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Chapter 1 : Statistics - Wikipedia

Basic Statistical Methods and Models for the Sciences - Kindle edition by Judah Rosenblatt. Download it once and read it on your Kindle device, PC, phones or tablets. Use features like bookmarks, note taking and highlighting while reading Basic Statistical Methods and Models for the Sciences.

Logistic regression is a notable special case of GLM. Other types of GLM include Poisson regression , gamma regression, and multinomial regression. Logistic regression differs from ordinary least squares OLS regression in that the dependent variable is binary in nature. This procedure has many applications. In biostatistics , the researcher may be interested in trying to model the probability of a patient being diagnosed with a certain type of cancer based on knowing, say, the incidence of that cancer in his or her family. In business, the marketer may be interested in modelling the probability of an individual purchasing a product based on the price of that product. Both of these are examples of a simple, binary logistic regression model. The model is "simple" in that each has only one independent, or predictor, variable, and it is "binary" in that the dependent variable can take on only one of two values: Generalized additive models[edit] Robust regression[edit] Robust regression includes a number of modelling approaches to handle high leverage observations or violation of assumptions. Models can be both parametric e. Presenting and using the results of a predictive model[edit] Predictive models can either be used directly to estimate a response output given a defined set of characteristics input , or indirectly to drive the choice of decision rules. This has some advantages for end users or decision makers, the main one being familiarity with the software itself, hence a lower barrier to adoption. Nomograms are useful graphical representation of a predictive model. As in spreadsheet software, their use depends on the methodology chosen. The advantage of nomograms is the immediacy of computing predictions without the aid of a computer. Point estimates tables are one of the simplest form to represent a predictive tool. Here combination of characteristics of interests can either be represented via a table or a graph and the associated prediction read off the y-axis or the table itself. CART, survival trees provide one of the most graphically intuitive ways to present predictions. However, their usage is limited to those methods that use this type of modelling approach which can have several drawbacks. Score charts are graphical tabular or graphical tools to represent either predictions or decision rules. A new class of modern tools are represented by web-based applications. With a Shiny app, a modeller has the advantage to represent any which way he or she chooses to represent the predictive model while allowing the user some control. A user can choose a combination of characteristics of interest via sliders or input boxes and results can be generated, from graphs to confidence intervals to tables and various statistics of interests. However, these tools often require a server installation of Rstudio. Uplift modelling[edit] Uplift modelling is a technique for modelling the change in probability caused by an action. Typically this is a marketing action such as an offer to buy a product, to use a product more or to re-sign a contract. For example, in a retention campaign you wish to predict the change in probability that a customer will remain a customer if they are contacted. A model of the change in probability allows the retention campaign to be targeted at those customers on whom the change in probability will be beneficial. This allows the retention programme to avoid triggering unnecessary churn or customer attrition without wasting money contacting people who would act anyway. Development of quantitative methods and a greater availability of applicable data led to growth of the discipline in the s and by the late s, substantial progress had been made by major land managers worldwide. Generally, predictive modelling in archaeology is establishing statistically valid causal or covariable relationships between natural proxies such as soil types, elevation, slope, vegetation, proximity to water, geology, geomorphology, etc. Through analysis of these quantifiable attributes from land that has undergone archaeological survey, sometimes the "archaeological sensitivity" of unsurveyed areas can be anticipated based on the natural proxies in those areas. By using predictive modelling in their cultural resource management plans, they are capable of making more informed decisions when planning for activities that have the potential to require ground disturbance and subsequently affect archaeological sites. Customer relationship management[edit] Predictive modelling is used extensively in analytical customer relationship management and data mining to produce customer-level models that describe the likelihood that a customer will take a particular action. The actions are usually sales, marketing and customer retention related. It is also now more common for such an organisation to have a model of savability using an uplift model. This predicts the likelihood that a customer can be saved at the end of a contract period the change in churn probability as opposed to the standard churn prediction model. Auto insurance[edit] Predictive modelling is utilised in vehicle insurance to assign risk of incidents to policy holders from information obtained from policy holders. This is extensively employed in usage-based insurance solutions where predictive models utilise telemetry-based data to build a model of predictive risk for claim likelihood. Initially the hospital focused on patients with congestive heart failure, but the program has expanded to include patients with diabetes, acute myocardial infarction, and pneumonia. The model was trained on a large dataset 10, patients and validated on a separated dataset patients. The high accuracy and explain-ability of the PPES-Met model may enable the model to be used as a decision support tool to personalize metastatic cancer treatment and provide valuable assistance to the physicians. Algorithmic trading[edit] Predictive modeling in trading is a modeling process wherein we predict the probability of an outcome using a set of predictor variables. Predictive models can be built for different assets like stocks, futures, currencies, commodities etc. It utilizes mathematically advanced software to evaluate indicators on price, volume, open interest and other historical data, to discover repeatable patterns. These failures exemplify the danger of relying exclusively on models that are essentially backward looking in nature. The following examples are by no mean a complete list: The rating can take on discrete values from AAA down to D. The rating is a predictor of the risk of default based on a variety of variables associated with the borrower and historical macroeconomic data. Almost the entire AAA sector and the super-AAA sector, a new rating the rating agencies provided to represent super safe investment of the CDO market defaulted or severely downgraded during , many of which obtained their ratings less than just a year previously. One particularly memorable failure is that of Long Term Capital Management , a fund that hired highly qualified analysts, including a Nobel Memorial Prize in Economic Sciences winner, to develop a sophisticated statistical model that predicted the price spreads between different securities. The models produced impressive profits until a major debacle that caused the then Federal Reserve chairman Alan Greenspan to step in to broker a rescue plan by the Wall Street broker dealers in order to prevent a meltdown of the bond market. Possible fundamental limitations of predictive model based on data fitting[edit] 1 History cannot always predict future: Using relations derived from historical data to predict the future implicitly assumes there are certain steady-state conditions or constants in the complex system. This is almost always wrong when the system involves people. In all data collection, the collector first defines the set of variables for which data is collected. However, no matter how extensive the collector considers his selection of the variables, there is always the possibility of new variables that have not been considered or even defined, yet are critical to the outcome. After an algorithm becomes an accepted standard of measurement, it can be taken advantage of by people who understand the algorithm and have the incentive to fool or manipulate the outcome. This is what happened to the CDO rating.

