Introduction To Statistical Inference Princeton University

An Introduction in Stata
Statistics, Data Mining, and Machine Learning in Astronomy
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Reconstructing Individual Behavior from Aggregate Data
Econometric Modeling
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Financial Econometrics
Quantitative Social Science
A Statistical Primer for Ecologists
Probability Theory and Statistical Inference
Introduction to Statistical Inference
Reliability for the Social Sciences

The Certified Quality Process Analyst Handbook, Second Edition
Bayesian Models
Breakthroughs in Statistics
John E. Freund's Mathematical Statistics
Problems, Models, and Methods
Ten Great Ideas about Chance
Probability and Statistics for Engineering and the Sciences + Enhanced Webassign Access
Mastering 'Metrics
A Practical Python Guide for the Analysis of Survey Data
Entropy
Theory and Applications
Benford's Law
Foundations
The Path from Cause to Effect

MAYO CARLA

An Introduction in Stata Princeton University Press
This authoritative book draws on the latest research to explore the interplay of high-dimensional statistics with optimization. Through an accessible analysis of fundamental problems of hypothesis testing and signal recovery, Anatoli Juditsky and Arkadi Nemirovski show how convex optimization theory can be used to devise and analyze near-optimal statistical inferences. Statistical Inference via Convex Optimization is an essential resource for optimization specialists who are new to statistics and its applications, and for data scientists who want to improve their optimization methods. Juditsky and Nemirovski provide the first systematic treatment of the statistical techniques that have arisen from advances in the theory of optimization. They focus on four well-known statistical problems—sparse recovery, hypothesis testing, and recovery from indirect observations of both signals and functions of signals—demonstrating how they can be solved more efficiently as convex optimization problems. The emphasis throughout is on achieving the best possible statistical performance. The construction of inference routines and the quantification of their statistical performance are given by efficient computation rather than by analytical derivation typical of more conventional statistical approaches. In addition to being computation-friendly, the methods

described in this book enable practitioners to handle numerous situations too difficult for closed analytical form analysis, such as composite hypothesis testing and signal recovery in inverse problems. Statistical Inference via Convex Optimization features exercises with solutions along with extensive appendixes, making it ideal for use as a graduate text.

Statistics, Data Mining, and Machine Learning in Astronomy Statistical Inference Via Convex Optimization

Statistical Foundations of Data Science gives a thorough introduction to commonly used statistical models, contemporary statistical machine learning techniques and algorithms, along with their mathematical insights and statistical theories. It aims to serve as a graduate-level textbook and a research monograph on high-dimensional statistics, sparsity and covariance learning, machine learning, and statistical inference. It includes ample exercises that involve both theoretical studies as well as empirical applications. The book begins with an introduction to the stylized features of big data and their impacts on statistical analysis. It then introduces multiple linear regression and expands the techniques of model building via nonparametric regression and kernel tricks. It provides a comprehensive account on sparsity explorations and model selections for multiple regression, generalized linear models, quantile regression, robust regression, hazards regression, among others. High-dimensional inference is also thoroughly addressed and so is feature screening. The book also provides a comprehensive account on high-dimensional covariance estimation, learning latent factors and hidden structures, as well as their applications to statistical estimation, inference, prediction and machine learning problems. It also introduces thoroughly statistical machine learning theory and methods for classification, clustering, and prediction. These include CART, random forests, boosting, support vector machines, clustering algorithms, sparse PCA, and deep learning.

