High Dimensional Statistical Inference And Random Matrices

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High-Dimensional Statistical Inference and Analysis of Microbial Association Networks ITA 2016 Assumption-Free, High-Dimensional Inference; Larry Wasserman, CMU *Introduction to the course High-dimensional statistics and probability Machine Learning: Inference for High-Dimensional Regression* High Dimensional Geometry and Concentration I *Keynote 1: High dimensional Causal Inference -- Peter Bühlman Aukosh Jagannath - From high-dimensional random landscapes to statistical inference* Stanford Seminar - Computing with High-Dimensional Vectors Double Machine Learning for Causal and Treatment Effects *Phase transitions in high-dimensional statistical inference (Lecture 1)by Remi Monasson*

Statistical Inference of Network Structure in Ultra-high Dimensional Space The things you'll find in higher dimensions A Breakthrough in Higher Dimensional Spheres | Infinite Series | PBS Digital Studios An Introduction to Statistical Inference Introduction to Bayesian statistics, part 1: The basic concepts (ML 7.1) Bayesian inference - A simple example A.I. Experiments: Visualizing High-Dimensional Space Recent advances in high dimensional robust statistics - Daniel Kane Understanding Statistical Inference - statistics help Maximum Likelihood Estimation and Bayesian Estimation *Introduction to Bayesian data analysis - part 1: What is Bayes?*

\"Minimum Distance Inference in High-dimensional Data: Past, Present and Future\"

High Dimensional Data High-dimensional Covariance Matrix Estimation With Applications in Finance and Genomic Studies Brief Introduction to Statistical Inference - Causal Inference *Phase transitions in high-dimensional statistical inference (Lecture 4) by Remi Monasson* Statistical Inference for Analysis of Massive Health Data: Challenges and Opportunities 21. Bayesian Statistical Inference I *Statistical inference with Adaptively Collected Data* High Dimensional Statistical Inference And

Statistical inference is the science of drawing conclusions about some system from data. In modern signal processing and machine learning, inference is done in very high dimension: very many unknown characteristics about the system have to be deduced from a lot of high-dimensional noisy data. This "high-dimensional regime" is reminiscent of statistical mechanics, which aims at describing the ...

[2010.14863] High-dimensional inference: a statistical ...

High dimensional statistical inference and random matrices 311 with probability density function for $X = (1,...,X_p)$ given by $f(X) = \square 2\pi T-1/2 \exp -\frac{1}{2}(X-\mu) -1(X-\mu)$. The observed sample is assumed to consist of n independent draws $X_1,...,X_n$

from X ~ Np(μ,), collected into a p × n data matrix X =[X1...Xn]. When

High-dimensional statistical inference and random matrices
In statistical theory, the field of high-dimensional statistics studies data whose dimension is larger than dimensions considered in classical multivariate analysis. High-dimensional statistics relies on the theory of random vectors. In many applications, the dimension of the data vectors may be larger than the sample size.

High-dimensional statistics - Wikipedia
High-dimensional vector autoregression with measurement error is frequently en-countered in a large variety of scienti c and business applications. In this article, we study statistical inference of the transition matrix under this model. While there has been a large body of literature studying sparse estimation of the transition matrix,

Statistical Inference for High Dimensional Vector ...
This thesis considers estimation and statistical inference for high dimensional model with constrained parameter space. Due to the recent development of data storage and computing technology, it is extremely common for researchers to face a high dimensional problem in practical applications, ranging from health-care, neural imaging, genetic studies, etc.

Estimation and Statistical Inference for High Dimensional ...
INFERENCE FOR LINEAR MODELS We consider first a high-dimensional linear model, while extensions are discussed in Section 3: (2.1) $Y = X\beta 0 + \varepsilon$, with n×p fixed or random design matrix X, n×1 response and error vectors Y and ε, respectively. The errors are assumed to be independent of X(for random design) with i.i.d. entries having $E[\varepsilon i] = 0$.