Chapter 2 : Basic Statistical Methods and Models for the Sciences: Judah Rosenblatt | NHBS Book Shop

Designed to be used in a first course for graduate or upper-level undergraduate students, Basic Statistical Methods and Models builds a practical foundation in the use of statistical tools and imparts a clear understanding of their underlying assumptions and limitations.

Overview[edit] In applying statistics to a problem, it is common practice to start with a population or process to be studied. Populations can be diverse topics such as "all persons living in a country" or "every atom composing a crystal". Ideally, statisticians compile data about the entire population an operation called census. This may be organized by governmental statistical institutes. Descriptive statistics can be used to summarize the population data. Numerical descriptors include mean and standard deviation for continuous data types like income , while frequency and percentage are more useful in terms of describing categorical data like race. When a census is not feasible, a chosen subset of the population called a sample is studied. Once a sample that is representative of the population is determined, data is collected for the sample members in an observational or experimental setting. Again, descriptive statistics can be used to summarize the sample data. However, the drawing of the sample has been subject to an element of randomness, hence the established numerical descriptors from the sample are also due to uncertainty. To still draw meaningful conclusions about the entire population, inferential statistics is needed. It uses patterns in the sample data to draw inferences about the population represented, accounting for randomness. These inferences may take the form of: Inference can extend to forecasting , prediction and estimation of unobserved values either in or associated with the population being studied; it can include extrapolation and interpolation of time series or spatial data , and can also include data mining. Sampling[edit] When full census data cannot be collected, statisticians collect sample data by developing specific experiment designs and survey samples. Statistics itself also provides tools for prediction and forecasting through statistical models. The idea of making inferences based on sampled data began around the mids in connection with estimating populations and developing precursors of life insurance. Representative sampling assures that inferences and conclusions can safely extend from the sample to the population as a whole. A major problem lies in determining the extent that the sample chosen is actually representative. Statistics offers methods to estimate and correct for any bias within the sample and data collection procedures. There are also methods of experimental design for experiments that can lessen these issues at the outset of a study, strengthening its capability to discern truths about the population. Sampling theory is part of the mathematical discipline of probability theory. Probability is used in mathematical statistics to study the sampling distributions of sample statistics and, more generally, the properties of statistical procedures. The use of any statistical method is valid when the system or population under consideration satisfies the assumptions of the method. The difference in point of view between classic probability theory and sampling theory is, roughly, that probability theory starts from the given parameters of a total population to deduce probabilities that pertain to samples. Statistical inference, however, moves in the opposite directionâ€" inductively inferring from samples to the parameters of a larger or total population. Experimental and observational studies[edit] A common goal for a statistical research project is to investigate causality , and in particular to draw a conclusion on the effect of changes in the values of predictors or independent variables on dependent variables. There are two major types of causal statistical studies: In both types of studies, the effect of differences of an independent variable or variables on the behavior of the dependent variable are observed. The difference between the two types lies in how the study is actually conducted. Each can be very effective. An experimental study involves taking measurements of the system under study, manipulating the system, and then taking additional measurements using the same procedure to determine if the manipulation has modified the values of the measurements. In contrast, an observational study does not involve experimental manipulation. Instead, data are gathered and correlations between predictors and response are investigated. While the tools of data analysis work best on data from randomized studies , they are also applied to other kinds of dataâ€"like natural experiments and observational studies [15] â€"for