

1. Record Nr.	UNINA9910616381603321
Autore	Awange Joseph L. <1969->
Titolo	Applications of linear and nonlinear models : fixed effects, random effects, and total least squares / / Joseph L. Awange, Erik W. Grafarend, Silvelyn Zwanzig
Pubbl/distr/stampa	Cham, Switzerland : , : Springer, , [2022] ©2022
ISBN	3-030-94598-7
Edizione	[2nd ed.]
Descrizione fisica	1 online resource (1127 pages)
Collana	Springer geophysics
Disciplina	550
Soggetti	Geophysics Linear models (Statistics) Mathematical models Geofísica Models lineals (Estadística) Models matemàtics Llibres electrònics
Lingua di pubblicazione	Inglese
Formato	Materiale a stampa
Livello bibliografico	Monografia
Nota di bibliografia	Includes bibliographical references and index.
Nota di contenuto	Intro -- Foreword -- Contents -- Preface to the First Edition -- Preface to the Second Edition -- Chapter 1 The First Problem of Algebraic Regression -- 1-1 Introduction -- 1-11 The Front Page Example -- 1-12 The Front Page Example: Matrix Algebra -- 1-13 The Front Page Example: MINOS, Horizontal Rank Partitioning -- 1-14 The Range R(f) and the Kernel N(f) -- 1-15 The Interpretation of MINOS -- 1-2 Minimum Norm Solution (MINOS) -- 1-21 A Discussion of the Metric of the Parameter Space X -- 1-22 An Alternative Choice of the Metric of the Parameter Space X -- 1-23 Gx-MINOS and Its Generalized Inverse -- 1-24 Eigenvalue Decomposition of Gx-MINOS: Canonical MINOS -- 1-3 Case Study -- 1-31 Fourier Series -- 1-32 Fourier-Legendre Series -- 1-33 Nyquist Frequency for Spherical Data -- 1-4 Special Nonlinear Models -- 1-41 Taylor Polynomials, Generalized Newton Iteration -- 1-42 Linearized Models with Datum Defect -- 1-5 Notes -- Chapter 2 The First Problem of Probabilistic Regression: The Bias Problem -- 2-1

Linear Uniformly Minimum Bias Estimator (LUMBE) -- 2-2 The Equivalence Theorem of Gx-MINOS and S-LUMBE -- 2-3 Example -- Chapter 3 The Second Problem of Algebraic Regression -- 3-1 Introduction -- 3-11 The Front Page Example -- 3-12 The Front Page Example in Matrix Algebra -- 3-13 Least Squares Solution of the Front Page Example by Means of Vertical Rank Partitioning -- 3-14 The RangeR(f) and the Kernel N(f), Interpretation of "LESS" by Three Partitionings -- 3-2 The Least Squares Solution: "LESS" -- 3-21 A Discussion of the Metric of the Parameter Space X -- 3-22 Alternative Choices of the Metric of the Observation Y -- 3-23 Gx-LESS and Its Generalized Inverse -- 3-24 Eigenvalue Decomposition of Gy-LESS: Canonical LESS -- 3-3 Case Study -- 3-31 Canonical Analysis of the Hat Matrix, Partial Redundancies, High Leverage Points.

