Statistics Of Extremes

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Statistics of Extremes Routledge
Extreme value theory (EVT) deals with extreme (rare) events, which are sometimes reported as outliers. Certain textbooks encourage readers to remove outliers—in other words, to correct reality if it does not fit the model. Recognizing that any model is only an approximation of reality, statisticians are eager to extract information about unknown distribution making as few assumptions as possible. Extreme Value Methods with Applications to Finance concentrates on modern topics in EVT, such as processes of exceedances, compound Poisson approximation, Poisson cluster approximation, and nonparametric estimation methods. These topics have not been fully focused on in other books on extremes. In addition, the book covers: Extremes in samples of random size Methods of estimating extreme quantiles and tail probabilities Self-normalized sums of random variables Measures of market risk Along with examples from finance and insurance to illustrate the methods, Extreme Value Methods with Applications to Finance includes over 200 exercises, making it useful as a reference book, self-study tool, or comprehensive course text. A systematic background to a rapidly growing branch of modern Probability and Statistics: extreme value theory for stationary sequences of random variables.
On extreme value statistics W. W. Norton & Company
Mounting failures of replication in social and biological sciences give a new urgency to critically appraising proposed reforms. This book pulls back the cover on disagreements between experts charged with restoring integrity to science. It denies two pervasive views of the role of probability in inference: to assign degrees of belief, and to control error rates in a long run. If statistical consumers are unaware of assumptions behind rival evidence reforms, they can't scrutinize the consequences that affect them (in personalized medicine, psychology, etc.). The book sets sail with a simple tool: if little has been done to rule out flaws in inferring a claim, then it has not passed a severe test. Many methods advocated by data experts do not stand up to severe scrutiny and are in tension with successful strategies for blocking or accounting for cherry picking and selective reporting. Through a series of excursions and exhibits, the philosophy and history of inductive inference come alive. Philosophical tools are put to work to solve problems about science and pseudoscience, induction and falsification.
Best Practices in Data Cleaning John Wiley & Sons
Extreme Value Modeling and Risk Analysis: Methods and Applications presents a broad overview of statistical modeling of extreme events along with the most recent methodologies and various applications. The book brings together background material and advanced topics, eliminating the need to sort through the massive amount of literature on the subje
Statistics of Extremes Harper Collins
Classical Extreme Value Theory-the asymptotic distributional theory for maxima of independent, identically distributed random variables-may be regarded as roughly half a century old, even though its roots reach further back into mathematical antiquity. During this period of time it has found significant application-exemplified best perhaps by the book Statistics of Extremes by E. J. Gumbel-as well as a rather complete theoretical development. More recently, beginning with the work of G. S. Watson, S. M. Berman, R. M. Loynes, and H. Cramer, there has been a developing interest in the extension of the theory to include, first, dependent sequences and then continuous parameter stationary processes. The early activity proceeded in two directions-the extension of general theory to certain dependent sequences (e.g., Watson and Loynes), and the beginning of a detailed theory for stationary sequences (Berman) and continuous parameter processes (Cramer) in the normal case. In recent years both lines of development have been actively pursued.
Extreme Value Methods with Applications to Finance Springer Science & Business Media
Many researchers jump straight from data collection to data analysis without realizing how analyses and hypothesis tests can go profoundly wrong without clean data. This book provides a clear, step-by-step process of examining and cleaning data in order to decrease error rates and increase both the power and replicability of results. Jason W. Osborne, author of Best Practices in Quantitative Methods (SAGE, 2008) provides easily-implemented suggestions that are research-based and will motivate change in practice by empirically demonstrating, for each topic, the benefits of following best practices and the potential consequences of not following these guidelines. If your goal is to do the best research you can do, draw conclusions that are most likely to be accurate representations of the population(s) you wish to speak about, and report results that are most likely to be replicated by other researchers, then this basic guidebook will be indispensible.
A Course in Large Sample Theory Springer Science & Business Media
This book provides a compilation of statistical analysis methods used to analyze and assess critical variables in the hydrological cycle.
How to Lie with Statistics Birkhäuser
Since the publication of the first edition of this seminar book, the theory and applications of extremes and rare events have seen increasing interest. Laws of Small Numbers gives a mathematically oriented development of the theory of rare events underlying various applications. The new edition incorporates numerous new results on about 130 additional pages. Part II, added in the second edition, discusses recent developments in multivariate extreme value theory.
Extreme Value Theory and Applications World Scientific
The first references to statistical extremes may perhaps be found in the Genesis (The Bible, vol. I): the largest age of Methu'selah and the concrete applications faced by Noah-- the long rain, the large flood, the structural safety of the ark --. But as the pre-history of the area can be considered to last to the first quarter of our century, we can say that Statistical Extremes emer ged in the last half-century. It began with the paper by Dodd in 1923, followed quickly by the papers of Fre-chet in 1927 and Fisher and Tippett in 1928, after by the papers by de Finetti in 1932, by Gumbel in 1935 and by von Mises in 1936, to cite the more relevant; the first complete frame in what regards probabilistic problems is due to Gnedenko in 1943. And by that time Extremes begin to explode not only in what regards applications (floods, breaking strength of materials, gusts of wind, etc.) but also in areas going from Proba bility to Stochastic Processes, from Multivariate Structures to Statistical Decision. The history, after the first essential steps, can't be written in few pages: the narrow and shallow stream gained momentum and is now a huge river, enlarging at every moment and flooding the margins. Statistical Extremes is, thus, a clear-cut field of Probability and Statistics and a new exploding area for research.
Extreme Value Theory CRC Press
Because of its potential to ...predict the unpredictable,... extreme value theory (EVT) and methodology is currently receiving a great deal of attention from statistical and mathematical researchers. This book brings together world-recognized authorities in their respective fields to provide expository chapters on the applications, use, and theory
Laws of Small Numbers: Extremes and Rare Events Cambridge University Press
This volume provides the definitive treatment of fortune's formula or the Kelly capital growth criterion as it is often called. The strategy is to maximize long run wealth of the investor by maximizing the period by period expected utility of wealth with a logarithmic utility function. Mathematical theorems show that only the log utility function maximizes asymptotic long run wealth and minimizes the expected time to arbitrary large goals. In general, the strategy is risky in the short term but as the number of bets increase, the Kelly bettor's wealth tends to be much larger than those with essentially different strategies. So most of the time, the Kelly bettor will have much more wealth than these other bettors but the Kelly strategy can lead to considerable losses a small percent of the time. There are ways to reduce this risk at the cost of lower expected final wealth