which a statistician would use a modified, more structured estimation method e. Experiments[edit] The basic steps of a statistical experiment are: Planning the research, including finding the number of replicates of the study, using the following information: Consideration of the selection of experimental subjects and the ethics of research is necessary. Statisticians recommend that experiments compare at least one new treatment with a standard treatment or control, to allow an unbiased estimate of the difference in treatment effects. Design of experiments , using blocking to reduce the influence of confounding variables , and randomized assignment of treatments to subjects to allow unbiased estimates of treatment effects and experimental error. At this stage, the experimenters and statisticians write the experimental protocol that will guide the performance of the experiment and which specifies the primary analysis of the experimental data. Performing the experiment following the experimental protocol and analyzing the data following the experimental protocol. Further examining the data set in secondary analyses, to suggest new hypotheses for future study. Documenting and presenting the results of the study. Experiments on human behavior have special concerns. The famous Hawthorne study examined changes to the working environment at the Hawthorne plant of the Western Electric Company. The researchers were interested in determining whether increased illumination would increase the productivity of the assembly line workers. The researchers first measured the productivity in the plant, then modified the illumination in an area of the plant and checked if the changes in illumination affected productivity. It turned out that productivity indeed improved under the experimental conditions. However, the study is heavily criticized today for errors in experimental procedures, specifically for the lack of a control group and blindness. The Hawthorne effect refers to finding that an outcome in this case, worker productivity changed due to observation itself. Those in the Hawthorne study became more productive not because the lighting was changed but because they were being observed. This type of study typically uses a survey to collect observations about the area of interest and then performs statistical analysis. In this case, the researchers would collect observations of both smokers and non-smokers, perhaps through a cohort study , and then look for the number of cases of lung cancer in each group. Types of data[edit] Main articles: Statistical data type and Levels of measurement Various attempts have been made to produce a taxonomy of levels of measurement. The psychophysicist Stanley Smith Stevens defined nominal, ordinal, interval, and ratio scales. Nominal measurements do not have meaningful rank order among values, and permit any one-to-one transformation. Ordinal measurements have imprecise differences between consecutive values, but have a meaningful order to those values, and permit any order-preserving transformation. Interval measurements have meaningful distances between measurements defined, but the zero value is arbitrary as in the case with longitude and temperature measurements in Celsius or Fahrenheit , and permit any linear transformation. Ratio measurements have both a meaningful zero value and the distances between different measurements defined, and permit any rescaling transformation. Because variables conforming only to nominal or ordinal measurements cannot be reasonably measured numerically, sometimes they are grouped together as categorical variables , whereas ratio and interval measurements are grouped together as quantitative variables , which can be either discrete or continuous , due to their numerical nature. Such distinctions can often be loosely correlated with data type in computer science, in that dichotomous categorical variables may be represented with the Boolean data type , polytomous categorical variables with arbitrarily assigned integers in the integral data type , and continuous variables with the real data type involving floating point computation. But the mapping of computer science data types to statistical data types depends on which categorization of the latter is being implemented. Other categorizations have been proposed. For example, Mosteller and Tukey [18] distinguished grades, ranks, counted fractions, counts, amounts, and balances. Nelder [19] described continuous counts, continuous ratios, count ratios, and categorical modes of data. See also Chrisman , [20] van den Berg Whether or not a transformation is sensible to contemplate depends on the question one is trying to answer" Hand, , p. A statistic is a random variable that is a function of the random sample, but not a function of unknown parameters. The probability distribution of the statistic, though, may have unknown parameters.

