

Contents

Preface	v
Contributing Authors	xxi
1. Passive Acoustic Detection of Marine Mammals Using Page's Test	1
Douglas A. Abraham	
1.1 Introduction	1
1.2 Acoustic Detection of Marine Mammals	3
1.3 Methodology and Analysis	4
1.3.1 Algorithm Specifics	8
1.3.2 Detection Results	10
1.3.3 Localization	11
1.4 Concluding Remarks	16
References	16
2. Two-Stage Procedures for Selecting the Best Component of a Multivariate Distribution	19
Makoto Aoshima, Mitsuru Aoki and Masaki Kai	
2.1 Introduction	19
2.2 A Specific Application	21
2.2.1 The Rule R_1	22
2.2.2 The Rule R_2	24
2.3 Methodologies and Analysis	26
2.3.1 Two-Stage Procedure for R_1	26
2.3.2 Two-Stage Procedure for R_2	29

2.4	Concluding Remarks	30
	References	33
3.	Sequential Randomization Tests	35
	Tathagata Banerjee and Onkar Prosad Ghosh	
3.1	Motivating Background	35
3.2	Formulation and Review of Existing Procedures	38
3.3	Sequential Estimation of a p-Value	41
3.4	An Illustrative Example	44
3.5	Concluding Remarks	47
	References	48
4.	Sequential Methods for Multistate Processes	53
	Michael I. Baron	
4.1	Introduction and the General Scheme	53
4.2	Analysis and Prediction of Electricity Prices	56
4.3	Methodology and Implementation	59
4.4	Other Applications	63
4.5	Concluding Remarks	64
	References	65
5.	Sequential Adaptive Designs for Clinical Trials with Longitudinal Responses	69
	Atanu Biswas and Anup Dewanji	
5.1	Introduction	69
5.2	Longitudinal Binary Responses	72
5.3	Longitudinal Ordinal Responses	76
5.4	Longitudinal Multivariate Ordinal Responses	77
5.5	Incorporating Prognostic Factors	78
5.6	Longitudinal Continuous Responses	79
5.7	An Application	80
5.8	Concluding Remarks	81
	References	83
6.	Sequential Approaches to Data Mining	85
	Yuan-Chin Ivan Chang and Adam Martinsek	
6.1	Introduction	85
6.2	Medical Insurance Proceeds	87

6.2.1	Clustering Tree	88
6.2.2	Stratification	93
6.2.3	Computational Complexity	95
6.3	Sequential Fixed-Width Interval Estimation	96
6.4	Concluding Remarks	100
	References	101
7.	Approximations and Bounds for Moving Sums of Discrete Random Variables	105
	Jie Chen and Joseph Glaz	
7.1	Introduction	105
7.2	The Distribution and Expectation of $W_{k,m}$	107
	7.2.1 Bernoulli Model	108
	7.2.2 Binomial and Poisson Models	110
7.3	Numerical Results	112
7.4	Concluding Remarks	113
	References	119
8.	Estimation of the Slope in a Measurement-Error Model	123
	Sujay Datta and Saibal Chattopadhyay	
8.1	Introduction and Motivation	123
8.2	Justification of Model and Literature Survey	126
8.3	Methodologies and Analysis	128
	8.3.1 A sketch of the Proof of Theorem 8.3.2	132
8.4	Concluding Remarks	134
8.5	Appendix	135
	References	136
9.	Kernel Density Estimation of Wool Fiber Diameter	141
	Basil M. de Silva and Nitis Mukhopadhyay	
9.1	Introduction	141
9.2	The Formulation	143
9.3	Literature Review and Specific Aims	146
	9.3.1 Specific Aims	147
9.4	A Two-Stage Procedure	148
	9.4.1 Band-Width Selection	148

9.4.2	Initial Sample Size Selection	150
9.4.3	Properties of the Methodology	152
9.5	Smooth Bootstrapping	152
9.6	A Simulation Study	153
9.7	Application to Wool Fiber Diameter Data	156
9.8	Concluding Remarks	158
	Appendices	159
	References	167
10.	Financial Applications of Sequential Nonparametric Curve Estimation	171
	Sam Efromovich	
10.1	Introduction	171
10.2	Capital Asset Price Model	173
10.3	Nonparametric Regression Analysis	175
10.4	Applications	180
10.5	Technical Details	189
10.6	Concluding Remarks	190
	References	191
11.	Interim and Terminal Analyses of Clinical Trials with Failure-Time Endpoints and Related Group Sequential Designs	193
	Tze Leung Lai	
11.1	Introduction	193
11.2	Interim and Terminal Analysis of BHAT Data	194
	11.2.1 Analysis by the Data and Safety Monitoring Board	195
	11.2.2 Further Analysis of BHAT Data	196
11.3	Design and Analysis of Group (or Time) Sequential Trials	197
	11.3.1 Time-Sequential Rank Statistics and Their Asymptotic Distributions	199
	11.3.2 Two Time Scales and Some Stopping Rules	202
	11.3.3 Theory of Group Sequential Boundaries	204
	11.3.4 Stochastic Curtailment	209
	11.3.5 Confidence Intervals in Group Sequential Designs	210
11.4	Concluding Remarks	213
	References	214