using fractional Kelly strategies that blend the Kelly suggested wager with cash. The various classic reprinted papers and the new ones written specifically for this volume cover various aspects of the theory and practice of dynamic investing. Good and bad properties are discussed, as are fixed-mix and volatility induced growth strategies. The relationships with utility theory and the use of these ideas by great investors are featured.

Extreme Values No Starch Press

This important book provides an up-to-date comprehensive and down-to-earth survey of the theory and practice of extreme value distributions OCo one of the most prominent success stories of modern applied probability and statistics. Originated by E J Gumbel in the early forties as a tool for predicting floods, extreme value distributions evolved during the last 50 years into a coherent theory with applications in practically all fields of human endeavor where maximal or minimal values (the so-called extremes) are of relevance. The book is of usefulness both for a beginner with a limited probabilistic background and to expert in the field. Sample Chapter(s). Chapter 1.1: Historical Survey (139 KB). Chapter 1.2: The Three Types of Extreme Value Distributions (146 KB). Chapter 1.3: Limiting Distributions and Domain of Attraction (210 KB). Chapter 1.4: Distribution Function and Moments of Type 1 Distribution (160 KB). Chapter 1.5: Order Statistics, Record Values and Characterizations (175 KB). Contents: Univariate Extreme Value Distributions; Generalized Extreme Value Distributions; Multivariate Extreme Value Distributions. Readership: Applied probabilists, applied statisticians, environmental scientists, climatologists, industrial engineers and management experts."

Extreme Value and Related Models with Applications in Engineering and Science Cambridge University Press

The statistical analysis of extremes is becoming more and more prevalent as we observe increasing levels of variability and turbulence, both in the natural world, and within social organizations such as commercial and financial institutions. In this book, full coverage is given to the analysis of extreme value data using R, providing the reader with the best starting point for analyzing data when the aim is inference about extreme values of the underlying process. The main topics in extreme value analysis are featured, together with a clear practical guide on how to implement the relevant statistical analysis using R. The book is aimed at those needing to carry out extreme value analyses, examples used will be taken from applications in engineering, reliability studies and in financial analysis where extremes are of interest (e.g. insurance/reinsurance).