Consider now a function of the unknown parameter: Commonly used estimators include sample mean , unbiased sample variance and sample covariance. A random variable that is a function of the random sample and of the unknown parameter, but whose probability distribution does not depend on the unknown parameter is called a pivotal quantity or pivot. Between two estimators of a given parameter, the one with lower mean squared error is said to be more efficient. Furthermore, an estimator is said to be unbiased if its expected value is equal to the true value of the unknown parameter being estimated, and asymptotically unbiased if its expected value converges at the limit to the true value of such parameter. Other desirable properties for estimators include: UMVUE estimators that have the lowest variance for all possible values of the parameter to be estimated this is usually an easier property to verify than efficiency and consistent estimators which converges in probability to the true value of such parameter. This still leaves the question of how to obtain estimators in a given situation and carry the computation, several methods have been proposed: Null hypothesis and alternative hypothesis[edit] Interpretation of statistical information can often involve the development of a null hypothesis which is usually but not necessarily that no relationship exists among variables or that no change occurred over time. The null hypothesis, H0, asserts that the defendant is innocent, whereas the alternative hypothesis, H1, asserts that the defendant is guilty. The indictment comes because of suspicion of the guilt. The H0 status quo stands in opposition to H1 and is maintained unless H1 is supported by evidence "beyond a reasonable doubt". However, "failure to reject H0" in this case does not imply innocence, but merely that the evidence was insufficient to convict. So the jury does not necessarily accept H0 but fails to reject H0. While one can not "prove" a null hypothesis, one can test how close it is to being true with a power test , which tests for type II errors.

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Chapter 3 : Basic Statistical Concepts | STAT ONLINE

The use of statistics in biology, medicine, engineering, and the sciences has grown dramatically in recent years and having a basic background in the subject has become a near necessity for students and researchers in these fields. Although many introductory statistics books already exist, too often.

Absolutely no previous knowledge of statistics is necessary or expected. However, participants should be comfortable working with spreadsheets in Microsoft Excel either the Mac or PC version. Those who have never used Excel should prepare before coming to SSI, as a basic familiarity with the program will be assumed. This hands-on course will introduce participants to common descriptive and inferential statistical analyses. In addition to covering the concepts behind each method, we will also practice applying them on real datasets using Microsoft Excel. Sufficient time will be spent on understanding relevant assumptions and how to correctly interpret the results of each analysis. The specific topics covered in this course include: Optional "homework" will be offered after each class day for those who want additional practice applying the techniques discussed. This course is designed for those with little to no experience in statistics and who want use descriptive and inferential methods to analyze data. Whether coming from academia, industry, or government, participants in this course will learn the skills needed to help them better understand the data that they work with. All participants will need a version of Excel from or newer. The University of Texas at Austin students and staff can download Excel for free through campus resources. Statistics and Data Sciences Title: He received his B. Knowledge of basic multivariate calculus, statistical inference, and linear algebra is expected. Audience who took at least one college level course in probability or statistics course and are comfortable with the following concepts: The course will make extensive use of the statistical software R and build on knowledge of introductory probability and statistics, as well as simple linear regression models. The course is aim to introduce the basic ideas of statistical learning and predictive modeling from a statistical, theoretical and computational perspective, together with applications in real data. Topics cover the major schools of thought that influence modern scientific practice. We will mainly focus on supervised learning methods, and will briefly discuss unsupervised learning. Anyone who are interested in overall knowledge of statistical learning and focus more on these techniques in real data application and the implementation in R. All participants will need a Mac and have the R software downloaded prior to the start of the course. She did her bachelor degree in applied mathematics and her master degree in math and actuarial science at UT-Austin. She is a certificated actuary and has worked in consulting for three years before starting her PhD. Her doctoral research lies in the interaction of theory, methodology and computation of Bayesian statistics and their applications to high dimensional data analysis. Participants should have basic working knowledge on Linux operating system and using command line interface. Participants are also expected to have at least introductory level of education in computer programming, such as knowledge on data structure, control flow. This course will introduce participants to using the two most popular big data processing frameworks, Hadoop and Spark, for big data analysis tasks. The course will introduce basic system architecture and core components of each system in order to give beginner a clear picture on basics of the two systems. The course will feature clear instructions and a test system access for participants to get started on using those systems from day one. The course will give a grand tour of the data analysis capability to show how common data analysis needs for large data can be met with those platforms. Those tools and libraries include a set of implementations of a wide range of analysis algorithms. Finally, the course will also introduce components and applications that enable utilization of the Hadoop and Spark through other programming language and interface including Hadoop Streaming, Spark-Shell and Hive. The course materials will include exemplar problems, hands-on exercises and demonstrations. This course is intended for people who are interested to learn more on available tools and solutions to support large scale data analysis. Students and professionals who are facing the scalability issue with data driven problems are welcome to this course. Participants should bring a personal laptop. Installation of Java 1. He has a Ph. Xu has over 50 peer-reviewed conference and journal publications in similarity-based data retrieval, data analysis, and information visualization with data from various scientific domains. He has served on program committees for several workshops and conferences in big data and high performance computing area, most recently, co-chair for IEEE Conference on Big Data in and He also has been a guest editor for Journal of Big Data Research since

