnames {base}	column names	6 8–12
colorRampPalette {grDevices}	color interpolation	5 9 12
colourmap {spatstat}	color lookup tables	11
confint {stats}	confidence ints model parameters	7
contour {graphics}	plot contours	5
coordinates {sp}	set/get spatial coordinates	5 9 11–13
coplot {graphics}	create conditioning plot	5
cor {stats}	correlation coefficient	3 7
cor.test {stats}	correlation test	3
cos {base}	cosine function	13
CRS {sp}	class coordinate reference system	5 9
cumsum {base}	cumulative sums	4 5 10
curve {graphics}	draw function curve	3 4 8 12 13
cut {base}	divide range into intervals	8
daisy {cluster}	dissimilarity matrix	11

Table A.1 (cont.)

<i>Function</i> { <i>Package</i> }	<i>Application</i>	<i>Chapters</i>
data.frame {base}	create data frames	3 6–13
dbeta {stats}	density beta distribution	4
dbinom {stats}	density binomial distribution	3
dchisq {stats}	density chi-squared distribution	11
degree {sna}	degree centrality of node	10
density {stats}	kernel density estimation	4 5 8 11
densityplot {lattice}	kernel density estimation lattice	4 5
dev.off {grDevices}	turn off current graphic device	2
dgamma {stats}	density gamma distribution	12 13
diameter {igraph}	diameter of graph	10
diff {base}	lagged differences	3 10
difftime {base}	time intervals	4–6
dim {base}	dimensions of object	2 6 7
dimnames {base}	dimension names	7 12
discint {LearnBayes}	highest prob int discrete distr	4
dist {stats}	distance matrix	11
dnbinom {stats}	density negative binomial dist	12
dnorm {stats}	density normal distribution	3
do.call {base}	execute function call	8 10
dpois {stats}	density Poisson distribution	3 7
drop1 {stats}	drop model term	3
dweibull {stats}	density Weibull distribution	3
ecdf {stats}	empirical cumulative distribution	8
effectiveSize {coda}	effective sample size for mean	12
ellipse {ellipse}	outline confidence region	3
envelope {spatstat}	simulation envelope of summary	11
equal.count {lattice}	create plot shingles	5
example {utils}	run example from online help	2
exp {base}	exponential function	4 7–10 12
expression {base}	unevaluated expressions	3–13
factor {base}	encode vector as factor	2 10
factorial {base}	factorial function	3
filter {stats}	linear filter on time series	10
findColours {classInt}	assign colors from classInt object	5
fit.variogram {gstat}	fit model to sample variogram	9
fitdistr {MASS}	fit univariate distributions	13
fitted {stats}	extracts fitted values	3 10
fivenum {stats}	five-number summary	5 7 8 12
formatC {base}	c-style formats	6
gamlss {gamlss}	fit generalized additive models	10
gelman.plot {coda}	shrink factor	12

<i>Function {Package}</i>	<i>Application</i>	<i>Chapters</i>
geocode {ggmap}	geocode google map location	5
get.max {get.max.R}	get cyclone maxima	6 12 13
get.tracks {getTracks.R}	get cyclone tracks	6
get.var.ncdf {ncdf}	read from netCDF file	6
get.visibility {get.visibility.R}	create visibility graph	10
getwd {base}	retrieve working directory	2
ggmap {ggmap}	create grammar of graphics map	5
ggmapplot {ggmap}	plot ggmaps	5
ggplot {ggplot2}	create grammar of graphics plot	6 13
glm {stats}	fit generalized linear models	7 8 10 12
gpd.fit {ismev}	fit generalized Pareto distr	8
graph.edgelist {igraph}	methods for creating graphs	10
gray {grDevices}	gray-level specification	6
grid {graphics}	add grid to plot	2 4 7 9–13
grid.circle {grid}	draw circle	4
grid.curve {grid}	draw curve	4
grid.newpage {grid}	move to new page on grid device	5
grid.text {grid}	add text	4
gridat {sp}	N–S and E–W grid locations	5
gridlines {sp}	add N–S and E–W grid lines	5
gsub {base}	pattern matching and replacement	10
gwr {spgwr}	geographically weighted regression	9
gwr.sel {spgwr}	select bandwidth for gwr	9
head {utils}	return first part of object	2 5–10 12
help {utils}	open help page	2
HexPoints2SpatialPolygons {sp}	make polygons from grid object	9 12
hist {graphics}	compute/plot histogram	4–6 9 12 13
histogram {lattice}	histogram using lattice	5
ifelse {base}	conditional element selection	9
image {graphics}	display color image	5
image.plot {fields}	image plot with legend	12
imageplot.bma {BMA}	image plot of models in BMA	12
imageplot.bma2 {imageplot.bma2.R}	modification of imageplot.bma	12
imageplot.bma3 {imageplot.bma3.R}	modification of imageplot.bma	12
import.grid {datasupport.R}	import grid boundaries	6
install.packages {utils}	install packages from repository	2
is.na {base}	which elements are missing?	6
ISOdate {base}	date/time conversion	4 6
ISOdatetime {base}	date/time conversion	6
jags.model {rjags}	create JAGS model object	4 12
Kest {spatstat}	second-moment spatial function	11

