Basic Concepts of Statistics

Dr. Sumera Ahsan

Today

Group activity:

- Group forming: 5 mins
- Understanding the activity: 5 mins
- Plan: 5 mins
- Data collection: 10 mins
- Data analysis: 10 mins
- Fill out the activity sheet (page 1): 10 mins

Presentation of slides: 20 mins

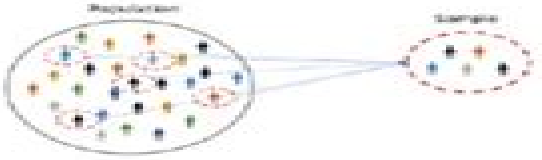
- Fill out the activity sheet (page 2): 5 mins

Variable ideas

- Age
- Height
- Resident/non-resident
- Average hour of social media use per day
- Average hours of sleep per day
- Average hours of study per day
- Divisions where they were born
- Gender/sex
- Favorite color
- Weight

Population and Sample

A **population** is the set of all the individuals of interest in a particular study.



A **sample** is a set of individuals selected from a population, usually intended to represent the population in a research study.

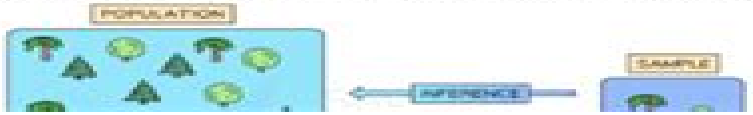
How should the sample look like?

Representative to population

What do we do with the sample?

We observe/investigate /collect data from that portion of population

Why does the sample need to represent population?



Inference

Statistical Inference Basic Concepts

G. A. Young,R. L. Smith

Statistical Inference Basic Concepts:

Introductory Statistical Inference Nitis Mukhopadhyay,2006-02-07 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 with a review of the basic concepts and methods in probability theory moments and moment generating functions the author moves to more intricate topics Introductory Statistical Inference studies multivariate random variables exponential families of distributions and standard probability inequalities It develops the Helmert transformation for normal distributions introduces the notions of convergence and spotlights the central limit theorems Coverage highlights sampling distributions Basu s theorem Rao Blackwellization and the Cram r Rao inequality The text also provides in depth coverage of Lehmann Scheff theorems focuses on tests of hypotheses describes Bayesian methods and the Bayes estimator and develops large sample inference The author provides a historical context for statistics and statistical discoveries and answers to a majority of the end of chapter exercises Designed primarily for a one semester first year graduate course in probability and statistical inference this text serves readers from varied backgrounds ranging from engineering economics agriculture and bioscience to finance financial mathematics operations and information management and psychology *Concepts of Statistical Inference* William C. Guenther,1973 **Some Basic Theory for Statistical Inference** E.J.G. Pitman,2018-01-18 In this book the author presents with elegance and precision some of the basic mathematical theory required for statistical inference at a level which will make it readable by most students of statistics

Probability and Statistical Inference Nitis Mukhopadhyay,2020-08-30 Priced very competitively compared with other textbooks at this level This gracefully organized textbook reveals the rigorous theory of probability and statistical inference in the style of a tutorial using worked examples exercises numerous figures and tables and computer simulations to develop and illustrate concepts Beginning wi **A Concise Introduction to Statistical Inference** Jacco Thijssen,2016-11-25 This short book introduces the main ideas of statistical inference in a way that is both user friendly and mathematically sound Particular emphasis is placed on the common foundation of many models used in practice In addition the book focuses on the formulation of appropriate statistical models to study problems in business economics and the social sciences as well as on how to interpret the results from statistical analyses The book will be useful to students who are interested in rigorous applications of statistics to problems in business economics and the social sciences as well as students who have studied statistics in the past but need a more solid grounding in statistical techniques to further their careers Jacco Thijssen is professor of finance at the University of York UK He holds a PhD in mathematical economics from Tilburg University Netherlands His main research interests are in applications of optimal stopping theory stochastic calculus and game theory to problems in economics and finance Professor Thijssen has earned several awards for his statistics teaching