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Chapter 4 : Judah Rosenblatt (Author of Basic Statistical Methods & Models for the Sciences)

The use of statistics in biology, medicine, engineering, and the sciences has grown dramatically in recent years and having a basic background in the subject has become a near necessity for.

View Blog Here we discuss general applications of statistical models, whether they arise from data science, operations research, engineering, machine learning or statistics. We do not discuss specific algorithms such as decision trees, logistic regression, Bayesian modeling, Markov models, data reduction or feature selection. Instead, I discuss frameworks - each one using its own types of techniques and algorithms - to solve real life problems. Most of the entries below are found in Wikipedia, and I have used a few definitions or extracts from the relevant Wikipedia articles, in addition to personal contributions. Spatial Models Spatial dependency is the co-variation of properties within geographic space: Time Series Methods for time series analyses may be divided into two classes: The former include spectral analysis and recently wavelet analysis; the latter include auto-correlation and cross-correlation analysis. In time domain, correlation analyses can be made in a filter-like manner using scaled correlation, thereby mitigating the need to operate in frequency domain. Additionally, time series analysis techniques may be divided into parametric and non-parametric methods. The parametric approaches assume that the underlying stationary stochastic process has a certain structure which can be described using a small number of parameters for example, using an autoregressive or moving average model. In these approaches, the task is to estimate the parameters of the model that describes the stochastic process. By contrast, non-parametric approaches explicitly estimate the covariance or the spectrum of the process without assuming that the process has any particular structure. Methods of time series analysis may also be divided into linear and non-linear, and univariate and multivariate. Survival Analysis Survival analysis is a branch of statistics for analyzing the expected duration of time until one or more events happen, such as death in biological organisms and failure in mechanical systems. This topic is called reliability theory or reliability analysis in engineering, duration analysis or duration modelling in economics, and event history analysis in sociology. Survival analysis attempts to answer questions such as: Of those that survive, at what rate will they die or fail? Can multiple causes of death or failure be taken into account? How do particular circumstances or characteristics increase or decrease the probability of survival? Survival models are used by actuaries and statisticians, but also by marketers designing churn and user retention models. Survival models are also used to predict time-to-event time from becoming radicalized to turning into a terrorist, or time between when a gun is purchased and when it is used in a murder , or to model and predict decay see section 4 in this article. Market Segmentation Market segmentation, also called customer profiling, is a marketing strategy which involves dividing a broad target market into subsets of consumers,businesses, or countries that have, or are perceived to have, common needs, interests, and priorities, and then designing and implementing strategies to target them. Market segmentation strategies are generally used to identify and further define the target customers, and provide supporting data for marketing plan elements such as positioning to achieve certain marketing plan objectives. Businesses may develop product differentiation strategies, or an undifferentiated approach, involving specific products or product lines depending on the specific demand and attributes of the target segment. Association Rule Learning Association rule learning is a method for discovering interesting relations between variables in large databases. In fraud detection, association rules are used to detect patterns associated with fraud. Linkage analysis is performed to identify additional fraud cases: Macro-economic models use long-term, aggregated historical data to assign, for each sale or conversion, an attribution weight to a number of channels. These models are also used for advertising mix optimization. Scoring Scoring model is a special kind of predictive models. Predictive models can predict defaulting on loan payments, risk of accident, client churn or attrition, or chance of buying a good. Scoring technology is typically applied to transactional data, sometimes in real time credit card fraud detection, click fraud. Predictive Modeling Predictive modeling leverages statistics to predict outcomes. Most often the event one wants to predict is in the future, but predictive modelling can be applied to any type of unknown event, regardless of when it occurred. For example, predictive models are often used to detect crimes and identify suspects, after the crime has taken place. They may also used for weather forecasting, to predict stock market prices, or to predict sales, incorporating time series or spatial models. Neural networks, linear regression, decision trees and naive Bayes are some of the techniques used for predictive modeling. They are associated with creating a training set, cross-validation, and model fitting and selection. Some predictive systems do not use statistical models, but are data-driven instead. Clustering Cluster analysis or clustering is the task of grouping a set of objects in such a way that objects in the same group called a cluster are more similar in some sense or another to each other than to those in other groups clusters. It is a main task of exploratory data mining, and a common technique for statistical data analysis, used in many fields, including machine learning, pattern recognition, image analysis, information retrieval, and bioinformatics. Unlike supervised classification below , clustering does not use training sets. Though there are some hybrid implementations, called semi-supervised learning. Supervised Classification Supervised classification, also called supervised learning, is the machine learning task of inferring a function from labeled training data. The training data consist of a set of training examples. In supervised learning, each example is a pair consisting of an input object typically a vector and a desired output value also called label, class or category. A supervised learning algorithm analyzes the training data and produces an inferred function, which can be used for mapping new examples. An optimal scenario will allow for the algorithm to correctly determine the class labels for unseen instances. Clustering algorithms are notoriously slow, though a very fast technique known as indexation or automated tagging will be described in Part II of this article. Extreme Value Theory Extreme value theory or extreme value analysis EVA is a branch of statistics dealing with the extreme deviations from the median of probability distributions. It seeks to assess, from a given ordered sample of a given random variable, the probability of events that are more extreme than any previously observed. For instance, floods that occur once every 10, , or years. These models have been performing poorly recently, to predict catastrophic events, resulting in massive losses for insurance companies. I prefer Monte-Carlo simulations, especially if your training data is very large. This will be described in Part II of this article.