Table A.1 (cont.)

<i>Function</i> { <i>Package</i> }	<i>Application</i>	<i>Chapters</i>
Kinhom {spatstat}	inhomogeneous K function	11
kmeans {stats}	perform k-means clustering	11
krige {gstats}	perform kriging	9
lag.listw {spdep}	compute spatial lag	9 12
lag.plot {stats}	time series lag plots	5
lapply {base}	apply function over list	6 10 12
layout {graphics}	plot arrangement	4 7 13
leap_year {lubridate}	is leap year?	5
legend {graphics}	add legend to plot	3–6 8 10 12
length {base}	length of object	2–13
library {base}	load package to workspace	2
lines {graphics}	add connected lines to plot	3–13
list {base}	construct and check for lists	4 7 9 11 12
lm {stats}	fit linear models	3 5 7 9 13
load {base}	reload saved data sets	4 6 7–13
loess {stats}	fit local polynomial regressions	13
loess.smooth {stats}	scatter plot with loess smooth	9
log {base}	logarithmic function	2
map {maps}	draw maps	5 6 9 11–13
map2SpatialLines {maptools}	convert map object to spatial line	5 9 11 12
marks {spatstat}	get/set marks of point pattern	11
matrix {base}	create a matrix	5 7 9 13
max {base}	sample maximum	2 3 8 11
mean {base}	sample mean	2 3 6–9 11
median {stats}	sample median	3 9 10 12
melt {reshape}	reshape object for easy casting	10
merge {base}	merge data frames	8 13
min {base}	sample minimum	3 8
minimum.spanning.tree {igraph}	minimum spanning tree of graph	10
moran {spdep}	compute moran's I	9 12
moran.test {spdep}	test spatial autocorrelation	9
mrl.plot {ismev}	mean residual life plot	8
mrl.plot2 {mrl.plot2.R}	revised mean residual life plot	8
mtext {graphics}	add margin text	4–8 10–13
mvrnorm {MASS}	samples from multivariate normal	3
mycontour {LearnBayes}	contour bivariate density	4
names {base}	get/set object names	2 5 6 9 11 12
nb2listw {spdep}	spatial weights for neighbor list	9 12
nb2WB {spdep}	output spatial weights for WinBUGS	12
ncol {base}	number of columns in array	12
network {network}	make/coerce to network object	10