Elementary Statistical Analysis Princeton University Press

MATHEMATICAL STATISTICS By S. S. WILKS PRINCETON UNIVERSITY PRESS Princeton, New Jersey 1947 Copyright, 1943, by PRINCETON UNIVERSITY PRESS PREFACE Moat of the mathematical theory of statistics In Its present state has been developed during the past twenty years. Because of the variety of scientific fields In which statistical problems have arisen, the original contributions to this branch of applied mathematics are widely scattered In scientific literature. Most of the theory still exists only In original form. During the past few years the author has conducted a two-semester course at Princeton University for advanced undergraduates and beginning graduate students in which an attempt has been made to give the students an Introduction to the more recent develop ments in the mathematical theory of statistics. The subject matter for this course has been gleaned, for the most part, from periodical literature. Since it is impossible to cover in detail any large portion of this literature in two semesters, the course has been held primarily to the basic mathematics of the material, with just enough problems and examples for illustrative and examination purposes. Except for Chapter XI, the contents or the present set of notes constitute the basic subject matter which this course was designed to cover. Some of the material in the authors Statistical Inference 1937 has been revised and Included. In writing up the notes an attempt has been made to be as brief and concise as possible and to keep to the mathematics with a minimum of excursions into applied mathematical statistics problems. An important topic which has been omitted is that of characteristic functions of random variables, which, when used in Fourier Inversions, provide a direct and powerful method of determining certain sampling distributions and other random variable distribu tions. However, moment generating functions are used they are more easily understood by students at this level and are almost as useful as characteristic functions as far as actual applications to mathematical statistics are concerned. Many specialized topics are omitted, such as intraclass, tetrachoric and other specialized correlation problems, aeml-lnvariants, renewal theory, the Behrens - Fisher problem, special transformations of population parameters and random variables, sampling from Poisson populations, etc. It is the experience of the author that an effective way for handling many of these specialized topics is to formulate them as problems for the students. If and when the present notes are revised and issued in permanent form, such problems will be Inserted at the ends of sections and chapters. In the meantime, criticisms, suggestions, and notices of errors will be gratefully received from readers. Finally, the author wishes to express his indebtedness to Dr. Henry Scheffe, Mr. T. W. Anderson, Jr. and Mr. D. F. Votaw, Jr. for their generous assistance in pre paring these notes. Most of the sections in the first seven chapters and several sections in ChapteSX and XI were prepared by these men, particularly the first two. Thanks are due Mrs. W. M. Weber for her painstaking preparation of the manuscript for lithoprinting. S. S. Wilks. Princeton, New Jersey April, TABLE OF CONTENTS CHAPTER I, INTRODUCTION 1 CHAPTER II. DISTRIBUTION FUNCTIONS 52.1 Cumulative Distribution Functions 5 2.11 IMivariate Case 5 2.12 Blva rlate Case 852.13 k-Variate Case 11 2.2 Marginal Distributions 12 52.3 Statistical Independence 13 52.1 Conditional Probability 15 52.5 The Stleltjes Integral 17 52.51 Univarlate Case 17 52.52 Blvarlate Case 20 52.53 k-Variate Case 21 52.6 Transformation of Variables 23 2.61 Unlvariate Case 2k 2.62 Blvarlate Case 2k 52.63 k-Vtetrlate Case 28 52.7 Mean Value 29 52.71 Univarlate Case Tchebychef f f s Inequality 30 52.72 Bivariate Case 31 52.73 k-Variate Case 32 52.71 Mean and Variance of a Linear Combination of Bandom Variables 33 52...

Statistical Inference Via Convex Optimization Princeton University Press
This empirical research methods course enables informed implementation of statistical procedures, giving rise to trustworthy evidence.

Reconstructing Individual Behavior from Aggregate Data SAGE
This book provides the first comprehensive treatment of Benford's law, the surprising logarithmic distribution of significant digits discovered in the late nineteenth century. Establishing the mathematical and statistical principles that underpin this intriguing phenomenon, the text combines up-to-date theoretical results with overviews of the law’s colorful history, rapidly growing body of empirical evidence, and wide range of applications.

An Introduction to Benford's Law begins with basic facts about significant digits, Benford functions, sequences, and random variables, including tools from the theory of uniform distribution. After introducing the scale-, base-, and sum-invariance characterizations of the law, the book develops the significant-digit properties of both deterministic and stochastic processes, such as iterations of functions, powers of matrices, differential equations, and products, powers, and mixtures of random variables. Two concluding chapters survey the finitely additive theory and the flourishing applications of Benford's law. Carefully selected diagrams, tables, and close to 150 examples illuminate the main concepts throughout. The text includes many open problems, in addition to dozens of new basic theorems and all the main references. A distinguishing feature is the emphasis on the surprising ubiquity and robustness of the significant-digit law. This text can serve as both a primary reference and a basis for seminars and courses.
Econometric Modeling Princeton University Press
This gracefully organized text reveals the rigorous theory of probability and statistical inference in the style of a tutorial, using worked examples, exercises, figures, tables, and computer simulations to develop and illustrate concepts. Drills and boxed summaries emphasize and reinforce important ideas and special techniques. Beginning wi
Mathematical Methods of Statistics
Cambridge University Press
In the sixteenth and seventeenth centuries, gamblers and mathematicians transformed the idea of chance from a mystery into the discipline of probability, setting the stage for a series of breakthroughs that enabled or transformed innumerable fields, from gambling, mathematics, statistics, economics, and finance to physics and computer science. This book tells the story of ten great ideas about chance and the thinkers who developed them, tracing the philosophical implications of these ideas as well as their mathematical impact.
Foundations of Agnostic Statistics
Princeton University Press
This book outlines Bayesian statistical analysis in great detail, from the development of a model through the process of making statistical inference. The key feature of this book is that it covers models that are most commonly used in social science research - including the linear regression model, generalized linear models, hierarchical models, and multivariate regression models - and it thoroughly develops each real-data example in painstaking detail.
Introductory Statistical Inference
Cambridge University Press
Provides an introduction to modern statistical theory for social and health scientists while invoking minimal modeling assumptions.
Introduction to Statistical Inference
Princeton University Press
The concept of entropy arose in the physical sciences during the nineteenth century, particularly in thermodynamics and statistical physics, as a measure of the equilibria and evolution of thermodynamic systems. Two main views developed: the macroscopic view formulated originally by Carnot, Clausius, Gibbs, Planck, and Caratheodory and the microscopic approach associated with Boltzmann and Maxwell. Since then both approaches have made possible deep

