# Table of contents

**PREFACE** ..... iii

**INTRODUCTION** ..... xiii

**PROLOGUE**

Measuring the performance of boundary-estimation methods
P. Hall and Marc Raimondo ..... 1

$L_1$ computation: An interior monologue
R. Koenker ..... 15

**I. ESTIMATION, TESTING AND CHARACTERIZATION**

Regression rank statistics
C. Gutenbrunner ..... 33

Unimodality and the asymptotics of M-estimators
M. Hallin and I. Mizera ..... 47

$L_1$-test procedures for detection of change
Marie Huskova ..... 57

Inadmissibility of robust estimators with respect to $L_1$ norm
J. Jureckovà and L.B. Klebanov ..... 71

Properties of $L_1$-residuals
S. Morgenthaler ..... 79

$L_1$-test in linear models: Tests with maximum relative power
C. Müller ..... 91

On $L_1$-norm estimators in nonlinear regression and in nonlinear error-in-variables models
S. Zwanzig ..... 101

**II. COMPUTATIONAL PROCEDURES AND ALGORITHMS**

A comparison of two LP Solvers and a new IRLS Algorithm for $L_1$ estimation
C. Adcock and N. Meade ..... 119

Exact algorithmes to compute the least median of squares estimate in multiple linear regression
J. Agullo ..... 133

Polynomial algorithms for isotonic regression
V. Chepoi, D. Cogneau and B. Fichet ..... 147

Notes on the early history of elemental set methods
R.W. Farebrother ..... 161

Computational aspects of censored quantile regression
B. Fitzenberger ..... 171

On computation of regression quantiles: Making the Laplacian Tortoise faster
S. Portnoy ..... 187

Recent developments in PROGRESS
P.J. Rousseeuw and M. Hubert ..... 201

**III. STATISTICAL GRAPHICS: FOUNDATIONS AND METHODOLOGY**

Dimension reduction via parametric inverse regression
E. Bura ..... 215

A reduction paradigm for multivariate laws
F. Chiaromonte ..... 229

Exploring data sets using partial residual plots based on robust fits
J. W. McKean and S. J. Sheather ..... 241

Bayes factors for intrinsic and fractional priors in nested models. Bayesian robustness
E. Moreno ..... 257

A comparison of procedures based on inverse regression
S. J. Sheather and J. W. McKean ..... 271

Interactive graphical modeling methods for regression
N. Wetzel ..... 279

**IV. TIME SERIES ANALYSIS AND FINANCIAL STATISTICS**

Nonparametric bounds for the probability of future prices based on option values
G. W. Bassett Jr. ..... 287

The marginal distributions of returns and volatility
S.R. Hurst and E. Platen ..... 301

Some limit theory for $L_1$-estimators in autoregressive models under general conditions
K. Knight ..... 315

A Lagrange multiplier approach to testing for serially dependent error terms
H. Nyquist ..... 329

Gaussianity and nonlinearity of foreign exchange rates
N. Terui and T. Kariya ..... 337

## V. NONPARAMETRIC INFERENCE

Rank plots in the affine invariant case
B. M. Brown, T.P. Hettmansperger, and J. Möttönen and H. Oja .. 351

Target estimation and implications to robustness
L. Fernholz ..... 363

Model checks in statistics: An innovation process approach
W. Stute ..... 373

Bootstrap selection of the smoothing parameter in density estimation under the Koziol-Green model
J. de Una-Alvarez, W. Gonzalez-Manteiga and C. Cadarso-Suarez . 385

## VI. MULTIVARIATE ANALYSIS

On multivariate rank regression
B. Chakraborty and P. Chaudhuri ..... 399

Multivariate density estimation by probing depth
R. Fraiman, R.Y. Liu and Jean Meloche ..... 415

Modes, caps and concentration: A geometric approach to estimation on the sphere
P. Milasevic and D. Nolan ..... 431

## VII. CLASSIFICATION

An $L_1$-norm procedure for fitting ADCLUS and INDCLUS
A. Chaturvedi and J. D. Carroll ..... 443

Hierarchical clustering and the construction of (optimal) ultrametrics using $L_p$-norms
L. Hubert, P. Arabie and J. Meulman ..... 457

$L_1$ and $L_2$ approximation clustering for mixed data: Scatter decompositions and algorithms
B. Mirkin ..... 473

**EPILOGUE**

Robustness: Where are we now ?
P. J. Huber ..... 487

**ABSTRACTS** ..... xix

**CONTRIBUTORS** ..... xxv