

1. Record Nr.	UNINA9910146081903321
Autore	Hocking R. R (Ronald R.), <1932->
Titolo	Methods and applications of linear models [[electronic resource]] : regression and the analysis of variance // Ronald R. Hocking
Pubbl/distr/stampa	Hoboken, N.J., : Wiley-Interscience, c2003
ISBN	1-280-27269-4 9786610272693 0-470-30647-5 0-471-45862-7 0-471-43415-9 0-471-23222-X
Edizione	[2nd ed.]
Descrizione fisica	1 online resource (773 pages)
Collana	Wiley series in probability and statistics
Disciplina	519.536
Soggetti	Regression analysis Analysis of variance Linear models (Statistics)
Lingua di pubblicazione	Inglese
Formato	Materiale a stampa
Livello bibliografico	Monografia
Note generali	Description based upon print version of record.
Nota di bibliografia	Includes bibliographical references and index.
Nota di contenuto	Methods and Applications of Linear Models -- Contents -- Preface to the Second Edition -- Preface to the First Edition -- Part 1 Regression Models -- 1 Introduction to Linear Models -- 1.1 Background Information -- 1.2 Mathematical and Statistical Models -- 1.3 Definition of the Linear Model -- 1.4 Examples of Regression Models -- 1.4.1 Single variable, Regression Model -- 1.4.2 Regression Models with Several Inputs -- 1.4.3 Discrete Response Variables -- 1.4.4 Multivariate Linear Models -- 1.5 Concluding Comments -- Exercises -- 2 Regression on Functions of One Variable -- 2.1 Simple Linear Regression Model -- 2.2 Parameter Estimation -- 2.2.1 Least Squares Estimation -- 2.2.2 Maximum Likelihood Estimation -- 2.2.3 Coded Data: Centering and Scaling -- 2.3 Properties of the Estimators -- 2.4 Analysis of the Simple Linear Regression Model -- 2.4.1 Parameter Estimation -- 2.4.2 Inference on the Parameters of the Model -- 2.4.3 Prediction and Prediction Intervals -- 2.5 Examining the Data and the Model -- 2.5.1 Residuals -- 2.5.2 Outliers, Extreme Points, and