12.	Applications of Sequential Tests to Target Tracking by Multiple Models	219
	X. Rong Li and Tumulesh K. S. Solanky	
12.1	Introduction	219
12.2	An Example	222
12.3	Formulation and Statistical Methods	223
	12.3.1 Sequential Solutions for Problems Involving Two Model-Sets	224
	12.3.2 Sequential Solutions for Multihypothesis Problems	231
12.4	Aircraft Motion Example: Evaluating Performance	237
12.5	Appendix	243
	References	244
13.	A Sequential Procedure that Controls Size and Power in a Multiple Comparison Problem	249
	Wei Liu	
13.1	Introduction	249
13.2	A Three-Stage Procedure	251
13.3	A Validation Study via Simulation	254
13.4	Concluding Remarks	255
	References	257
14.	How Many Simulations Should One Run?	261
	Nitis Mukhopadhyay and Greg Cicconetti	
14.1	Introduction: One-Sample t -Test	261
14.2	Formulation, Loss and Risk Functions, and Objective	263
	14.2.1 The Formulation	267
	14.2.2 A Relative Squared Error Loss Function	267
	14.2.3 The Objective: Prespecified Proportional Accuracy	269
14.3	A Purely Sequential Methodology	270
14.4	A Two-Stage Methodology	272
	14.4.1 The Motivation	273
14.5	Computer Simulations	275
	14.5.1 The Purely Sequential Methodology (14.3.2)-(14.3.3)	276
	14.5.2 The Two-Stage Methodology (14.4.1)-(14.4.2)	281

14.5.3	Comparing the Two Methodologies and Conclusions	281
14.6	Large-Sample Properties	284
14.6.1	The Purely Sequential Methodology (14.3.2)-(14.3.3): Proof of Theorem 14.6.1	285
14.6.2	The Two-Stage Methodology (14.4.1)-(14.4.2): Proof of Theorem 14.6.1	288
	References	289
15.	Sequential Estimation in the Agricultural Sciences	293
	Madhuri S. Mulekar and Linda J. Young	
15.1	Introduction	293
15.2	A Specific Application	295
15.3	Methodology and Analysis	297
15.4	Concluding Remarks	312
	References	313
16.	Whither Group-Sequential or Time-Sequential Interim Analysis in Clinical Trials?	319
	Pranab K. Sen	
16.1	Introduction	319
16.2	Interim Analysis: Genesis and Anatomy	321
16.3	Statistical Surveillance	327
16.4	Evolution of Time-Sequential Methods	330
16.5	Concluding Remarks	334
	References	336
17.	Change-Point Detection in Multichannel and Distributed Systems with Applications	339
	Alexander G. Tartakovsky and Venugopal V. Veeravalli	
17.1	Introduction	339
17.2	Multichannel-Change Detection: Theory	340
17.2.1	Problem Formulation	340
17.2.2	The Detection Procedure and False Alarm Rate	342

17.2.3	Asymptotic Performance for Low FAR	343
17.2.4	Composite Hypotheses: Adaptive Detection Procedures	347
17.3	Detection in Distributed Sensor Systems	349
17.4	Applications and Experimental Results	353
17.4.1	Target Detection and Tracking in Surveillance Systems	353
17.4.2	Rapid Attack/Intrusion Detection	357
17.4.3	Decentralized Detection Example and Simulation Results	359
17.5	Concluding Remarks	362
	Appendix	363
	References	367
18.	Extension of Hochberg's Two-Stage Multiple Comparison Method	371
	Rand R. Wilcox	
18.1	Introduction	371
18.2	Application to a Schizophrenia Study	373
18.3	Methodology	374
18.4	Simulation Results	377
18.5	Concluding Remarks	379
	References	379
19.	Sequential Testing in the Agricultural Sciences	381
	Linda J. Young	
19.1	Introduction	381
19.2	Greenbugs on Sorghum	382
19.3	The SPRT	383
19.4	The 2-SPRT	389
19.5	Binomial Sampling Based on the Negative Binomial	393
19.6	Binomial Sampling Based on an Ecological Model	397
19.7	Concluding Remarks	399
	References	403

20. Bayesian Sequential Procedures for Ordering Genes	411
Shelemyahu Zacks and André Rogatko	
20.1 Introduction: The Gene Ordering Problem	411
20.2 Basic Model of Independence	413
20.2.1 Orders, Gametes and Recombination	413
20.2.2 The General Case	413
20.3 Bayesian Testing	416
20.3.1 Posterior Order Probabilities	416
20.3.2 Bayesian Sequential Testing	417
20.3.3 Bayesian Testing with Fixed Sample Sizes	423
20.4 Stepwise Ordering	424
20.4.1 Stepwise Search for Maximal Posterior (SSMAP)	424
20.5 Applications in Genetic Counseling	428
References	430
Author Index	433
Subject Index	443