Asymptotic Statistical Inference Shailaja Deshmukh,Madhuri Kulkarni,2021-07-05 The book presents the fundamental concepts from asymptotic statistical inference theory elaborating on some basic large sample optimality properties of estimators and some test procedures The most desirable property of consistency of an estimator and its large sample distribution with suitable normalization are discussed the focus being on the consistent and asymptotically normal CAN estimators It is shown that for the probability models belonging to an exponential family and a Cramer family the maximum likelihood estimators of the indexing parameters are CAN The book describes some large sample test procedures in particular the most frequently used likelihood ratio test procedure Various applications of the likelihood ratio test procedure are addressed when the underlying probability model is a multinomial distribution These include tests for the goodness of fit and tests for contingency tables The book also discusses a score test and Wald s test their relationship with the likelihood ratio test and Karl Pearson s chi square test An important finding is that while testing any hypothesis about the parameters of a multinomial distribution a score test statistic and Karl Pearson s chi square test statistic are identical Numerous illustrative examples of differing difficulty level are incorporated to clarify the concepts For better assimilation of the notions various exercises are included in each chapter Solutions to almost all the exercises are given in the last chapter to motivate students towards solving these exercises and to enable digestion of the underlying concepts The concepts from asymptotic inference are crucial in modern statistics but are difficult to grasp in view of their abstract nature To overcome this difficulty keeping up with the recent trend of using R software for statistical computations the book uses it extensively for illustrating the concepts verifying the properties of estimators and carrying out various test procedures The last section of the chapters presents R codes to reveal and visually demonstrate the hidden aspects of different concepts and procedures Augmenting the theory with R software is a novel and a unique feature of the book The book is designed primarily to serve as a text book for a one semester introductory course in asymptotic statistical inference in a post graduate program such as Statistics Bio statistics or Econometrics It will also provide sufficient background information for studying inference in stochastic processes The book will cater to the need of a concise but clear and student friendly book introducing conceptually and computationally basics of asymptotic inference **Statistical inference ; basic concepts** ELLIS RICHARD B.,1975

Essentials of Statistical Inference G. A. Young,R. L. Smith,2005-07-25 Aimed at advanced undergraduate and graduate students in mathematics and related disciplines this book presents the concepts and results underlying the Bayesian frequentist and Fisherian approaches with particular emphasis on the contrasts between them Computational ideas are explained as well as basic mathematical theory Written in a lucid and informal style this concise text provides both basic material on the main approaches to inference as well as more advanced material on developments in statistical theory including material on Bayesian computation such as MCMC higher order likelihood theory predictive inference bootstrap methods and conditional inference It contains numerous extended examples of the application of formal inference techniques

to real data as well as historical commentary on the development of the subject Throughout the text concentrates on concepts rather than mathematical detail while maintaining appropriate levels of formality Each chapter ends with a set of accessible problems Statistical Inference George Casella,Roger Berger,2024-05-23 This classic textbook builds theoretical statistics from the first principles of probability theory Starting from the basics of probability the authors develop the theory of statistical inference using techniques definitions and concepts that are statistical and natural extensions and consequences of previous concepts It covers all topics from a standard inference course including distributions random variables data reduction point estimation hypothesis testing and interval estimation Features The classic graduate level textbook on statistical inference Develops elements of statistical theory from first principles of probability Written in a lucid style accessible to anyone with some background in calculus Covers all key topics of a standard course in inference Hundreds of examples throughout to aid understanding Each chapter includes an extensive set of graduated exercises Statistical Inference Second Edition is primarily aimed at graduate students of statistics but can be used by advanced undergraduate students majoring in statistics who have a solid mathematics background It also stresses the more practical uses of statistical theory being more concerned with understanding basic statistical concepts and deriving reasonable statistical procedures while less focused on formal optimality considerations This is a reprint of the second edition originally published by Cengage Learning Inc in 2001 **Introduction to the Theory of Statistical Inference** Hannelore Liero,2016-04-19 Based on the authors lecture notes this text presents concise yet complete coverage of statistical inference theory focusing on the fundamental classical principles Unlike related textbooks it combines the theoretical basis of statistical inference with a useful applied toolbox that includes linear models Suitable for a second semester undergraduate course on statistical inference the text offers proofs to support the mathematics and does not require any use of measure theory It illustrates core concepts using cartoons and provides solutions to all examples and problems *Foundations of Probability Theory, Statistical Inference, and Statistical Theories of Science* W.L. Harper,C.A. Hooker,2012-12-06 In May of 1973 we organized an international research colloquium on foundations of probability statistics and statistical theories of science at the University of Western Ontario During the past four decades there have been striking formal advances in our understanding of logic semantics and algebraic structure in probabilistic and statistical theories These advances which include the development of the relations between semantics and metamathematics between logics and algebras and the algebraic geometrical foundations of statistical theories especially in the sciences have led to striking new insights into the formal and conceptual structure of probability and statistical theory and their scientific applications in the form of scientific theory The foundations of statistics are in a state of profound conflict Fisher s objections to some aspects of Neyman Pearson statistics have long been well known More recently the emergence of Bayesian statistics as a radical alternative to standard views has made the conflict especially acute In recent years the response of many practising statisticians to the conflict has been an

