

Detailed Contents

16	2.3	Two-way ANOVA in R	221
18	2.3	Plotting Interactions	190
19	2.4	Post-hoc Testing	131
		Summary	136
		<i>List of Tables</i>	xii
		<i>List of Figures</i>	xiii
		<i>List of Abbreviations</i>	xv
		Foreword by Dilip M. Nachane	xvii
		Preface	xix
		Acknowledgments	xxi
		About the Authors	xxiii
		CHAPTER 4	
		4.1	Types of Measurement Scales
		4.2	Summary Measures
		4.3	Summary Statistics for Continuous Data
		4.4	Testing for Normality
		4.5	Summary
			Exercises
			142
		CHAPTER 5	
			Parametric Tests
		5.1	Hypothesis Test
		5.2	Assumption Testing
		5.3	Performing One Sample T-test
		5.4	Effect Size
		5.5	Power Analysis
		5.6	Independent T-test
		5.7	Assumptions of Independent Sample T-Test
		5.8	Assumption Testing
		5.9	Performing T-test
		5.10	Effect Size
		5.11	Power Analysis
		5.12	Paired Sample T-test
		5.13	Assumptions of Paired Sample T-Test
		5.14	Implementing Paired T-test
		5.15	Effect Size
		5.16	Power Analysis
		5.17	Summary
			Exercises
			49
			53
			55
		CHAPTER 6	
			Analysis of Variance
		6.1	Assumptions of One-way ANOVA
		6.2	Fitting ANOVA Model in R
		6.3	Post-hoc Testing
		6.4	Evaluating Test Assumptions
		6.5	Summary
			Exercises
			64
			65
			72
		CHAPTER 1	
			Introduction
		1.1	Why Use R
		1.2	Installing R
		1.3	Getting Help
		1.4	Updating R
		1.5	Installing, Loading, and Unloading R Packages
		1.6	Getting Familiarity with R
		1.7	Data Entry
		1.8	Exporting R Data Files
		1.9	Using Script Files in R
		1.10	RStudio
		1.11	Summary
		CHAPTER 2	
			Data Management in R
		2.1	Vectors
		2.2	Matrices
		2.3	Lists
		2.4	Data Frames
		2.5	Factors
		2.6	Arrays
		2.7	Missing Values
		2.8	Summary
			Exercises
			Appendix
		CHAPTER 3	
			Describing Data Graphically
		3.1	Bar Chart
		3.2	Histogram

3.3	Boxplot	75
3.4	Pie Chart	77
3.5	Scatter Plot	79
3.6	Line Graph	81
3.7	Summary	83
	Exercises	84

CHAPTER 4**Descriptive Statistics**

4.1	Types of Measurement Scales	85
4.2	Summary Measures	86
4.3	Summary Statistics for Continuous Data	94
4.4	Testing for Normality	96
4.5	Summary	97
	Exercises	98

CHAPTER 5**Parametric Tests**

5.1	Hypothesis Tests	100
5.2	Assumption Testing	102
5.3	Performing One Sample T -test	102
5.4	Effect Size	104
5.5	Power Analysis	105
5.6	Independent T -test	106
5.7	Assumptions of Independent Sample T -Test	106
5.8	Assumption Testing	107
5.9	Performing T -test	109
5.10	Effect Size	110
5.11	Power Analysis	111
5.12	Paired Sample T -test	113
5.13	Assumptions of Paired Sample T -Test	113
5.14	Implementing Paired T -test	113
5.15	Effect Size	114
5.16	Power Analysis	115
5.17	Summary	116
	Exercises	117

CHAPTER 6**Analysis of Variance**

6.1	Assumptions of One-way ANOVA	119
6.2	Fitting ANOVA Model in R	119
6.3	Post-hoc Testing	123
6.4	Evaluating Test Assumptions	124
6.5	Summary	125
	Exercises	126

CHAPTER 7**Two-way Analysis of Variance**

- 7.1 Assumptions of Two-way ANOVA
- 7.2 Two-way ANOVA in R
- 7.3 Plotting Interactions
- 7.4 Post-hoc Testing
- 7.5 Summary
- Exercises