<i>Function {Package}</i>	<i>Application</i>	<i>Chapters</i>
now {lubridate}	get current date	5
nrow {base}	number of rows in array	9 11
numeric {base}	create numeric vector	3 4 7 8 10 12 13
object.size {utils}	space allocation for object	6
objects {base}	list objects in working directory	2
open.ncdf {ncdf}	open netCDF file	6
optim {stats}	general purpose optimizer	12
options {base}	set/get options	2
order {base}	return permutation in ascending	10 11
outer {base}	outer product of arrays	7 12
over {sp}	overlay points grids and polygons	9 12 13
pairs {graphics}	matrix of scatter plots	3
par {graphics}	set graph parameters	2–13
parse {base}	parse expressions	5
paste {base}	concatenate character strings	3–13
pbeta {stats}	beta distribution function	4
pbetap {LearnBayes}	predict dist binom w/ beta prior	4
pchisq {stats}	chi-squared distribution function	7
pgamma {stats}	gamma distribution function	12
pixellate {spatstat}	convert object to pixel image	11
plot {graphics}	generic x–y plotting	3–13
plot.im {spatstat}	plot pixel image	11
plot.rq.process {quantreg}	plot quantile regression process	8
plot.windrose2 {plot.windrose2.R}	modified plot wind rose diagram	13
plotfits {correlationfuns.R}	annual count vs cluster rate	11
plotmo {plotmo}	plot model response	7
pnbinom {stats}	negative binomial distribution	12
pnorm {stats}	normal distribution function	3
points {graphics}	add points to plot	4–8 10–13
poly2nb {spdep}	neighborhood from polygon list	9 12
polygon {graphics}	draw polygons with given vertices	4 5 7 8 10 11 13
Polygon {sp}	create spatial polygons object	9 13
Polygons {sp}	polygons object	9
ppois {stats}	Poisson distribution function	3 7
predict {stats}	generic function for predictions	3 5 7 12 13
print {base}	print objects	3 5–7 9 10 12
prod {base}	product of values in object	3
proj4string {sp}	projection attributes for sp data	9 11 12
projInfo {rgdal}	list proj.4 tag information	5
prop.test {stats}	test of equal or given proportions	4
pt {stats}	Student’s t-distribution function	3

Table A.1 (cont.)

<i>Function</i> { <i>Package</i> }	<i>Application</i>	<i>Chapters</i>
pushViewport {grid}	navigate grid viewport	5
q {base}	terminate session	2
qbeta {stats}	quantile beta distribution	4
qnorm {stats}	quantile normal distribution	3 8
qplot {ggplot2}	quick plot wrapper for ggplot	5 10
qqline {stats}	plot line on qqplot/qqnorm	5
qqnorm {stats}	quantile quantile plot	5
qr {base}	qr decomposition of a matrix	12
qr.Q {base}	recover Q matrix from qr object	12
qr.R {base}	recover R matrix from qr object	12
quadratcount {spatstat}	quadrat counts for point pattern	11
quantile {stats}	sample quantiles	2–4 8 10 12 13
randomForest {randomForest}	random forest algorithm	7
range {base}	range of values	5
rank {base}	sample ranks	3 8
rbeta {stats}	random numbers beta distribution	4
rbind {base}	combine objects by rows	11
rbinom {stats}	random numbers binomial	4 7
read.bugs {R2WinBUGS}	read output files in coda format	4
read.csv {utils}	read comma-separated values file	4 6 7 11
read.table {utils}	read space-separated values file	2–12
readCov {datasupport.R}	read environmental covariates	6
readShapeSpatial {maptools}	read shape files	5
regionTable {correlationfuns.R}	table counts by region	11
rep {base}	replicate elements	2 6 8
require {base}	load package to workspace	2–13
resid {stats}	extract model residuals	3
rev {base}	reverse elements	2 4 6–9 11–13
rgamma {stats}	random numbers gamma distribution	4
rle {base}	run length encoding	3
rlWeibPois {CountyWinds.R}	return-level Weibull Poisson model	8
rm {utils}	remove objects from workspace	2 6 8
rMatClust {spatstat}	simulate Matern cluster process	11
rMaternI {spatstat}	simulate Matern inhibition process	11
rnorm {stats}	random numbers normal distribution	3
roc {roc.R}	plot roc curve	7
round {base}	round the number	3–10 12
rowMeans {base}	row averages	11
rownames {base}	get/set row names in data frame	6 7 12
rpois {stats}	random count Poisson distribution	3 7 11
rq {quantreg}	fit quantile regression models	8 13