Influence -- 2.5.3 Normality, Independence and Variance Homogeneity -- 2.6 Test for Lack of Fit -- 2.7 Polynomial Regression Models -- 2.7.1 Quadratic Model -- 2.7.2 Higher-Ordered Polynomial Models -- 2.7.3 Orthogonal Polynomials -- 2.7.4 Regression Through the Origin -- Exercises -- 3 Transforming the Data -- 3.1 Need for Transformations -- 3.2 Weighted Least Squares -- 3.3 Variance Stabilizing Transformations -- 3.4 Transformations to Achieve a Linear Model -- 3.4.1 Transforming the Dependent Variable -- 3.4.2 Transforming the Predictors -- 3.5 Analysis of the Transformed Model -- 3.6 Transformations with Forbes Data -- Exercises -- 4 Regression on Functions of Several Variables -- 4.1 Multiple Linear Regression Model -- 4.2 Preliminary Data Analysis. 4.3 Analysis of the Multiple Linear Regression Model -- 4.3.1 Fitting the Model in Centered Form -- 4.3.2 Estimation and Analysis of the Original Data -- 4.3.3 Model Assessment and Residual Analysis -- 4.3.4 Prediction -- 4.3.5 Transforming the Response -- 4.4 Partial Correlation and Added-Variable Plots -- 4.4.1 Partial Correlation -- 4.4.2 Added-Variable Plots -- 4.4.3 Simple Versus Partial Correlation -- 4.5 Variable Selection -- 4.5.1 Orthogonal Predictors -- 4.5.2 Criteria for Deletion of Variables -- 4.5.3 Non-Orthogonal Predictors -- 4.5.4 Computational Considerations -- 4.5.5 Selection Strategies -- 4.6 Model Specification -- Exercises -- 5 Collinearity in Multiple Linear Regression -- 5.1 Collinearity Problem -- 5.1.1 Introduction -- 5.1.2 Simple Example -- 5.1.3 The Picket Fence -- 5.1.4 Rotation of Coordinates -- 5.2 Example With Collinearity -- 5.2.1 Preliminary Data Analysis -- 5.2.2 Initial Regression Analysis -- 5.3 Collinearity Diagnostics -- 5.3.1 Variance Inflation Factors -- 5.3.2 Eigenvalues, Eigenvectors and Principal Component Plots -- 5.4 Remedial Solutions: Biased Estimators -- 5.4.1 Variable Deletion -- 5.4.2 Regression on Principal Components -- 5.4.3 Ridge Regression -- Exercises -- 6 Influential Observations in Multiple Linear Regression -- 6.1 Influential Data Problem -- 6.2 Hat Matrix -- 6.2.1 Centered and Uncentered Hat Matrices -- 6.2.2 Properties of the Hat Matrices -- 6.3 Effects of Deleting Observations -- 6.4 Numerical Measures of Influence -- 6.4.1 Diagonal Elements of the Hat Matrix -- 6.4.2 Residuals -- 6.4.3 Mean Square Ratio -- 6.4.4 Cook's Distance -- 6.4.5 Other Indicators of Influential Data -- 6.5 Dilemma Data -- 6.6 Plots for Identifying Unusual Cases -- 6.6.1 Projection Ellipse -- 6.6.2 Augmented Hat Matrix -- 6.6.3 Multiple Extremes: The Masking Problem. 6.7 Robust/Resistant Methods in Regression Analysis -- 6.7.1 M-Estimation -- 6.7.2 Iterative, Reweighted Least Squares -- 6.7.3 Regression with Bounded Influence -- Exercises -- 7 Polynomial Models and Qualitative Predictors -- 7.1 Polynomial Models -- 7.1.1 Quadratic Model with Two Predictors -- 7.1.2 Quadratic Surfaces -- 7.2 Analysis of Response Surfaces -- 7.2.1 Analysis with First-Order Models -- 7.2.2 Analysis with Second-Order Models -- 7.3 Models with Qualitative Predictors -- 7.3.1 Indicator Variables to Identify Groups of Data -- 7.3.2 Indicator Variables to Fit Segmented Polynomials -- Exercises -- 8 Additional Topics -- 8.1 Non-Linear Regression Models -- 8.1.1 Some Linearizable Functions -- 8.1.2 Modified Gauss-Newton Method -- 8.2 Non-Parametric Model-Fitting Methods -- 8.2.1 Locally Weighted-Average Predictors -- 8.2.2 Projection Pursuit Regression -- 8.3 Logistic Regression -- 8.4 Random Input Variables -- 8.5 Errors in the Inputs -- 8.6 Calibration -- Exercises -- Part II Analysis of Variance Models -- 9 Introduction to Analysis of Variance Models -- 9.1 Background Information -- 9.2 Cell Means Model -- 9.3 Fixed Effects Models -- 9.3.1 One-way Classification Model -- 9.3.2 Two-way Classification Model -- 9.3.3 Constrained Cell Means Model