eclectic approach to statistical inference Many good statisticians have developed a kind of wisdom which enables them to know which problems are most appropriately handled by each of the methods available The search for principles which would explain why each of the methods works where it does and fails where it does offers a fruitful approach to the controversy over foundations **Probability and Statistical Inference** Miltiadis C. Mavrakakis,Jeremy Penzer,2021-03-28 Probability and Statistical Inference From Basic Principles to Advanced Models covers aspects of probability distribution theory and inference that are fundamental to a proper understanding of data analysis and statistical modelling It presents these topics in an accessible manner without sacrificing mathematical rigour bridging the gap between the many excellent introductory books and the more advanced graduate level texts The book introduces and explores techniques that are relevant to modern practitioners while being respectful to the history of statistical inference It seeks to provide a thorough grounding in both the theory and application of statistics with even the more abstract parts placed in the context of a practical setting Features Complete introduction to mathematical probability random variables and distribution theory Concise but broad account of statistical modelling covering topics such as generalised linear models survival analysis time series and random processes Extensive discussion of the key concepts in classical statistics point estimation interval estimation hypothesis testing and the main techniques in likelihood based inference Detailed introduction to Bayesian statistics and associated topics Practical illustration of some of the main computational methods used in modern statistical inference simulation boostrap MCMC This book is for students who have already completed a first course in probability and statistics and now wish to deepen and broaden their understanding of the subject It can serve as a foundation for advanced undergraduate or postgraduate courses Our aim is to challenge and excite the more mathematically able students while providing explanations of statistical concepts that are more detailed and approachable than those in advanced texts This book is also useful for data scientists researchers and other applied practitioners who want to understand the theory behind the statistical methods used in their fields **Probability Theory and Statistical Inference** Aris Spanos,2019-09-19 This empirical research methods course enables informed implementation of statistical procedures giving rise to trustworthy evidence Statistical Inference Paul H. Garthwaite,I. T. Jolliffe,Byron Jones,2002 Statistical inference is the foundation on which much of statistical practice is built The book covers the topic at a level suitable for students and professionals who need to understand these foundations **Basic Concepts of Statistical Inference** Erling Sverdrup,1967 **Comparative Statistical Inference** Vic Barnett,2009-09-25 This fully updated and revised third edition presents a wide ranging balanced account of the fundamental issues across the full spectrum of inference and decision making Much has happened in this field since the second edition was published for example Bayesian inferential procedures have not only gained acceptance but are often the preferred methodology This book will be welcomed by both the student and practising statistician wishing to study at a fairly elementary level the basic conceptual and interpretative distinctions between the different approaches how they

interrelate what assumptions they are based on and the practical implications of such distinctions As in earlier editions the material is set in a historical context to more powerfully illustrate the ideas and concepts Includes fully updated and revised material from the successful second edition Recent changes in emphasis principle and methodology are carefully explained and evaluated Discusses all recent major developments Particular attention is given to the nature and importance of basic concepts probability utility likelihood etc Includes extensive references and bibliography Written by a well known and respected author the essence of this successful book remains unchanged providing the reader with a thorough explanation of the many approaches to inference and decision making Advances in the Statistical Sciences: Foundations of Statistical Inference I.B. MacNeill,G. Umphrey,2012-12-06 On May 27 31 1985 a series of symposia was held at The University of Western Ontario London Canada to celebrate the 70th birthday of Pro fessor V M Joshi These symposia were chosen to reflect Professor Joshi s research interests as well as areas of expertise in statistical science among faculty in the Departments of Statistical and Actuarial Sciences Economics Epidemiology and Biostatistics and Philosophy From these symposia the six volumes which comprise the Joshi Festschrift have arisen The 117 articles in this work reflect the broad interests and high quality of research of those who attended our conference We would like to thank all of the contributors for their superb cooperation in helping us to complete this project Our deepest gratitude must go to the three people who have spent so much of their time in the past year typing these volumes Jackie Bell Lise Constant and Sandy Tarnowski This work has been printed from camera ready copy produced by our Vax 785 computer and QMS Lasergraphix printers using the text processing software TEX At the initiation of this project we were neophytes in the use of this system Thank you Jackie Lise and Sandy for having the persistence and dedication needed to complete this undertaking **Instructor's Manual** Richard B. Ellis,1975 *Selected Topics in Statistical Inference* Manisha Pal,Bikas K. Sinha,2024-09-11 This book focuses exclusively on the domain of parametric inference and that too from a reader s perspective i e covering only point estimation of parameter s It covers those topics in parametric inference which need clarity of exposure to students researchers and teachers alike mere statements of theorems and proofs may not always reveal the inner beauty and significance of some aspects of inference To ensure clarity the book discusses the following topics at an advanced level 1 sequential unbiased point estimation of p and its functions generalization to trinomial and tetranomial populations 2 some aspects of the use of additional resources in finite population inference 3 the concept of sufficiency vis vis the notion of sufficient experiments and comparison of experiments 4 estimation of the size of a finite population with special features and 5 unbiased estimation of reliability in exponential samples and other settings This book provides a platform for thought provoking creative and challenging discussions on a variety of topics in statistical estimation theory it is also ideal for research methodology course for statistics research scholars and for clarification of basic ideas in topics discussed at basic advanced levels *Intelligent Data Analysis* Michael Berthold,David J Hand,2013-04-17 The obvious question when confronted with a book with the title of