Chapter 5 : Basic Statistical Methods and Models for the Sciences: 1st Edition (Hardback) - Routledge

BOOK REVIEWS in Chapters 5- 7. In contrast, only four of the distributions mentioned in the chapter (normal, chi-squared, binomial, andt) are used elsewhere in the book.

Basic Statistical Concepts The Prerequisites Checklist page on the Department of Statistics website lists a number of courses that require a foundation of basic statistical concepts as a prerequisite. All of the graduate courses in the Master of Applied Statistics program heavily rely on these concepts and procedures. Therefore, it is imperative â€” after you study and work through this lesson â€” that you thoroughly understand all the material presented here. Students that do not possess a firm understanding of these basic concepts will struggle to participate successfully in any of the graduate level courses above STAT Review Materials These review materials are intended to provide a review of key statistical concepts and procedures. Specifically, the lesson reviews: For instance, with regards to hypothesis testing, some of you may have learned only one approach â€” some the P-value approach, and some the critical value approach. It is important that you understand both approaches. If the P-value approach is new to you, you might have to spend a little more time on this lesson than if not. Distinguish between a population and a sample. Distinguish between a parameter and a statistic. Understand the basic concept and the interpretation of a confidence interval. Know the general form of most confidence intervals. Understand the general idea of hypothesis testing -- especially how the basic procedure is similar to that followed for criminal trials conducted in the United States. Be able to distinguish between the two types of errors that can occur whenever a hypothesis test is conducted. Understand the basic procedures for the critical value approach to hypothesis testing. Understand the basic procedures for the P-value approach to hypothesis testing. Understand the basic procedures for testing the independence of two categorical variables using a Chi-square test of independence. Be able to determine if a test contains enough power to make a reasonable conclusion using power analysis. Be able to use power analysis to calculate the number of samples required to achieve a specified level of power. Understand how a test of proportion can be used to assess whether a sample from a population represents the true proportion from the entire population. Self-Assessment Procedure Review the concepts and methods on the pages in this section of this website. Download and complete the Self-Assessment Exam at the end of this section. Review the Self-Assessment Exam Solutions and determine your score. Students are strongly encouraged to take STAT , thoroughly review the materials that are covered in the sections above or take additional coursework that focuses on these foundations. If you have struggled with the concepts and methods that are presented here, you will indeed struggle in any of the graduate level courses included in the Master of Applied Statistics program above STAT that expect and build on this foundation. These materials are NOT intended to be a complete treatment of the ideas and methods used in basic statistics.

Chapter 6 : 40 Techniques Used by Data Scientists - Data Science Central

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Chapter 7 : Basic Statistical Methods and Models for the Sciences - CRC Press Book

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Chapter 8 : - Basic Statistical Methods and Models for the Sciences by Judah Rosenblatt

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Chapter 9 : Predictive modelling - Wikipedia

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