3-32 Multilinear Algebra, "Join" and "Meet", the Hodge Star Operator -- 3-33 From A to B: Latent Restrictions, Grassmann Coordinates, Plücker Coordinates -- 3-34 From B to A: Latent Parametric Equations, Dual Grassmann Coordinates, Dual Plücker Coordinates -- 3-35 Break Points -- 3-4 Special Linear and Nonlinear Models: A Family of Means for Direct Observations -- 3-5 A Historical Note on C.F. Gauss and A.M. Legendre -- Chapter 4 The Second Problem of Probabilistic Regression -- 4-1 Introduction -- 4-11 The Front Page Example -- 4-12 Estimators of Type BLUUE and BIQUUE of the Front Page Example -- 4-13 BLUUE and BIQUUE of the Front Page Example, Sample Median, Median Absolute Deviation -- 4-14 Alternative Estimation Maximum Likelihood (MALE) -- 4-2 Setup of the Best Linear Uniformly Unbiased Estimator -- 4-21 The Best Linear Uniformly Unbiased Estimation ^ of : y-BLUUE -- 4-22 The Equivalence Theorem of Gy-LESS and y-BLUUE -- 4-3 Setup of the Best Invariant Quadratic Uniformly Unbiased Estimator -- 4-31 Block Partitioning of the Dispersion Matrix and Linear Space Generated by Variance-Covariance Components -- 4-32 Invariant Quadratic Estimation of Variance-Covariance Components of Type IQE -- 4-33 Invariant Quadratic Uniformly Unbiased Estimations of Variance-Covariance Components of Type IQUUE -- 4-34 Invariant Quadratic Uniformly Unbiased Estimationsof One Variance Component (IQUUE) from y-BLUUE: HIQQUE -- 4-35 Invariant Quadratic Uniformly Unbiased Estimators of Variance Covariance Components of Helmert Type: HIQQUE Versus HIQE -- 4-36 Best Quadratic Uniformly Unbiased Estimations of One Variance Component: BIQUUE -- 4-37 Simultaneous Determination of First Moment and the Second Central Moment, Inhomogeneous Multilinear Estimation, the E - D Correspondence, Bayes Designwith Moment Estimations.

Chapter 5 The Third Problem of Algebraic Regression -- 5-1 Introduction -- 5-11 The Front Page Example -- 5-12 The Front Page Example in Matrix Algebra -- 5-13 Minimum Norm: Least Squares Solution of the Front Page Example by Means of Additive Rank Partitioning -- 5-14 Minimum Norm: Least Squares Solution of the Front Page Example by Means of Multiplicative Rank Partitioning -- 5-15 The Range R(f) and the Kernel N(f) Interpretation of "MINOLESS" by Three Partitionings -- 5-2 MINOLESS and Related Solutions Like Weighted Minimum Norm-Weighted Least Squares Solutions -- 5-21 The Minimum Norm-Least Squares Solution: "MINOLESS" -- 5-22 (Gx, Gy)-MINOS and Its Generalized Inverse -- 5-23 Eigenvalue Decomposition of (Gx, Gy)-MINOLESS -- 5-24 Notes -- 5-3 The Hybrid Approximation Solution: -HAPS and Tykhonov-Phillips Regularization -- Chapter 6 The Third Problem of Probabilistic Regression -- 6-1 Setup of the Best Linear Minimum Bias Estimator of Type BLUMBE -- 6-11 Definitions, Lemmas and Theorems -- 6-12 The First Example: BLUMBE Versus BLE, BIQUUE Versus BIQE, Triangular Leveling Network

