<<高维数据分析>>

图书基本信息

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前言

0ver the last few years. significant developments have been taking place in high-dimensional data analysis. which are driven primarily by a wide range of applications in many fields， such as genomics and signal processing. In particular， substantial advances have been made in the areas of feature selection， covarlance estimation. classification and regression. This book intends to examine important issues arising from high-dimensional data analysis to explore key ideas for statistical infcrence and prediction. The book is structured around topics on multiple hypothesis testing， feature selection， regression， classification， dimension reduction. as well as applications in survival analysis and in biomedical research.Fundamental statistical issues underlying data have changed， when moving from low-dimensional to high-dimensional analyses. For instance， certain structures such as sparsity need to be utilized in feature selection when the number of candidate features greatly exceeds that of the sample size. As a result of high-dimensionality, traditional statistical methods designed for low dimensional problems become inadequate or break down. To meet these challenges in high-dimensional analysis. statisticians have been developing new methods and Introducing new concepts， where many issues emerge with regard to how to identity or utilize certain structures for dimension reduction in inference and prediction.There exists a vast body of literature on high-dimensional analysis， especially for prediction， classification and regression. We do not intend to give an overview of each subject but would like to mention here only a few topics of interest-feature selection， basis／grouping pursuit， multiple hypothesis testing， effective dimension reduction and projection pursuit， sparsity, high-dimensional regression and classification.

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内容概要

over the last few years, significant developments have been taking place in high-dimensional data analysis, driven primarily by a wide range of applications in many fields such as genomics and signal processing. in particular , substantial advances have been made in the areas of feature selection, covariance estimation, classification and regression. this book intends to examine important issues arising from high-dimensional data analysis to explore key ideas for statistical inference and prediction. it is structured around topics on multiple hypothesis testing, feature selection, regression, classification, dimension reduction, as well as applications in survival analysis and biomedical research. the book will appeal to graduate students and new researchers interested in the plethora of opportunities available in highdimensional data analysis.

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书籍目录

Preface part i high-dimensional classification chapter 1 high-dimensional classification jianqing fan, yingying fan and yichao wu 1 introduction 2 elements of classifications 3 impact of dimensionality on classification 4 distance-based classification rules 5 feature selection by independence rule 6 loss-based classification 7 feature selection in loss-based classification 8 multi-category classification references chapter 2 flexible large margin classifiers yufeng liu and yichao wu 1 background on classification 2 the support vector machine: the margin formulation and the sv interpretation 3 regularization framework 4 some extensions of the svm: bounded constraint machine and the balancing svm 5 multicategory classifiers 6 probability estimation 7 conclusions and discussions .references part ii large-scale multiple testing chapter 3 a compound decision-theoretic approach to large-scale multiple testing t tony cai and wenguang sun 1 introduction 2 fdr controlling procedures based on p-values 3 oracle and adaptive compound decision rules for fdr control 4 simultaneous testing of grouped hypotheses 5 large-scale multiple testing under dependence 6 open problems references part iii model building with variable selection chapter 4 model building with variable selection ming yuan 1 introduction 2 why variable selection 3 classical approaches 4 bayesian and stochastic search 5 regularization 6 towards more interpretable models 7 further readings references chapter 5 bayesian variable selection in regression with networked predictors feng tai, wei pan and xiaotong shen 1 introduction 2 statistical models 3 estimation 4 results 5 discussion references part iv high-dimensional statistics in genomics chapter 6 high-dimensional statistics in genomics hongzhe li 1 introduction 2 identification of active transcription factors using time-course gene expression data 3 methods for analysis of genomic data with a graphical str 4 statistical methods in eqtl studies 5 discussion and future direction references chapter 7 an overview on joint modeling of censored survival time and longitudinal data runze li and jian-jian ren 1 introduction 2 survival data with longitudinal covariates 3 joint modeling with right censored data 4 joint modeling with interval censored data 5 further studies references part v analysis of survival and longitudinal data chapter 8 survival analysis with high-dimensional covariates bin nan 1 introduction 2 regularized cox regression 3 hierarchically penalized cox regression with grouped variables 4 regularized methods for the accelerated failure time model 5 tuning parameter selection and a concluding remark references part vi sufficient dimension reduction in regression chapter 9 sufficient dimension reduction in regression xiangrong yin 1 introduction 2 sufficient dimension reduction in regression 3 sufficient variable selection (svs) 4 sdr for correlated data and large-p-small-n 5 further discussion references chapter 10 combining statistical procedures lihua chen and yuhong yang 1 introduction 2 combining for adaptation 3 combining procedures for improvement 4 concluding remarks references subject index author index

章节摘录

插图：The topic of high-dimensional feature (variable) selection has been a focus in recent research. In Chapter 4, Yuan reviews several popular variable selection methods, and contrast classical methods such as stepwise selection with modern methods such as regularization. In Chapter 5, Zhu, Pan and Shen examine Bayesian model selection for networks, particularly gene networks where the number of genes in a network may greatly exceed the sample size. In Chapter 6, Li describes a number of interesting applications in genomics studies involving networks and graphical models, where the dimension under consideration is ultra-high. Various regression techniques have been reviewed, where special structures of genomic data are considered. Survival data analysis is an important subject in biostatistics. Analysis highdimensional survival data requires power tools. In Chapter 7, Li and Ren focus on joint modeling for censored and longitudinal data. Various models are reviewed,subject to different types of censoring. In Chapter 8, Nan reviews the recent development of feature selection in penalized regression in survival analysis, which is a marriage between high-dimensional feature selection and survival analysis.Several methods are examined, particularly for high-dimensional covariates such as gene expressions, whereas various penalties such as grouped, hierarchical penalties are discussed.

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