High Dimensional Inference: Confidence Intervals, p Values ...
Over the past decade, statistics have undergone drastic changes with the development of high-dimensional statistical inference. Indeed, on each indi-vidual, more and more features are measured to a point that their number usually far exceeds the number of observations. This is the case in biology and

High Dimensional Statistics - MIT Mathematics
'Non-asymptotic, high-dimensional theory is critical for modern statistics and machine learning. This book is unique in providing a crystal clear, complete and unified treatment of the area. With topics ranging from concentration of measure to graphical models, the author weaves together probability theory and its applications to statistics.

High Dimensional Statistics by Martin J. Wainwright
Without further restrictions on the model, practical inference in this kind of high-dimensional linear model remains impossible since p☐nis allowed. A structure that has played an important role in the literature is approximate sparsityof the high-dimensional linear model.

High-Dimensional Methods and Inference on Structural and ...
Statistics for high-dimensional data - methods, theory and applications. Springer.

[Google Scholar] [2] Bühlmann P and van de Geer S (2015). High-dimensional inference in misspecified linear models. Electronic Journal of Statistics 9, 1449–1473. [Google Scholar] [3] ...

High-Dimensional Inference for Personalized Treatment Decision

High-dimensional data arise through a combi- nnation of two phenomena.ation of two phenomena. FFirst, the data may be inherently high dimensional in that many different char-irst, the data may be inherently high dimensional in that many different char- aacteristics per observation are available.

High Dimensional Methods and Inference on Structural and ...

High-dimensional Statistical Inference (T. T. Cai and X. Shen, eds.), 3-37. World Scientific, New Jersey. 2009: Lv, J. and Fan, Y. (2009). A unified approach to model selection and sparse recovery using regularized least squares. The Annals of Statistics 37, 3498-3528. 2008: Fan, J. and Fan, Y. (2008). High-dimensional classification using features annealed independence rules.

Yingying Fan - Publications

Abstract: This paper proposes an innovative method for constructing confidence intervals and assessing p-values in statistical inference for high-dimensional linear models. The proposed method has successfully broken the high-dimensional inference problem into a series of low-dimensional inference problems: For each regression coefficient β_i, the confidence interval and p-value are computed by regressing on a subset of variables selected according to the conditional independence ...

Markov Neighborhood Regression for High Dimensional Inference

Matrix models are ubiquitous in modern statistics. For instance, they are used in finance to assess interdependence of assets, in genomics to impute missing data and in movie recommender systems to model the relationship between users and movie ratings. Typically such models are either high-dimensional, meaning that the number of parameters may exceed the number of data points by many orders of magnitudes, or nonparametric in the sense that the quantity of interest is an infinite dimensional ...

Statistical inference in high-dimensional matrix models

Statistical inference in high dimensional experiments 3.1 Multiple test statistics and multiple P-values In a high-dimensional experiment there are, say K , observations per sampled unit and data from a completely randomized design comparing T levels of a treatment are of the form Y ij = (Y 1 ij , …, Y Kij)⊤ for the jth sample in the ith treatment group.

Challenges and Approaches to Statistical Design and ...

of a high-dimensional matrix model is inference about the main sources of variability in a data set. This is frequently used in Finance or Psychometrics and known in the statistics

Statistical inference in high-dimensional matrix models

'Non-asymptotic, high-dimensional theory is critical for modern statistics and machine learning. This book is unique in providing a crystal clear, complete and

unified treatment of the area. With topics ranging from concentration of measure to graphical models, the author weaves together probability theory and its applications to statistics.

High-Dimensional Statistics (Cambridge Series in ...