<i>Function {Package}</i>	<i>Application</i>	<i>Chapters</i>
<code>rug {graphics}</code>	add rug to plot	4–6 8 10
<code>runif {stats}</code>	random number uniform distribution	4 11
<code>rweibull {stats}</code>	random number Weibull distribution	3
<code>sample {base}</code>	random samples and permutations	3 7 8 12
<code>sampleParameters {CountWinds.R}</code>	sample return levels	8
<code>sapply {base}</code>	wrapper for <code>lapply</code>	8 10–12
<code>save {base}</code>	save objects	6
<code>savgol.best {savgol.R}</code>	filter best-track data	6
<code>scale {base}</code>	scale and center object	11
<code>scatterhist {scatterplot.R}</code>	scatter plot with histogram	5
<code>sd {stats}</code>	sample standard deviation	2 3
<code>seq {base}</code>	sequence generator	2–5 7–9 12 13
<code>set.seed {base}</code>	set seed value for random numbers	3 7
<code>signif {base}</code>	round the number	3
<code>simcontour {LearnBayes}</code>	random draws bivariate density	4
<code>sin {base}</code>	sine function	2 13
<code>slot {methods}</code>	list slots in object	9 12
<code>sort {base}</code>	sort elements of a vector	5 8 10
<code>source {base}</code>	input code from file	4–8 10 11 13
<code>SpatialPointsDataFrame {sp}</code>	create spatial points data frame	5
<code>SpatialPolygons {sp}</code>	create spatial polygons	9
<code>SpatialPolygonsDataFrame {sp}</code>	create spatial polygons data frame	9 12
<code>split {base}</code>	divide into groups	11 12 13
<code>spplot {sp}</code>	plot method for spatial data	5 9 12
<code>spsample {sp}</code>	sample locations in spatial object	9
<code>spTransform {rgdal}</code>	map projections and transforms	5 9 11
<code>sqrt {base}</code>	square root function	2 3 7 8 12
<code>step {stats}</code>	choose model stepwise	3
<code>stl {stats}</code>	seasonal decomposition of series	10
<code>str {utils}</code>	display object structure	5 6 9 10
<code>strptime {base}</code>	date/time conversion	5
<code>strsplit {base}</code>	split elements of character vector	6 12
<code>subset {base}</code>	subset data objects	3 6 10 11 13
<code>substring {base}</code>	substring of character vector	12
<code>sum {base}</code>	sum of vector elements	2–4 6 7 9–12
<code>summary {base}</code>	summarize objects	2–5 7–9 11–13
<code>switch {base}</code>	select one from list of choices	12
<code>Sys.time {base}</code>	get current date and time	6
<code>Szero {spdep}</code>	give constant for spatial weights	9 12
<code>t {base}</code>	matrix transpose	11 12
<code>t.test {stats}</code>	perform Student's t-test	3

Table A.1 (cont.)

<i>Function</i> { <i>Package</i> }	<i>Application</i>	<i>Chapters</i>
table {base}	cross tabulations	2–4 7 10 13
tail {utils}	return last part of object	3 5
terrain.colors {grDevices}	color palette	11
testfits {correlationsfun.R}	test for time clustering	11
text {graphics}	add text to plot	4 5 9 11
time {stats}	create vector of times	5
title {graphics}	add title to plot	12
toBibtex {util}	convert to bibtex/latex	8
topo.colors {grDevices}	color palette	9
traceplot {code}	successive iterations of mcmc	12
transitivity {igraph}	prob adjacent vertices connected	10
tree {tree}	regression/classification tree	7
trellis.par.get {lattice}	get parameters of trellis display	12
trellis.par.set {lattice}	set parameters of trellis display	12
try {base}	try expression	2
ts {stats}	create time series object	5 10
unique {base}	remove duplicate elements	12
unlist {base}	flatten lists	6 11
unmark {spatstat}	remove marks from spatial points	11
update {stats}	refit model	4 5 9 12
var {stats}	sample variance	2 3 7
var.test {stats}	test comparing two variances	3
variogram {gstat}	sample variogram	9
viewport {grid}	create grid viewport	5
wday {lubridate}	get day of the week	5
week {lubridate}	get week of the year	5
which {base}	which indices are true?	2 10 12
which.max {base}	where is the maximum?	3
wilcox.test {stat}	rank/sign test difference in mean	3
with {base}	evaluate expression in data enviro	5 6
with_tz {lubridate}	get date–time in diff time zone	5
write.table {utils}	output data frame	6
writeDataFileR {writedatafileR.R}	output WinBUGS data	12
xtable {xtable}	create export table	3 7 8 10–12
year {lubridate}	get/set year of date–time object	5
ymd {lubridate}	parse dates to specified formats	6
zeroinfl {gamlss}	fit zero-inflated Poisson model	7