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Chapter 1 : Statistical process control - Wikipedia

*Turkey old and new (v.1): historical, geographical and statistical [Elizabeth. Stone] on calendrierdelascience.com *FREE* shipping on qualifying offers. This book was digitized and reprinted from the collections of the University of California Libraries.*

Because practitioners of the statistical analysis often address particular applied decision problems, methods developments is consequently motivated by the search to a better decision making under uncertainties. Decision making process under uncertainty is largely based on application of statistical data analysis for probabilistic risk assessment of your decision. Managers need to understand variation for two key reasons. First, so that they can lead others to apply statistical thinking in day to day activities and secondly, to apply the concept for the purpose of continuous improvement. This course will provide you with hands-on experience to promote the use of statistical thinking and techniques to apply them to make educated decisions whenever there is variation in business data. Therefore, it is a course in statistical thinking via a data-oriented approach. Statistical models are currently used in various fields of business and science. However, the terminology differs from field to field. For example, the fitting of models to data, called calibration, history matching, and data assimilation, are all synonymous with parameter estimation. Your organization database contains a wealth of information, yet the decision technology group members tap a fraction of it. Employees waste time scouring multiple sources for a database. The decision-makers are frustrated because they cannot get business-critical data exactly when they need it. Therefore, too many decisions are based on guesswork, not facts. Many opportunities are also missed, if they are even noticed at all. Knowledge is what we know well. Information is the communication of knowledge. In every knowledge exchange, there is a sender and a receiver. The sender make common what is private, does the informing, the communicating. Information can be classified as explicit and tacit forms. The explicit information can be explained in structured form, while tacit information is inconsistent and fuzzy to explain. Know that data are only crude information and not knowledge by themselves. Data is known to be crude information and not knowledge by itself. The sequence from data to knowledge is: Data becomes information, when it becomes relevant to your decision problem. Information becomes fact, when the data can support it. Facts are what the data reveals. However the decisive instrumental i. Fact becomes knowledge, when it is used in the successful completion of a decision process. Once you have a massive amount of facts integrated as knowledge, then your mind will be superhuman in the same sense that mankind with writing is superhuman compared to mankind before writing. The following figure illustrates the statistical thinking process based on data in constructing statistical models for decision making under uncertainties. The above figure depicts the fact that as the exactness of a statistical model increases, the level of improvements in decision-making increases. Statistical data analysis arose from the need to place knowledge on a systematic evidence base. This required a study of the laws of probability, the development of measures of data properties and relationships, and so on. Statistical inference aims at determining whether any statistical significance can be attached that results after due allowance is made for any random variation as a source of error. Intelligent and critical inferences cannot be made by those who do not understand the purpose, the conditions, and applicability of the various techniques for judging significance. Considering the uncertain environment, the chance that "good decisions" are made increases with the availability of "good information. The above figure also illustrates the fact that as the exactness of a statistical model increases, the level of improvements in decision-making increases. Knowledge is more than knowing something technical. Wisdom is the power to put our time and our knowledge to the proper use. Wisdom comes with age and experience. Wisdom is the accurate application of accurate knowledge and its key component is to knowing the limits of your knowledge. Wisdom is about knowing how something technical can be best used to meet the needs of the decision-maker. Wisdom, for example, creates statistical software that is useful, rather than technically brilliant. For example, ever since the Web entered the popular

consciousness, observers have noted that it puts information at your fingertips but tends to keep wisdom out of reach. Almost every professionals need a statistical toolkit. Statistical skills enable you to intelligently collect, analyze and interpret data relevant to their decision-making. Statistical concepts enable us to solve problems in a diversity of contexts. Statistical thinking enables you to add substance to your decisions. The appearance of computer software, JavaScript Applets , Statistical Demonstrations Applets , and Online Computation are the most important events in the process of teaching and learning concepts in model-based statistical decision making courses. These tools allow you to construct numerical examples to understand the concepts, and to find their significance for yourself. The course is tailored to meet your needs in the statistical business-data analysis using widely available commercial statistical computer packages such as SAS and SPSS. By doing this, you will inevitably find yourself asking questions about the data and the method proposed, and you will have the means at your disposal to settle these questions to your own satisfaction. Accordingly, all the applications problems are borrowed from business and economics. Greater and Lesser Statistics. Greater statistics is everything related to learning from data, from the first planning or collection, to the last presentation or report. Lesser statistics is the body of statistical methodology. This is a Greater Statistics course. There are basically two kinds of "statistics" courses. The real kind shows you how to make sense out of data. These courses would include all the recent developments and all share a deep respect for data and truth. The imitation kind involves plugging numbers into statistics formulas. The emphasis is on doing the arithmetic correctly. These courses generally have no interest in data or truth, and the problems are generally arithmetic exercises. If a certain assumption is needed to justify a procedure, they will simply tell you to "assume the It seems like you all are suffering from an overdose of the latter. This course will bring out the joy of statistics in you. Statistics is a science assisting you to make decisions under uncertainties based on some numerical and measurable scales. Decision making process must be based on data neither on personal opinion nor on belief. It is already an accepted fact that "Statistical thinking will one day be as necessary for efficient citizenship as the ability to read and write. Gives probability of exactly successes in n independent trials, when probability of success p on single trial is a constant. Used frequently in quality control, reliability, survey sampling, and other industrial problems. What is the probability of 7 or more "heads" in 10 tosses of a fair coin?

