Statistics For High Dimensional Data Methods Theory And Applications

Statistics for High-Dimensional DataIntroduction to High-Dimensional StatisticsGeometric Structure of High-Dimensional Data and Dimensionality ReductionHigh-Dimensional Data Analysis in Cancer ResearchData Warehousing and Mining: Concepts, Methodologies, Tools, and ApplicationsStatistical Methods for High-dimensional Data AnalysisClustering High--Dimensional DataSome Statistical Methods on Design, Modeling and Analysis of High-Dimensional DataStatistical Methods for the Analysis of High-dimensional DataAnalysis of Variance for High-Dimensional DataAdvanced Methods of Representing Three-dimensional DataEfficiently Indexing High Dimensional Data SpacesMeasuring Technology and Mechatronics AutomationRobust Techniques for High-dimensional DataModern Methods for the Analysis of Multi-dimensional Data in the Natural SciencesMethods for High-Dimensional Data in EconometricsComputer Applications and Quantitative Methods in ArchaeologyThe Crystalline State: The determination of crystal structures, by H. Lipson and W. CochranComminution PracticesAstronomical Data Analysis Software and Systems XVIII Peter Bühlmann Christophe Giraud Jianzhong Wang Xiaochun Li Wang, John Francesco Masulli Shulian Shang Hugh Richard Miller Age K. Smilde Lisa Jane Pearce Christian Böhm Zhixiang Hou Zhaoxue Tong Fred A. Hamprecht Sir William Lawrence Bragg S. Komar Kawatra David A. Bohlender

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Efficiently Indexing High Dimensional Data Spaces Measuring Technology and Mechatronics Automation Robust Techniques for High-dimensional Data Modern Methods for the Analysis of Multi-dimensional Data in the Natural Sciences Methods for High-Dimensional Data in Econometrics Computer Applications and Quantitative Methods in Archaeology The Crystalline State: The determination of crystal structures, by H. Lipson and W. Cochran Comminution Practices Astronomical Data Analysis Software and Systems XVIII *Peter Bühlmann Christophe Giraud Jianzhong Wang Xiaochun Li Wang, John Francesco Masulli Shulian Shang Hugh Richard Miller Age K. Smilde Lisa Jane Pearce Christian Böhm Zhixiang Hou Zhaoxue Tong Fred A. Hamprecht Sir William Lawrence Bragg S. Komar Kawatra David A. Bohlender*

modern statistics deals with large and complex data sets and consequently with models containing a large number of parameters this book presents a detailed account of recently developed approaches including the lasso and versions of it for various models boosting methods undirected graphical modeling and procedures controlling false positive selections a special characteristic of the book is that it contains comprehensive mathematical theory on high dimensional statistics combined with methodology algorithms and illustrations with real data examples this in depth approach highlights the methods great potential and practical applicability in a variety of settings as such it is a valuable resource for researchers graduate students and experts in statistics applied mathematics and computer science

ever greater computing technologies have given rise to an exponentially growing volume of data today massive data sets with potentially thousands of variables play an important role in almost every branch of modern human activity including networks finance and genetics however analyzing such data has presented a challenge for statisticians

geometric structure of high dimensional data and dimensionality reduction adopts data geometry as a framework to address various methods of dimensionality reduction in addition to the introduction to well known linear methods the book moreover stresses the recently developed nonlinear methods and introduces the

applications of dimensionality reduction in many areas such as face recognition image segmentation data classification data visualization and hyperspectral imagery data analysis numerous tables and graphs are included to illustrate the ideas effects and shortcomings of the methods matlab code of all dimensionality reduction algorithms is provided to aid the readers with the implementations on computers the book will be useful for mathematicians statisticians computer scientists and data analysts it is also a valuable handbook for other practitioners who have a basic background in mathematics statistics and or computer algorithms like internet search engine designers physicists geologists electronic engineers and economists jianzhong wang is a professor of mathematics at sam houston state university u s a

