Models and likelihood are essential to modern statistics and data analysis. Anthony Davison here blends theory and practice to provide an integrated text for advanced undergraduate and graduate students, researchers, and practitioners. The coverage is unrivalled, with sections on survival analysis, missing data, Markov chains, Markov random fields, point processes, graphical models, simulation and Markov chain Monte Carlo, estimating functions, asymptotic approximations, local likelihood and spline regressions as well as chapters on more standard topics such as the linear model and Bayesian statistics. Each chapter contains a wide range of exercises. Worked examples, aimed at helping users make the transition from theory to practice, run through the text. Practicals in the S language designed to develop computing and data analysis skills are also available, together with a library of data sets. These features will ensure that this becomes a standard text and reference in the subject, both for users of statistics and for students.

Cambridge Series in Statistical and Probabilistic Mathematics

Editorial Board:

- R. Gill (Department of Mathematics, Utrecht University)
- B.D. Ripley (Department of Statistics, University of Oxford)
- S. Ross (Department of Industrial Engineering, University of California, Berkeley)
- M. Stein (Department of Statistics, University of Chicago)
- D. Williams (School of Mathematical Sciences, University of Bath)

This series of high quality upper-division textbooks and expository monographs covers all aspects of stochastic applicable mathematics. The topics range from pure and applied statistics to probability theory, operations research, optimization and mathematical programming. The books contain clear presentations of new developments in the field and also of the state of the art in classical methods. While emphasizing rigorous treatment of theoretical methods, the books also contain applications and discussions of new techniques made possible by advances in computational practice.



Preface

2

3

1 Introduction

				15
	Varia	ation		15
	2.1	Statistics and Sampling Variation		15
	2.2	Convergence		28
	2.3	Order Statistics		37
	2.4	Moments and Cumulants		44
	2.5	Bibliographic Notes		48
	2.6	Problems		49
	Uncertainty			52
	3.1	Confidence Intervals		52
	3.2	Normal Model		62
	3.3	Simulation		77
	3.4	Bibliographic Notes		90
	3.5	Problems		90
		ice and starging meeting		
	Like	elihood		94
10	4.1	T ilealihaad		94
	4.1	Likelinood		101
	4.2	Summaries		101
	4.3	Information		109
	4.4	Maximum Likelihood Estimator	Model Building	115
	4.5	Likelihood Ratio Statistic		126
	4.6	Non-Regular Models		140

eniado volvela i de 1

	4.7	Model Selection		150
	4.8	Bibliographic Notes		150
	4.9	Problems		156
				150
5	Models			161
	5.1	Straight-Line Regression		161
	5.2	Exponential Family Models		166
	5.3	Group Transformation Model	S	183
	5.4	Survival Data		188
	5.5	Missing Data		203
	5.6	Bibliographic Notes		203
	5.7	Problems	settin by Cambridge University Pro-	210
				217
5	Sto	chastic Models	100 million (100 million 100 m	225
	6.1	Markov Chains		225
	6.2	Markov Random Fields		225
	6.3	Multivariate Normal Data	1 Cileman anno 1	244
	6.4	Time Series		255
	6.5	Point Processes	of an average the solution of	200
	6.6	Bibliographic Notes		2/4
	6.7	Problems		292
				293
1	Estimation and Hypothesis Testing			300
	7.1	Estimation		200
	7.2	Estimating Functions		300
	7.3	Hypothesis Tests		315
	7.4	Bibliographic Notes		323
	7.5	Problems		340
				549
	Line	ar Regression Models		353
	8.1	Introduction	nonaciona given la al antoRitera /	000
	8.2	Normal Linear Model	bright University Press does not for	353
	8.3	Normal Distribution Theory		359
	8.4	Least Squares and Robustness		370
	8.5	Analysis of Variance		3/4
	8.6	Model Checking		3/8
	8.7	Model Building		386
	8.8	Bibliographic Notes		397
	8.9	Problems		409
			. /	409

Con	tents	17	VII
9	Design	ed Experiments	electron A she 417
	9.1 F	Randomization	417
	9.2 5	Some Standard Designs	426
	9.3 H	Further Notions	439
	9.4 (Components of Variance	449
	9.5 1	Bibliographic Notes	463
	9.6 1	Problems	464
10	Nonlin	near Regression Models	468
	10.1	Introduction	468
	10.2	Inference and Estimation	471
	10.3	Generalized Linear Models	480
	10.4	Proportion Data	. 487
	10.5	Count Data	498
	10.6	Overdispersion	511
	10.7	Semiparametric Regression	518
	10.8	Survival Data	540
	10.9	Bibliographic Notes	554
	10.10	Problems	555
11	Bayes	sian Models	565
	11.1	Introduction	565
	11.2	Inference	578
	11.3	Bayesian Computation	596
	11.4	Bayesian Hierarchical Models	619
	11.5	Empirical Bayes Inference	627
	11.6	Bibliographic Notes	637
	11.7	Problems	639
12	Cone	litional and Marginal Inference	645
	12.1	Ancillary Statistics	646
	12.1	Marginal Likelihood	656
	12.2	Conditional Inference	665
	12.5	Modified Profile Likelihood	680
	12.4	Bibliographic Notes	691
	12.5	Problems	692
	12.0	1100101110	

.....

viii

Appendix A. Practicals

Bibliography Name Index Example Index Index Contents

696

699712716718