1. Record Nr. UNINA9910830940503321

Autore	Berger Martijn P. F
Titolo	An introduction to optimal designs for social and biomedical research [[electronic resource] /] / Martijn P.F. Berger, Weng Kee Wong
Pubbl/distr/stampa	Hoboken, NJ, : Wiley, 2009
ISBN	1-282-18889-5 9786612188893 0-470-74691-2 0-470-74692-0
Descrizione fisica	1 online resource (348 p.)
Collana	Statistics in Practice ; ; v.83
Altri autori (Persone)	WongWeng Kee
Disciplina	300.72
Soggetti	Social sciences - Research Biology - Research Optimal designs (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	An Introduction to Optimal Designs for Social and Biomedical Research; Contents; Preface; Acknowledgements; 1 Introduction to designs; 1.1 Introduction; 1.2 Stages of the research process; 1.2.1 Choice of a 'good' design; 1.3 Research design; 1.3.1 Choice of independent variables and levels; 1.3.2 Units of analysis; 1.3.3 Variables; 1.3.4 Replication; 1.4 Types of research designs; 1.5 Requirements for a 'good' design; 1.5.1 Statistical conclusion validity; 1.5.2 Internal validity; 1.5.3 Control of (unwanted) variation; 1.6 Ethical aspects of design choice 1.7 Exact versus approximate designs1.8 Examples; 1.8.1 Radiation dosage example; 1.8.2 Designs for the Poggendorff and Ponzo illusion experiments; 1.8.3 Uncertainty about best .tting regression models; 1.8.4 Designs for a priori contrasts among composite faces; 1.8.5 Designs for calibration of item parameters in item response theory models; 1.9 Summary; 2 Designs for simple linear regression; 2.1 Design problem for a linear model; 2.1.1 The design; 2.1.2 The linear regression model; 2.1.3 Estimation of parameters and efficiency; 2.2 Designs for radiation-dosage example

2.3 Relative efficiency and sample size2.4 Simultaneous inference; 2.5 Optimality criteria; 2.5.1 D-optimality criterion; 2.5.2 A-optimality criterion; 2.5.3 G-optimality criterion; 2.5.4 E-optimality criterion; 2.5.5 Number of distinct design points; 2.6 Relative efficiency; 2.7 Matrix formulation of designs for linear regression; 2.8 Summary; 3 Designs for multiple linear regression analysis; 3.1 Design problem for multiple linear regression; 3.1.1 The design; 3.1.2 The multiple linear regression model; 3.1.3 Estimation of parameters and ef.ciency; 3.2 Designs for vocabulary-growth study
3.3 Relative efficiency and sample size3.4 Simultaneous inference; 3.5 Optimality criteria for a subset of parameters; 3.6 Relative efficiency; 3.7 Designs for polynomial regression model; 3.7.1 Exact D-optimal designs for a quadratic regression model; 3.7.2 Scale dependency of A- and E-optimality criteria; 3.8 The Poggendorff and Ponzo illusion study; 3.9 Uncertainty about best .tting regression models; 3.10 Matrix notation of designs for multiple regression models; 3.10.1 Design for regression models with two independent variables
3.10.2 Design for regression models with two non-additive independent variables3.11 Summary; 4 Designs for analysis of variance models; 4.1 A typical design problem for an analysis of variance model; 4.1.1 The design; 4.1.2 The analysis of variance model; 4.1.3 Formulation of an ANOVA model as a regression model; 4.2 Estimation of parameters and efficiency; 4.2.1 Measures of uncertainty; 4.3 Simultaneous inference and optimality criteria; 4.4 Designs for groups under stress study; 4.4.1 A priori planned unequal sample sizes; 4.4.2 Not planned unequal sample sizes
4.5 Specific hypotheses and contrasts

Sommario/riassunto

The increasing cost of research means that scientists are in more urgent need of optimal design theory to increase the efficiency of parameter estimators and the statistical power of their tests. The objectives of a good design are to provide interpretable and accurate inference at minimal costs. Optimal design theory can help to identify a design with maximum power and maximum information for a statistical model and, at the same time, enable researchers to check on the model assumptions. This Book:Introduces optimal experimental design in an accessible format.Pro