-- 6-2 Setup of the Best Linear Estimators of Type hom BLE, hom S-BLE and hom a-BLE for Fixed Effects -- 6-3 Continuous Networks -- 6-31 Continuous Networks of Second Derivatives Type -- Chapter 7
Overdetermined System of Nonlinear Equations on Curved Manifolds -- 7-1 Introduction -- 7-2 Minimal Geodesic Distance: MINGEODISC -- 7-3 Special Models: From the Circular Normal Distribution to the Oblique Normal Distribution -- 7-31 A Historical Note of the von Mises Distribution -- 7-32 Oblique Map Projection -- 7-33 A Note on the Angular Metric -- 7-4 Case Study -- References -- Chapter 8 The Fourth Problem of Probabilistic Regression -- 8-1 The Random Effect Model -- 8-2 Examples.
Chapter 9 The Fifth Problem of Algebraic Regression: The System of Conditional Equations: Homogeneous and Inhomogeneous Equations: {By = Bi versus -c + By = Bi} -- 9-1 Gy-LESS of a System of a Inconsistent Homogeneous Conditional Equations -- 9-2 Solving a System of Inconsistent Inhomogeneous Conditional Equations -- 9-3 Examples -- Chapter 10 The Fifth Problem of Probabilistic Regression -- 10-1 Inhomogeneous General Linear Gauss-Markov Model (Fixed Effects and Random Effects) -- 10-2 Explicit Representations of Errors in the General Gauss-Markov Model with Mixed Effects -- 10-3 An Example for Collocation -- 10-4 Comments -- Chapter 11 The sixth problem of probabilistic regression -- 11-1 Introduction -- 11-2 The Errors-in-Variables Model and its Symmetry -- 11-3 Least Squares in Linear Errors-in-Variables Models -- 11-31 Naive Least Squares -- 11-32 Total Least Squares TLS -- 11-4 SIMEX and SYMEX -- 11-41 SIMEX -- 11-42 SYMEX -- 11-5 Datum Transformation -- 11-6 Nonlinear Errors-in-Variables Models -- Chapter 12 The Nonlinear Problem of the 3d Datum Transformation and the Procrustes Algorithm -- 12-1 The 3d Datum Transformation and the Procrustes Algorithm -- 12-2 The Variance: Covariance Matrix of the Error Matrix E -- 12-3 References -- Chapter 13 The Sixth Problem of Generalized Algebraic Regression -- 13-1 Variance-Covariance-Component Estimation in the Linear Model Ax + = y, y R(A) -- 13-2 Variance-Covariance-Component Estimation in the Linear Model B = By -c, By R(A) + c -- 13-3 Variance-Covariance-Component Estimation in the Linear Model Ax + + B = By -c, By R(A) + c -- 13-4 The Block Structure of Dispersion Matrix D{y} -- Chapter 14 Special Problems of Algebraic Regression and Stochastic Estimation -- 14-1 The Multivariate Gauss-Markov Model: A Special Problem of Probabilistic Regression -- 14-2 n-Way Classification Models.
14-21 A First Example: 1-Way Classification -- 14-22 A Second Example: 2-Way Classification Without Interaction -- 14-23 A Third Example: 2-Way Classification with Interaction -- 14-24 Higher Classifications with Interaction -- 14-3 Dynamical Systems -- Chapter 15 Systems of equations: Hybrid algebraic-numeric solutions -- 15-1 Algebraic, numeric, and hybrid algebraic-numeric -- 15-2 Algebraic solutions: Background -- 15-3 Nonlinear systems of equations: Algebraic methods -- 15-31 Nonlinear Gauss-Markov model: Algebraic solution -- 15-32 Adjustment of the combinatorial subsets -- 15-4 Examples -- 15-5 Hybrid algebraic-numeric methods -- 15-6 Notes -- Chapter 16 Integer Least Squares -- 16-1 Introductory remarks -- 16-2 Model for Positioning -- 16-3 Mixed Integer Linear Model -- 16-4 Integer Least Squares -- 16-41 Simple Rounding Solution -- 16-42 Main Steps -- 16-43 The Closest Vector Problem (CVP) -- 16-44 Reduction -- 16-45 Gram-Schmidt Method -- 16-46 The LLL Algorithm -- 16-47 Babai's Rounding Technique -- Chapter 17 Bayesian Inference -- 17-1 Introduction -- 17-2 Principle of Bayesian Analysis -- 17-21 Sequential Analysis -- 17-22 Hierarchical Bayes

Models -- 17-23 Choice of Prior -- 17-24 Bayesian Inference -- 17-3
Univariate Linear Model -- 17-31 Model Assumptions -- 17-32
Normal-inverse-gamma Distribution -- 17-33 Noninformative Prior --
17-34 Conjugate Prior -- 17-35 Regularized Estimators -- 17-4 Mixed
Model -- 17-41 Prior Distribution -- 17-42 Posterior Distribution --
17-5 Multivariate Linear Model -- 17-51 Normal-inverse-Wishart
Distribution -- 17-52 Noninformative Prior -- 17-53 Informative Prior
-- 17-6 Computer Intensive Methods -- 17-61 Independent Monte
Carlo (MC) -- 17-62 Importance Sampling -- 17-63 Markov Chain
Monte Carlo -- 17-64 Gibbs Sampling -- 17-65 Rejection Algorithm --
17-66 Approximative Bayesian Computation (ABC).
Appendix A Tensor Algebra, Linear Algebra, Matrix Algebra, Multilinear
Algebra.