CHAPTER 8**Analysis of Covariance**

- 8.1 Assumptions
- 8.2 ANCOVA Using R
- 8.3 Assumption Testing
- 8.4 Fitting ANCOVA in R
- 8.5 Multiple Comparisons with User-specified Contrasts
- 8.6 Post-hoc Tests in ANCOVA
- 8.7 Testing for Homogeneity of Regression Slopes
- 8.8 Summary
- Exercises

CHAPTER 9**Correlation Analysis**

- 9.1 Assumptions of Correlations
- 9.2 Pearson Correlations
- 9.3 Spearman Correlations
- 9.4 Kendall Tau Correlation
- 9.5 Partial Correlation
- 9.6 Phi Correlation
- 9.7 Point-biserial and Biserial Correlations
- 9.8 Summary
- Exercises

CHAPTER 10**Linear Regression Analysis**

- 10.1 Linear Regression
- 10.2 Assumptions of Linear Regression
- 10.3 Performing Regression Model in R
- 10.4 Linear Model Statistics
- 10.5 Regression Diagnostics
- 10.6 Multiple Regression
- 10.7 Regression Diagnostics
- 10.8 Prediction
- 10.9 Remedial Measures
- 10.10 Summary
- Exercises

CHAPTER 11**Parametric Tests**

- 11.1 Wilcoxon Test 127
- 11.2 Wilcoxon signed-rank Test 128
- 11.3 Wilcoxon Matched-pairs Signed Rank Test 130
- 11.4 Mann-Whitney U Test 132
- 11.5 Kruskal-Wallis Test 136
- 11.6 Friedman Test for Repeated Measures 136
- 11.7 Run Test 141
- 11.8 Kolmogorov-Smirnov Test for Two Independent Samples 141
- 11.9 Chi-square Test of Independence 142
- 11.10 Chi-square Test of Association 137
- 11.11 Fisher Exact Test 138
- 11.12 Spearman Correlation 139
- 11.13 Summary 140
- Exercises 142

CHAPTER 12**Principal Components and Factor Analysis**

- 12.1 Principal Component Analysis (PCA) 144
- 12.2 Assumptions of PCA 147
- 12.3 PCA in R 147
- 12.4 Factor Analysis 151
- 12.5 Assumptions of Factor Analysis 151
- 12.6 EFA in R 151
- 12.7 Factors to Extract 151
- 12.8 Factor Scores 151
- 12.9 Summary 152
- Exercises 153
- 12.10 The Generalized Linear Model in R 156
- 12.11 Summary 157
- Exercises 157

CHAPTER 13**Nonlinear Regression**

- 13.1 The Generalized Linear Model in R 156
- 13.2 Summary 157
- Exercises 157

CHAPTER 14**Cluster Analysis**

- 14.1 Approaches to Cluster Analysis 161
- 14.2 Cluster Analysis in R 162
- 14.3 Summary 164
- Exercises 165
- 14.4 Summary 167
- 14.5 Remedial Measures 167
- 14.6 Summary 168
- Exercises 168

CHAPTER 11**Nonparametric Tests**

121	11.1	Wilcoxon Tests	170
121	11.2	Wilcoxon Signed-rank Test	170
120	11.3	Wilcoxon Matched-pairs Signed Rank Test	172
122	11.4	Mann-Whitney U Test	174
120	11.5	Kruskal-Wallis Test	175
120	11.6	Friedman Test for Repeated Measure	177
120	11.7	Run Test	179
120	11.8	Kolmogorov-Smirnov Test for Two Independent Samples	180
121	11.9	Chi-square Test of Independence	180
127	11.10	Chi-square Test of Association	182
127	11.11	Fisher Exact Test	183
128	11.12	Spearman Correlation	183
128	11.13	Summary	185
140		Exercises	186

CHAPTER 12**Principal Components and Factor Analysis**

144	12.1	Principal Components Analysis (PCA)	188
144	12.2	Assumptions of PCA	189
144	12.3	PCA in R	190
146	12.4	Factor Analysis	199
147	12.5	Assumptions of Factor Analysis	199
147	12.6	EFA in R	200
147	12.7	Factors to Extract	202
151	12.8	Factor Scores	204
154	12.9	Summary	205
151		Exercises	205