insights into the nature and behavior of thermodynamic and other microscopically unpredictable processes. However, the mathematical tools used have later developed independently of their original physical background and have led to a plethora of methods and differing conventions. The aim of this book is to identify the unifying threads by providing surveys of the uses and concepts of entropy in diverse areas of mathematics and the physical sciences. Two major threads, emphasized throughout the book, are variational principles and Ljapunov functionals. The book starts by providing basic concepts and terminology, illustrated by examples from both the macroscopic and microscopic lines of thought. In-depth surveys covering the macroscopic, microscopic and probabilistic approaches follow. Part I gives a basic introduction from the views of thermodynamics and probability theory. Part II collects surveys that look at the macroscopic approach of continuum mechanics and physics. Part III deals with the microscopic approach exposing the role of entropy as a concept in probability theory, namely in the analysis of the large time behavior of stochastic processes and in the study of qualitative properties of models in statistical physics. Finally in Part IV applications in dynamical systems, ergodic and information theory are presented. The chapters were written to provide as cohesive an account as possible, making the book accessible to a wide range of graduate students and researchers. Any scientist dealing with systems that exhibit entropy will find the book an invaluable aid to their understanding.

Economic Modeling and Inference Prentice Hall

"This is an intro-level text that teaches how to think clearly and conceptually about quantitative information, emphasizing ideas over technicality and assuming no prior exposure to data analysis, statistics, or quantitative methods. The books four parts present the foundation for quantiative reasoning: correlation and causation; statistical relationships; causal phenomena; and incorporating quantitative information into decision making. Within these parts it covers the array of tools used by social scientists, including regression, inference, experiments, research design, and more, all by explaining the rationale and logic behind such tools rather than focusing only on the technical calculations used for each. New concepts are presented simply, with the help of copious examples, and the books leans towards graphic rather than mathematical representation of data, with any technical material included in appendices"--

Introduction to Applied Bayesian Statistics and Estimation for Social Scientists Quality Press

How can social scientists assess the reliability of the measures derived from tests and questionnaires? Through an illustrative review of the principles of classical reliability theory, Ross E Traub explores some general strategies for improving measurement procedures. Beginning with a presentation of random variables and the expected value of a random variable, the book covers such topics as: the definition of reliability as a coefficient and possible uses of a coefficient; the notion of parallel tests so as to make possible the estimation of a reliability coefficient for a set of measurements; what to do when parallel tests are not available; what factors affect the reliability coefficient; and how to estimate the

Theory and Applications Princeton University Press

Benford's law states that the leading digits of many data sets are not uniformly distributed from one through nine, but rather exhibit a profound bias. This bias is evident in everything from electricity bills and street addresses to stock prices, population numbers, mortality rates, and the lengths of rivers. Here, Steven Miller brings together many of the world's leading experts on Benford's law to demonstrate the many useful techniques that arise from the law, show how truly multidisciplinary it is, and encourage collaboration. Beginning with the general theory, the contributors explain the prevalence of the bias, highlighting explanations for when systems should and should not follow Benford's law and how quickly such behavior sets in. They go on to discuss important applications in disciplines ranging from accounting and economics to psychology and the natural sciences. The contributors describe how Benford's law has been successfully used to expose fraud in elections, medical tests, tax filings, and financial reports. Additionally, numerous problems, background materials, and technical details are available online to help instructors create courses around the book. Emphasizing common challenges and techniques across the disciplines, this accessible book shows how Benford's law can serve as a productive meeting ground for researchers and practitioners in diverse fields.

A New Framework for Machine Learning and the Social Sciences Princeton University Press

Econometric Modeling provides a new and stimulating introduction to econometrics, focusing on modeling. The key issue confronting empirical economics is to establish sustainable relationships that are both supported by data and interpretable from economic theory. The unified likelihood-based approach of this book gives students the required statistical foundations of estimation and inference, and leads to a thorough understanding of econometric techniques. David Hendry and Bent Nielsen introduce modeling for a range of situations, including binary data sets, multiple regression, and cointegrated systems. In each setting, a statistical model is constructed to explain the observed variation in the data, with estimation and inference based on the likelihood function. Substantive issues are always addressed, showing how both statistical and economic assumptions can be tested and empirical results interpreted. Important empirical problems such as structural breaks, forecasting, and model selection are covered, and Monte Carlo simulation is explained and applied. Econometric Modeling is a self-contained introduction for advanced undergraduate or graduate students. Throughout, data illustrate and motivate the approach, and are available for computer-based teaching. Technical issues from probability theory and statistical theory are introduced only as needed. Nevertheless, the approach is rigorous, emphasizing the coherent formulation, estimation, and evaluation of econometric models relevant for empirical research.