multivariate analysis is a mainstay of statistical tools in the analysis of biomedical data it concerns with associating data matrices of n rows by p columns with rows representing samples or patients and columns attributes of samples to some response variables e g patients outcome classically the sample size n is much larger than p the number of variables the properties of statistical models have been mostly discussed under the assumption of fixed p and infinite n the advance of biological sciences and technologies has revolutionized the process of investigations of cancer the biomedical data collection has become more automatic and more extensive we are in the era of p as a large fraction of n and even much larger than n take proteomics as an example although proteomic techniques have been researched and developed for many decades to identify proteins or peptides uniquely associated with a given disease state until recently this has been mostly a laborious process carried out one protein at a time the advent of high throughput proteome wide technologies such as liquid chromatography tandem mass spectroscopy make it possible to generate proteomic signatures that facilitate rapid development of new strategies for proteomics based detection of disease this poses new challenges and calls for scalable solutions to the analysis of such high dimensional data in this volume we will present the systematic and analytical approaches and strategies from both biostatistics and bioinformatics to the analysis of correlated and high dimensional data

in recent years the science of managing and analyzing large datasets has emerged as a critical area of research in the race to answer vital questions and make

knowledgeable decisions impressive amounts of data are now being generated at a rapid pace increasing the opportunities and challenges associated with the ability to effectively analyze this data

statistical methods for high dimensional data analysis

this book constitutes the proceedings of the international workshop on clustering high dimensional data chdd 2012 held in naples italy in may 2012 the 9 papers presented in this volume were carefully reviewed and selected from 15 submissions they deal with the general subject and issues of high dimensional data clustering present examples of techniques used to find and investigate clusters in high dimensionality and the most common approach to tackle dimensionality problems namely dimensionality reduction and its application in clustering

overview of methods for analyzing high dimensional experimental data including theory methodologies and applications analysis of variance for high dimensional data summarizes all the methods to analyze high dimensional data that are obtained through applying an experimental design in the life food and chemical sciences especially those developed in recent years written by international experts who lead development in the field analysis of variance for high dimensional data includes information on basic and established theories on linear models from a mathematical and statistical perspective available methods and their mutual relationships including coverage of asca apca pc anova asca limm pca and rm asca and permanova as well as various alternative methods and extensions applications in metabolomics microbiome gene expression proteomics food science sensory science and chemistry commercially available and open source software for application of these methods analysis of variance for high dimensional data is an essential reference for practitioners involved in data analysis in the natural sciences including professionals working in chemometrics bioinformatics data science statistics and machine learning the book is valuable for developers of new methods in high dimensional data analysis

selected peer reviewed papers from the third international conference on measuring technology and mechatronics automation icmtma held in shanghai china jan 6 7 2011

this dissertation aims to develop statistical methods to address the challenges in modeling high dimensional data caused by the presence of large amounts of noisy and ultra high dimensional data the work focuses on fundamental theory and methodology in high dimensional data analysis including feature screening false discovery rate control robust regression and precision matrix estimation the first project introduces a new model free conditional feature screening approach that is robust to outliers and heavy tailed predictors and responses additionally an fdr control procedure is proposed to enhance the performance of the screening procedure we provide theoretical guarantees for the sure screening and false discovery control performance we also present finite sample performance comparisons with existing methods through monte carlo simulation studies and a real data example the second project proposes a new robust estimator that can handle both heavy tailed predictors and heavy tailed errors in high dimensional regression the estimator employs rank based regression and winsorizes heavy tailed predictors with a focus on reducing the burden of tuning the work establishes sufficient conditions for statistical consistency and demonstrates the strong oracle property through a second stage enhancement both simulation studies and real data analysis demonstrate good performance the third project presents a new approach for estimating the precision matrix for high dimensional heavy tailed data the proposed estimator employs winsorized rank based regression and eliminates the burden of fine tuning providing robustness guarantees and computational efficiency we establish sufficient conditions for statistical consistency and propose a robust variance estimator for heavy tailed data based on the median of means approach which performs well in simulation studies

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