

Contents

Contents.....	i
1 Introduction.....	1
1.1 Our books.....	1
1.2 The software.....	1
2 Installing Brodgar.....	5
2.1 Brodgar.....	5
2.1.1 Installing Brodgar.....	5
2.1.2 Upgrade the evaluation version to a licensed version.....	6
2.1.3 Upgrade to a newer version.....	7
2.1.4 Hardware requirements.....	7
2.1.5 Running Brodgar.....	7
2.2 Brodgar and R.....	7
2.2.1 What is R?.....	7
2.2.2 Link Brodgar & R.....	8
2.2.3 Installing packages.....	9
2.2.4 Problems.....	10
2.3 Getting started.....	10
2.4 Dealing with graphs.....	11
2.4.1 R graphs.....	11
2.4.2 Non-R graphs.....	12
2.5 Microsoft VISTA problems.....	12
3 Import data in Brodgar.....	13
3.1 Import a data set for the first time.....	13
3.1.1. Import data from a spreadsheet.....	15
3.1.2 Import data from an ascii file.....	18
3.2 Open existing project.....	19
3.3 The “Info Y & X” tab.....	21
3.4 Demo data.....	23
3.5 Missing values and nominal variables.....	25
3.6 Problems and error messages.....	27
4 Exploration.....	1
4.1 Data exploration using R tools.....	1

4.1.1 Boxplots and conditional boxplots	2
4.1.2 Histograms	3
4.1.3 Dotplot	4
4.1.4 QQ-plots	5
4.1.5 Coplot	5
4.1.6 Pairs	7
4.1.7 Lattice graphs	7
4.1.8 Scatterplot	8
4.1.9 General remarks	9
4.2 General tools	9
4.2.1 Plot data	9
4.2.2 Enumerate large correlations	10
4.2.3 Diversity indices	10
4.3 Time series tools	11
4.4 Examples from Zuur et al. (2007)	18
4.4.1 Figure 21.2 in Zuur et al. (2007)	18
4.4.2 Figure 21.4 in Zuur et al. (2007)	18
4.4.3 Figure 22.3 in Zuur et al. (2007)	18
4.4.4 Figure 33.1 in Zuur et al. (2007)	19
4.4.5 Figure 16.1 in Zuur et al. (2007)	19
4.4.6 Figure 4.7 in Zuur et al. (2007)	20
4.4.7 Figure 4.8 in Zuur et al. (2007)	20
5 Univariate techniques.....	29
5.1 Linear regression in Brodgar	29
5.1.1 A simple linear regression analysis	29
5.1.2 Select response variable	31
5.1.3 Select explanatory variables and nominal variables	31
5.1.4 Use weights	32
5.1.5 Graphs settings and general settings	32
5.1.6 Interactions	38
5.1.7 Specialised corner	39
5.1.8 Visualise the model	39
5.2 Regression examples from Zuur et al. (2007; 2009)	40
5.2.1 Section 20.4 in Zuur et al. (2007)	40
5.2.2 Section 26.4 in Zuur et al. (2007)	41
5.2.3 Section 7.5 in Zuur et al. (2009)	42
5.2.4 Figure A.3 in Zuur et al. (2009)	44
5.3 Generalised linear modelling in Brodgar	49
5.4 GLM examples from Zuur et al. (2007; 2009)	52
5.4.1 Section 21.6 in Zuur et al. (2007)	52
5.4.2 Section 10.3 in Zuur et al. (2009)	53
5.4.3 Section 9.10 in Zuur et al. (2009)	54
5.5 Generalised additive modelling in Brodgar	56
5.5.1 Selection of variables	56
5.5.2 Distribution and link function	58

5.5.3 Weights	59
5.5.4 Results	59
5.5.5 Graphs settings and settings	59
5.5.6 Changing options for the smoothers	60
5.5.7 Interactions	62
5.5.8 Specialised corner	63
5.6 GAM examples from Zuur et al. (2009)	65
5.6.1 GAM with multiple smoothers	65
5.6.2 GAM with an offset	66
5.7 Regression and classification trees in Brodgar	67
5.8 Mixed effects modelling in Brodgar	69
5.8.1 The random intercept model	69
5.8.2 Settings	73
5.8.3 The random intercept and slope model	73
5.8.4 Specialised corner for mixed effects models	74
5.8.5 Mixed effects modelling example from Zuur et al. (2009)	76
5.9 GLS to model heterogeneity	83
5.10 GLS example from Zuur et al. (2009)	89
5.11 GMM (or GLS) and auto-regressive correlation	92
5.12 GMM (or GLS) and other correlation structures	94
5.13 GMM and random effects	97
5.14 Multinomial logistic regression	98
6 Multivariate techniques	99
6.1 Principal component analysis	99
6.2 Redundancy analysis	104
6.3 Correspondence analysis and canonical correspondence analysis	108
6.4 Discriminant analysis	108
6.5 Measures of association	110
6.6 Bray-Curtis ordination in Brodgar	112
6.7 Generalised Procrustes analysis	114
6.7.1 Fisher's Irish data	115
6.8 Clustering	118
6.9 Multivariate tree models	119
6.10 Other techniques	121
6.10.1 Canonical correlation analysis	121
6.10.2 Factor analysis	122
6.10.3 Multidimensional scaling	122
6.11 Missing values	124
6.12 (Partial) Mantel test, ANOSIM, BIOENV & BVSTEP	124
6.12.1 ANOSIM	124
6.12.2 Mantel test and Partial Mantel test	125
6.12.3 BIOENV & BVSTEP	125
7 Time series analysis	127
7.1 Time series techniques	127

7.2 Dynamic factor analysis.....	128
7.3 Repeated Loess smoothing in Brodgar.	142
7.4 Seasonal decomposition by Loess smoothing.....	144
7.4.1 Month plots (cycle plots).....	144