this one is why intelligent data analysis The answer is that modern data analysis uses tools developed by a wide variety of intellectual communities and that intelligent data analysis or IDA has been adopted as an overall term It should be taken to imply the intelligent application of data analytic tools and also the application of intelligent data analytic tools computer programs which probe more deeply into structure than first generation methods These aspects reflect the distinct influences of statistics and machine learning on the subject matter The importance of intelligent data analysis arises from the fact that the modern world is a data driven world We are surrounded by data numerical and otherwise which must be analysed and processed to convert it into infor mation which informs instructs answers or otherwise aids understanding and decision making The quantity of such data is huge and growing the number of sources is effectively unlimited and the range of areas covered is vast industrial commercial financial and scientific activities are all generating such data

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Statistical Inference Basic Concepts Introduction

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; Adam Levigne. What is Maroon 5? ; Treble Clef. What is... ? ; Beyonce. What is...? ; She has to leave before midnight. Kids Music Jeopardy Factile lets you create your own Jeopardy-style classroom game or quiz in minutes. You can even choose from millions of pre-made games. Play “Kids Music ... Music jeopardy Browse music jeopardy resources on Teachers Pay Teachers, a marketplace trusted by millions of teachers for original educational ... Jeopardy Questions For Kids List of Jeopardy Questions for Kids · How many legs does a spider have? · How many noses does a slug have? · What group of animals is called a pride? · What do ... 21 Kids Music Trivia Questions to Make You Sing a Song of ... Mar 5, 2023 — 1. What song is often sung when you turn a year older? This Little Light Of Mine. Can You Answer These Real "Jeopardy!" Questions About ... May 15, 2019 — ... history, but novices may be able to beat the trivia wizes when it comes to music. How many of these 25 real “Jeopardy!” questions can you answer Music Jeopardy (Grades 2 - 5) This resource is specifically designed for parents! Music Jeopardy is a great way to engage your kids and tune into the music that they are into. We So Seldom Look on Love by Barbara Gowdy We So Seldom Look on Love explores life at its quirky extremes, pushing past limits of convention into lives that are fantastic and heartbreakingly real. We So Seldom Look on Love by Gowdy, Barbara This book of short stories is an incredible and dizzying fall into the world of the bizarre - where everything that is off-the-wall, quirky, and unacceptable, ... We So Seldom Look On Love by Barbara Gowdy Sep 5, 2014 — Barbara Gowdy investigates life at its extremes, pushing past limits of convention into lives that are fantastic and heartbreakingly real. we so seldom look on love : r/LPOTL we so seldom look on love. is a short story by barbara gowdy based on karen greenlea. excellent little read that has popped into my mind ... We So Seldom Look on Love by Barbara Gowdy This book of short stories is an incredible and dizzying fall into the world of the bizarre - where everything that is off-the-wall, quirky, and unacceptable, ... We So Seldom Look on Love book by Barbara Gowdy A collection of short stories that explores the experience of a range of characters whose physical and mental handicaps both compel and inhibit each one's ... We So Seldom Look on Love: Stories These eight short stories employ both satire and morbid humor to explore the lives of emotionally and physically abnormal characters. We So Seldom Look on Love - Barbara Gowdy This masterfully crafted story collection by the author of the internationally best-selling novel Mister Sandman is a haunting audiobook that is. Neo-Gothics in Gowdy's "We so Seldom Look on Love" The author addresses the belief that necrophiliacs are cold-minded perverts lacking spirituality. The protagonist's confessions reveal her deep inner world and ... 3. “We So Seldom Look on Love” by Barbara Gowdy Jan 9, 2012 — The narrator is a woman who gets off on cadavers, and death. She's a necrophile, and it's about the joy of extremes, heat and chill, life and ...