Statistical Inference For High-Dimensional Linear Models Abstract High-dimensional linear models play an important role in the analysis of modern data sets. Although the estimation problem has been well understood, there is still a paucity of methods and theories on the inference problem for high-dimensional linear models. This thesis focuses on statistical inference for high-dimensional

Statistical Inference For High-Dimensional Linear Models

In the present paper, we consider adaptive estimation and statistical inference for high-dimensional sparse Gaussian copula regression. The model can be formulated as follows. Suppose we have an independent and identically distributed random sample $Z_1 = (Y_1;X_1), ..., Z_n = (Y_n;X_n) \in R^{p+1}$ where $Y_i \in R$ are the responses and $X_i \in R^p$ are the covariates. Set $d = p+1$.

☐ Real-world problems can be high-dimensional, complex, and noisy ☐ More data does not imply more information ☐ Different approaches deal with the so-called curse of dimensionality to reduce irrelevant information ☐ A process with multidimensional information is not necessarily easy to interpret nor process ☐ In some real-world applications, the number of elements of a class is clearly lower than the other. The models tend to assume that the importance of the analysis belongs to the majority class and this is not usually the truth ☐ The analysis of complex diseases such as cancer are focused on more-than-one dimensional omic data ☐ The increasing amount of data thanks to the reduction of cost of the high-throughput experiments opens up a new era for integrative data-driven approaches ☐ Entropy-based approaches are of interest to reduce the dimensionality of high-dimensional data

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.

A coherent introductory text from a groundbreaking researcher, focusing on clarity and motivation to build intuition and understanding.

This textbook provides a step-by-step introduction to the tools and principles of high-dimensional statistics. Each chapter is complemented by numerous exercises, many of them with detailed solutions, and computer labs in R that convey valuable practical insights. The book covers the theory and practice of high-dimensional linear regression, graphical models, and inference, ensuring readers have a smooth start in the field. It also offers suggestions for further reading. Given its scope, the textbook is intended for beginning graduate and advanced undergraduate students in statistics, biostatistics, and bioinformatics, though it will be equally useful to a broader audience.

This book provides a unified exposition of some fundamental theoretical problems in high-dimensional statistics. It specifically considers the canonical problems of detection and support estimation for sparse signals observed with noise. Novel phase-transition results are obtained for the signal support estimation problem under a variety of statistical risks. Based on a surprising connection to a concentration of maxima probabilistic phenomenon, the authors obtain a complete characterization of the exact support recovery problem for thresholding estimators under dependent errors.

This book features research contributions from The Abel Symposium on Statistical Analysis for High Dimensional Data, held in Nyvågar, Lofoten, Norway, in May 2014. The focus of the symposium was on statistical and machine learning methodologies specifically developed for inference in "big data" situations, with particular reference to genomic applications. The contributors, who are among the most prominent researchers on the theory of statistics for high dimensional inference, present new theories and methods, as well as challenging applications and computational solutions. Specific themes include, among others, variable selection and screening, penalised regression, sparsity, thresholding, low dimensional structures, computational challenges, non-convex situations, learning graphical models, sparse covariance and precision matrices, semi- and non-parametric formulations, multiple testing, classification, factor models, clustering, and preselection. Highlighting cutting-edge research and casting light on future research directions, the contributions will benefit graduate students and researchers in computational biology, statistics and the machine learning community.

In nonparametric and high-dimensional statistical models, the classical Gauss–Fisher–Le Cam theory of the optimality of maximum likelihood estimators and Bayesian posterior inference does not apply, and new foundations and ideas have been developed in the past several decades. This book gives a coherent account of the statistical theory in infinite-dimensional parameter spaces. The mathematical foundations include self-contained 'mini-courses' on the theory of Gaussian and empirical processes, approximation and wavelet theory, and the basic theory of function spaces. The theory of statistical inference in such models - hypothesis testing, estimation and confidence sets - is presented within the minimax paradigm of decision theory. This includes the basic theory of convolution

kernel and projection estimation, but also Bayesian nonparametrics and nonparametric maximum likelihood estimation. In a final chapter the theory of adaptive inference in nonparametric models is developed, including Lepski's method, wavelet thresholding, and adaptive inference for self-similar functions. Winner of the 2017 PROSE Award for Mathematics.

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