-- 9.4 Mixed Effects Models -- 9.5 Concluding Comments -- Exercises
-- 10 Fixed Effects Models I: One-way Classification of Means -- 10.1
Introduction -- 10.2 One- Way Classification: Balanced Data -- 10.2.1
Parameter Estimation -- 10.2.2 Hypothesis of Equal Means -- 10.2.3
Simultaneous Inferences About the Population Means -- 10.2.4
Simultaneous Acceptance and Confidence Ellipses -- 10.2.5 Orthogonal
Contrasts -- 10.2.6 Reparameterizations of the One-way Model --
10.3 One- Way Classification: Unbalanced Data -- 10.4 Analysis of
Covariance -- Exercises.
11 Fixed Effects Models II: Two-way Classification of Means -- 11.1
Unconstrained Model: Balanced Data -- 11.1.1 Parameter Estimation --
11.1.2 Tests of Hypotheses -- 11.1.3 Simultaneous Inference -- 11.1.4
Reparameterizations of the Two-Factor Model -- 11.1.5 Test for
Interaction with One Observation per Cell -- 11.2 Unconstrained Model:
Unbalanced Data -- 11.2.1 Discussion in Terms of the Cell Means
Model -- 11.2.2 Reparameterized Model -- 11.3 No-Interaction Model:
Balanced Data -- 11.3.1 Parameter Estimation -- 11.3.2 Tests of
Hypotheses -- 11.3.3 Simultaneous Inference -- 11.3.4
Reparameterization of the No-Interaction Model -- 11.4 No-Interaction
Model: Unbalanced Data -- 11.4.1 Missing Cells: Estimation -- 11.4.2
Missing Cells: Testing Hypotheses -- 11.4.3 Connected Designs --
11.5 Non-Homogeneous Experimental Units: The Concept of Blocking
-- 11.5.1 Model for the Randomized, Complete Block Design -- 11.5.2
Inferences on Parameters -- Exercises -- 12 Fixed Effects Models III:
Multiple Crossed and Nested Factors -- 12.1 Three-Factor Cross-
Classified Model -- 12.1.1 Tests of Hypotheses -- 12.1.2
Reparameterized Model -- 12.1.3 Estimability and Testability with
Missing Cells -- 12.2 General Structure for Balanced, Factorial Models
-- 12.3 Two-Fold Nested Model -- 12.3.1 Analysis with Balanced Data
-- 12.3.2 Analysis with Unbalanced Data -- 12.4 General Structure for
Balanced, Nested Models -- 12.5 Three-Factor, Nested-Factorial Model
-- 12.5.1 Analysis with Balanced Data -- 12.5.2 Analysis with
Unbalanced Data -- 12.6 General Structure for Balanced, Nested-
Factorial Models -- Exercises -- 13 Mixed Models I: The AOV Method
with Balanced Data -- 13.1 Introduction -- 13.2 One-way
Classification, Random Model -- 13.3 Two-way Classification, Mixed
Model -- 13.4 Three-Factor, Nested-Factorial Model -- 13.5 General
Analysis for Balanced, Mixed Models.
13.5.1 Description of the Model -- 13.5.2 Parameter Estimation --
13.5.3 Properties of the Estimators and Inferential Results -- 13.6
Additional Examples -- 13.6.1 Two-Fold Nested, Random Model --
13.6.2 Randomized Block Design -- 13.6.3 Mixed Model for Split-Plot
Designs -- 13.6.4 Repeated Measures Designs -- 13.6.5 Longitudinal
Studies -- 13.7 Alternative Development of Mixed Models -- 13.7.1
Graybill Mixed Model -- 13.7.2 Scheffe Mixed Model -- 13.7.3
Randomization Theory -- Exercises -- 14 Mixed Models II: The AVE
Method with Balanced Data -- 14.1 Introduction -- 14.2 Two-way
Cross-Classification Model -- 14.3 Two-Fold Nested Model -- 14.4
Three Factor, Nested-Factorial Model -- 14.5 General Description of
the AVE Table -- 14.5.1 AVE Table for Factorial Models -- 14.5.2 AVE
Table for Nested Models -- 14.5.3 AVE Table for Nested-Factorial
Models -- 14.5.4 AVE Method for General Mixed Effects Models -- 14.6
Additional Examples -- 14.7 Computational Procedure for the AVE
Method -- 14.8 Properties of the AVE Estimates -- 14.8.1 Diagnostic
Analysis for the Two-way Classification Model -- 14.8.2 Confidence
Intervals -- Exercises -- 15 Mixed Models III: Unbalanced Data -- 15.1
Introduction -- 15.2 Parameter Estimation: Likelihood Methods --
15.2.1 Maximum Likelihood Estimation -- 15.2.2 Restricted Maximum

Likelihood Estimation -- 15.2.3 Minimum Norm Quadratic Unbiased Estimators -- 15.2.4 Numerical Illustration of the Methods -- 15.3 ML and REML, Estimates with Balanced Data -- 15.3.1 ML Estimation with Balanced Data -- 15.3.2 REML, Estimates with Balanced Data -- 15.4 EM Algorithm for REML Estimation -- 15.4.1 Review of the EM Algorithm -- 15.4.2 EM Algorithm Applied to REML, Estimation -- 15.4.3 Estimation of Fixed Effects -- 15.4.4 Inferences on Variance Components and Fixed Effects -- 15.4.5 Numerical Examples to Illustrate the EM-AOV Algorithm.
15.5 EM Algorithm Applied to the AVE Method.

Sommario/riassunto

A popular statistical text now updated and better than ever! The ready availability of high-speed computers and statistical software encourages the analysis of ever larger and more complex problems while at the same time increasing the likelihood of improper usage. That is why it is increasingly important to educate end users in the correct interpretation of the methodologies involved. Now in its second edition, *Methods and Applications of Linear Models: Regression and the Analysis of Variance* seeks to more effectively address the analysis of such models through several important changes.

Notable in this new edition: Fully updated and expanded text reflects the most recent developments in the AVE method. Rearranged and reorganized discussions of application and theory enhance text's effectiveness as a teaching tool. More than 100 new exercises in the areas of regression and analysis of variance. As in the First Edition, the author presents a thorough treatment of the concepts and methods of linear model analysis, and illustrates them with various numerical and conceptual examples, using a data-based approach to development and analysis. Data sets, available on an FTP site, allow readers to apply analytical methods discussed in the book.
