1. Record Nr. UNIORUON00059420

Autore	DINAKARA, Ramadhari Simha
Titolo	Humkara / Rama Dhari Simha Dinakara
Pubbl/distr/stampa	Patana, : Udayachala, s. d
Descrizione fisica	87 p. ; 18 cm
Classificazione	SI VI CC
Soggetti	LETTERATURA HINDI - POESIA E TEATRO
Lingua di pubblicazione	Hindi
Formato	Materiale a stampa
Livello bibliografico	Monografia

2. Record Nr. UNIORUON00119830

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Titolo	Ba kamal musulman 'avrten / 'Abdu'l-Qayyum Nadvi
Pubbl/distr/stampa	Lahawr, : Em Sana'ul-la Xan, s. d
Descrizione fisica	232 p. ; 17 cm
Classificazione	SI XIII
Lingua di pubblicazione	Urdu
Formato	Materiale a stampa
Livello bibliografico	Monografia

3. Record Nr. UNINA9910805583103321

Autore	Knafl George J.
Titolo	Modeling Correlated Outcomes Using Extensions of Generalized Estimating Equations and Linear Mixed Modeling / / by George J. Knafl
Pubbl/distr/stampa	Cham : , : Springer International Publishing : , : Imprint : Springer, , 2023
ISBN	9783031419881 303141988X
Edizione	[1st ed. 2023.]
Descrizione fisica	1 online resource (525 pages)
Disciplina	780
Soggetti	Statistics Biometry Statistical Theory and Methods Biostatistics Anàlisi de regressió Llibres electrònics
Lingua di pubblicazione	Inglese
Formato	Materiale a stampa
Livello bibliografico	Monografia
Nota di bibliografia	Includes bibliographical references and index.
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2.6 Likelihood Cross-Validation -- 2.6.1 Choosing the Number of Folds -- 2.6.2 LCV Ratio Tests -- 2.6.3 Penalized Likelihood Criteria -- 2.7 Adaptive Regression Modeling of Means -- 2.8 Example Data Sets -- 2.8.1 The Dental Measurement Data -- 2.8.2 The Epilepsy Seizure Rate Data -- 2.8.3 The Dichotomous Respiratory Status Data -- 2.8.4 The Blood Lead Level Data -- References -- Chapter 3: Partially Modified GEE Modeling of Correlated Univariate Outcomes -- 3.1 Including Non-constant Dispersions -- 3.2 Adding Estimating Equations for the Dispersions Based on the Likelihood -- 3.3 Estimating the Correlation Structure -- 3.4 Estimating the Covariance Matrix for Coefficient Parameter Estimates -- 3.5 The Constant Dispersion Model -- 3.6 Degeneracy in Correlation Parameter Estimation.
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11.1.4.5 Second Partial Derivatives with Respect to Correlation Parameters.

Sommario/riassunto

This book formulates methods for modeling continuous and categorical correlated outcomes that extend the commonly used methods: generalized estimating equations (GEE) and linear mixed modeling. Partially modified GEE adds estimating equations for variance/dispersion parameters to the standard GEE estimating equations for the mean parameters. Fully modified GEE provides alternate estimating equations for mean parameters as well as estimating equations for variance/dispersion parameters. The new estimating equations in these two cases are generated by maximizing a "likelihood" function related to the multivariate normal density function. Partially modified GEE and fully modified GEE use the standard GEE approach to estimate correlation parameters based on the residuals. Extended linear mixed modeling (ELMM) uses the likelihood function to estimate not only mean and variance/dispersion parameters, but also correlation parameters. Formulations are provided for gradient vectors and Hessianmatrices, for a multi-step algorithm for solving estimating equations, and model-based and robust empirical tests for assessing theory-based models. Standard GEE, partially modified GEE, fully modified GEE, and ELMM are demonstrated and compared using a variety of regression analyses of different types of correlated outcomes. Example analyses of correlated outcomes include linear regression for continuous outcomes, Poisson regression for count/rate outcomes, logistic regression for dichotomous outcomes, exponential regression for positive-valued continuous outcome, multinomial regression for general polytomous outcomes, ordinal regression for ordinal polytomous outcomes, and discrete regression for discrete numeric outcomes. These analyses also address nonlinearity in predictors based on adaptive search through alternative fractional polynomial models controlled by likelihood cross-validation (LCV) scores. Larger LCV scores indicate better models but not necessarilydistinctly better models. LCV ratio tests are used to identify distinctly better models. A SAS macro has been developed for analyzing correlated outcomes using standard GEE, partially modified GEE, fully modified GEE, and ELMM within alternative regression contexts. This macro and code for conducting the analyses addressed in the book are available online via the book’s Springer website. Detailed descriptions of how to use this macro and interpret its output are provided in the book.