Statistical Analysis of Hydrologic Variables CRC Press

The overarching aim of this open access book is to present self-contained theory and algorithms for investigation and prediction of electric demand peaks. A cross-section of popular demand forecasting algorithms from statistics, machine learning and mathematics is presented, followed by extreme value theory techniques with examples. In order to achieve carbon targets, good forecasts of peaks are essential. For instance, shifting demand or charging battery depends on correct demand predictions in time. Majority of forecasting algorithms historically were focused on average load prediction. In order to model the peaks, methods from extreme value theory are applied. This allows us to study extremes without making any assumption on the central parts of demand distribution and to predict beyond the range of available data. While applied on individual loads, the techniques described in this book can be extended naturally to substations, or to commercial settings. Extreme value theory techniques presented can be also used across other disciplines, for example for predicting heavy rainfalls, wind speed, solar radiation and extreme weather events. The book is intended for students, academics, engineers and professionals that are interested in short term load prediction, energy data analytics, battery control, demand side response and data science in general.

Extreme Values, Regular Variation and Point Processes CRC Press

This book examines the fundamental mathematical and stochastic process techniques needed to study the behavior of extreme values of phenomena based on independent and identically distributed random variables and vectors. It emphasizes the core primacy of three topics necessary for understanding extremes: the analytical theory of regularly varying functions; the probabilistic theory of point processes and random measures; and the link to asymptotic distribution approximations provided by the theory of weak convergence of probability measures in metric spaces.

Handbook of Environmental and Ecological Statistics John Wiley & Sons

It appears that we live in an age of disasters: the mighty Missis sippi and Missouri flood millions of acres, earthquakes hit Tokyo and California, airplanes crash due to mechanical failure and the seemingly ever increasing wind speeds make the storms more and more frightening. While all these may seem to be unexpected phenomena to the man on the street, they are actually happening according to well defined rules of science known as extreme value theory. We know that records must be broken in the future, so if a flood design is based on the worst case of the past then we are not really prepared against floods. Materials will fail due to fatigue, so if the body of an aircraft looks fine to the naked eye, it might still suddenly fail if the aircraft has been in operation over an extended period of time. Our theory has by now penetrated the so cial sciences, the medical profession, economics and even astronomy. We believe that our field has come of age. In or~er to fully utilize the great progress in the theory of extremes and its ever increasing acceptance in practice, an international conference was organized in which equal weight was given to theory and practice. This book is Volume I of the Proceedings of this conference. In selecting the papers for Volume lour guide was to have authoritative works with a large variety of coverage of both theory and practice.

The Asymptotic Theory of Extreme Order Statistics Springer Science & Business Media

Sojourns and Extremes of Stochastic Processes is a research monograph in the area of probability theory. During the past thirty years Berman has made many contributions to the theory of the extreme values and sojourn times of the sample functions of broad classes of stochastic processes. These processes arise in theoretical and applied models, and are presented here in a unified exposition.

An Introduction to Statistical Modeling of Extreme Values National Academies Press

In all your boyhood dreams of growing up, did you dream of being a "nice guy"? Eldredge believes that every man longs for a battle to fight, an adventure to live, and a beauty to rescue. That is how he bears the image of God; that is what God made him to be.

Sojourns And Extremes of Stochastic Processes Springer Nature

The risks posed by climate change and its effect on climate extremes are an increasingly pressing societal problem. This book provides an accessible overview of the statistical analysis methods which can be used to investigate climate extremes and analyse potential risk. The statistical analysis methods are illustrated with case studies on extremes in the three major climate variables: temperature, precipitation, and wind speed. The book also provides datasets and access to appropriate analysis software, allowing the reader to replicate the case study calculations. Providing the necessary tools to analyse climate risk, this book is invaluable for students and researchers working in the climate sciences, as well as risk analysts interested in climate extremes.

Measurement and Statistics Springer Science & Business Media

This book provides a selection of pioneering papers or extracts ranging from Pascal (1654) to R.A. Fisher (1930). The editors'annotations put the articles in perspective for the modern reader. A special feature of the book is the large number of translations, nearly all made by the authors. There are several reasons for studying the history of statistics: intrinsic interest in how the field of statistics developed, learning from often brilliant ideas and not reinventing the wheel, and livening up general courses in statistics by reference to important contributors.

The Kelly Capital Growth Investment Criterion Springer

Climate change can reasonably be expected to increase the frequency and intensity of a variety of potentially disruptive environmental events-slowly at first, but then more quickly. It is prudent to expect to be surprised by the way in which these events may cascade, or have far-reaching effects. During the coming decade, certain climate-related events will produce consequences that exceed the capacity of the affected societies or global systems to manage; these may have global security implications. Although focused on events outside the United States, Climate and Social Stress: Implications for Security Analysis recommends a range of research and policy actions to create a whole-of-government approach to increasing understanding of complex and contingent connections between climate and security, and to inform choices about adapting to and reducing vulnerability to climate change.