CHAPTER 13**Logistic Regression**

158	13.1	The Generalized Linear Models in R	207
158	13.2	Summary	211
158		Exercises	212

CHAPTER 14**Cluster Analysis**

161	14.1	Approaches to Cluster Analysis	213
161	14.2	Cluster Analysis in R	214
164	14.3	Summary	216
165		Exercises	224
167			225
167			225
167			225
168			225
168			225

168		Exercises	213
-----	--	-----------	-----

CHAPTER 7

170	7.1	Assumptions of Two-way ANOVA	170
170	7.2	Two-way ANOVA in R	172
172	7.3	Plotting Interactions	174
174	7.4	Post-hoc Testing	175
175	7.5	Summary	177
177		Exercises	179
180			180
180			180
182			182
183	8.1	Assumptions	183
183	8.2	ANOVA Using R	183
185	8.3	Assumption Testing	185
186	8.4	Using ANOVA in R	186
186	8.5	Multiple Comparisons with User-specified Contrast	186
186	8.6	Post-hoc Test in ANOVA	186
186	8.7	Testing for Homogeneity of Regression Slopes	186
188	8.8	Summary	188
188		Exercises	188

CHAPTER 9

199			199
199			199
200	9.1	Assumptions of Correlations	200
202	9.2	Pearson Correlation	202
204	9.3	Spearman Correlation	204
205	9.4	Kendall Tau Correlation	205
205	9.5	Partial Correlation	205
205	9.6	Pi Correlation	205
205	9.7	Point-biserial and Biserial Correlations	205
205	9.8	Summary	205
206		Exercises	206

CHAPTER 10

212			212
212			212
213	10.1	Linear Regression	213
214	10.2	Assumptions of Linear Regression	214
214	10.3	Performing Regression Model in R	214
216	10.4	Linear Model Statistics	216
224	10.5	Regression Diagnostics	224
225	10.6	Multiple Regression	225
225	10.7	Regression Diagnostics	225
225	10.8	Prediction	225
225	10.9	Remedial Measures	225
225	10.10	Summary	225
225		Exercises	225

CHAPTER 15**Multidimensional Scaling**

15.1 Data Structure for MDS	226
15.2 Approaches to MDS	230
15.3 Summary	239
Exercises	240

CHAPTER 16**Introduction to Time Series Analysis**

16.1 Reading Data in R	241
16.2 Stationarity	247
16.3 Time Series Components	248
16.4 AR, MA, and ARIMA Processes	254
16.5 ARMA Modeling	255
16.6 Summary	260
Exercises	260

CHAPTER 17**Volatility Analysis**

17.1 Data and Descriptive Statistics	262
17.2 Unit Root Test	269
17.3 Volatility Models	272
17.4 Summary	306
Exercises	307

Bibliography

B-1

Index

I-1

1.20 Commands in R Script Editor	24
1.21 Result of <code>install.packages()</code> Along with the Knowledge of <code>install.packages()</code>	25
1.22 Dialogue Box for Saving the Script File	26
1.23 Dialogue Box for Opening the Script File	27
1.24 Graphical Interface of RStudio	27
3.1 Bar Chart (In its Most Basic Form)	67
3.2 Embellished Bar Chart	67
3.3 Bar Chart with Value Labels	67
3.4 Horizontal Bar Chart	68
3.5 Clustered Bar Chart	69
3.6 Stacked Bar Chart	70
3.7 Stacked Bar Chart with Change in Legend Position	71
3.8 Stacked Bar Chart with Changed Bar Width and Distance Between Bars	71
3.9 Basic Histogram	72
3.10 Bar Chart with Changed Class Intervals, Colored Bar, Chart Title, and Axis Labels	73
3.11 Bar Chart with X-axis Extended	74
3.12 Histogram with Probability on Y-axis	74
3.13 Histogram with a Probability Density Curve	75
3.14 Basic Boxplot	76