Dictionary/outline of Basic Statistics Princeton University Press

This book provides a solution to the ecological inference problem, which has plagued users of statistical methods for over seventy-five years: How can researchers reliably infer individual-level behavior from aggregate (ecological) data? In political science, this question arises when individual-level surveys are unavailable (for instance, local or comparative electoral politics), unreliable (racial politics), insufficient (political geography), or infeasible (political history). This ecological inference problem also confronts researchers in numerous areas of major significance in public policy, and other academic disciplines, ranging from epidemiology and marketing to sociology and quantitative history. Although many have attempted to make such cross-level inferences, scholars agree that all existing methods yield very inaccurate conclusions about the world. In this volume, Gary King lays out a unique--and reliable--solution to this venerable problem. King begins with a qualitative overview, readable even by those without a statistical background. He then unifies the apparently diverse findings in the methodological literature, so that only one aggregation problem remains to be solved. He then presents his solution, as well as empirical evaluations of the solution that include over 16,000 comparisons of his estimates from real aggregate data to the known individual-level answer. The method works in practice. King's solution to the ecological inference problem will enable empirical researchers to investigate substantive questions that have heretofore proved unanswerable, and move forward fields of inquiry in which progress has been stifled by this problem.

Designing Social Inquiry Cambridge University Press

The classic work on qualitative methods in political science Designing Social Inquiry presents a unified approach to qualitative and quantitative research in political science, showing how the same logic of inference underlies both. This stimulating book discusses issues related to framing research questions, measuring the accuracy of data and the uncertainty of empirical inferences, discovering causal effects, and getting the most out of qualitative research. It addresses topics such as interpretation and inference, comparative case studies, constructing causal theories, dependent and explanatory variables, the limits of random selection, selection bias, and errors in measurement. The book only uses mathematical notation to clarify concepts, and assumes no prior knowledge of mathematics or statistics. Featuring a new preface by Robert O. Keohane and Gary King, this edition makes an influential work available to new generations of qualitative researchers in the social sciences.

Probability and Statistical Inference for Scientists and Engineers Springer Science & Business Media

This is a two volume collection of seminal papers in the statistical sciences written during the past 100 years. These papers have each had an outstanding influence on the development of statistical theory and practice over the last century. Each paper is preceded by an introduction written by an authority in the field providing background information and assessing its influence. Readers will enjoy a fresh outlook on now well-established features of statistical techniques and philosophy by becoming acquainted with the ways they have been developed. It is hoped that some readers will be stimulated to study some of the references provided in the Introductions (and also in the papers themselves) and so attain a deeper background knowledge of the basis of their work.

Statistics in Theory and Practice Springer Science & Business Media

In this classic of statistical mathematical theory, Harald Cramér joins the two major lines of development in the field: while British and American statisticians were developing the science of statistical inference, French and Russian probabilitists transformed the classical calculus of probability into a rigorous and pure mathematical theory. The result of Cramér's work is a masterly exposition of the mathematical methods of modern statistics that set the standard that others have since sought to follow. For anyone with a working knowledge of undergraduate mathematics the book is self contained. The first part is an introduction to the fundamental concept of a distribution and of integration with respect to a distribution. The second part contains the general theory of random variables and probability distributions while the third is devoted to the theory of sampling, statistical estimation, and tests of significance.

Structural and Statistical Problems for a Class of Stochastic Processes Princeton University Press

Over 1,000 clear, concise definitions of statistical terms, with explanations. Also, formulas covering grouped and ungrouped data, finite populations, probability, other topics.

Statistical Foundations of Data Science Princeton University Press

Aimed at a diverse scientific audience, including physicists, astronomers, chemists, geologists, and economists, this book explains the theory underlying the classical statistical methods. Its level is between introductory "how to" texts and intimidating mathematical monographs. A reader without previous exposure to statistics will finish the book with a sound working knowledge of statistical methods, while a reader already familiar with the standard tests will come away with an understanding of their strengths, weaknesses, and domains of applicability. The mathematical level is that of an advanced undergraduate; for example, matrices and Fourier analysis are used where appropriate. Among the topics covered are common probability distributions; sampling and the distribution of sampling statistics; confidence intervals, hypothesis testing, and the theory of tests; estimation (including maximum likelihood); goodness of fit (including c2 and Kolmogorov-Smirnov tests); and non-parametric and rank tests. There are nearly one hundred problems (with answers) designed to bring out points in the text and to cover topics slightly outside the main line of development.