Chapter 2 : Inferring From Data

Mexico, Aztec, Spanish and Republican Vol. 1 of 2 A Historical, Geographical, Political, Statistical and Social Account of That Country From the Period War and Notices of New Mexico and California - Kindle edition by Brantz Mayer.

Received Dec 12; Accepted Jan This article has been cited by other articles in PMC. Abstract The Diagnostic and Statistical Manual DSM of the American Psychiatric Association, currently in its fourth edition and considered the reference for the characterization and diagnosis of mental disorders, has undergone various developments since its inception in the mid-twentieth century. With the fifth edition of the DSM presently in field trials for release in , there is renewed discussion and debate over the extent of its relative successes - and shortcomings - at iteratively incorporating scientific evidence on the often ambiguous nature and etiology of mental illness. Given the power that the DSM has exerted both within psychiatry and society at large, this essay seeks to analyze variations in content and context of various editions of the DSM, address contributory influences and repercussion of such variations on the evolving landscape of psychiatry as discipline and practice over the past sixty years. Specifically, we document major modifications in the definition, characterization, and classification of mental disorders throughout successive editions of the DSM, in light of shifting trends in the conceptualization of psychopathology within evolving schools of thought in psychiatry, and in the context of progress in behavioral and psychopharmacological therapeutics over time. We touch upon the social, political, and financial environments in which these changes took places, address the significance of these changes with respect to the legitimacy and legitimization of what constitutes mental illness and health, and examine the impact and implications of these changes on psychiatric practice, research, and teaching. We argue that problematic issues in psychiatry, arguably reflecting the large-scale adoption of the DSM, may be linked to difficulties in formulating a standardized nosology of psychopathology. Psychiatry, DSM; classification; nosology; psychopathology; mental disorders; historicity Introduction Translated into over twenty languages, referred to by clinicians from multiple schools, as well as by researchers, policy-makers, criminal courts, and third-party reimbursement entities [1], the Diagnostic and Statistical Manual of the American Psychiatric Association DSM enjoys a nearly hegemonic status as the reference for the assessment and categorization of mental disorders of all types - not only in the United States, but increasingly in Europe and more recently Asia. To be sure, the discipline and practice of psychiatry has changed since the first DSM was released, and with the fifth edition DSM-V currently in field trials in preparation for general release in spring , there is renewed discussion - and debate - about whether this latest volume represents 1 a work of lessons learned from prior editions, and in this way may be seen as an epistemologically iterative step in defining and characterizing the often ambiguous if not enigmatic qualities of "mental disorder s ", or 2 merely an embellished version of previous volumes that perpetuates misnomers and vagaries and thus fails to be anything more than of nominal value. Whether endorsed as a reasonable gold-standard or criticized as limited in scope and utility, what cannot be ignored is the effect - if not power - that the DSM has exerted, and continues to exert, both within psychiatry and society at-large. Therefore, it is important to consider if, and how the DSM-V will manifest impact in and upon the character and conduct of psychiatry, medicine and the social sphere. Toward this end, we pose a Socratic question - from where have the DSM and psychiatry come, and to where are they going? Thus, this essay seeks to analytically scrutinize - and contextualize - the major developments that have occurred in various editions of the DSM, focusing upon factors that motivated its development in , and the multiple changes and repercussions various editions have effected in psychiatry over the past sixty years. Inquiry to the history of such a prominent standardized nosology of mental disorders may be a means of probing at least in contours and highlights the intellectual landscape of psychiatry throughout the second half of the twentieth century. In this light, three major "phases" will be addressed: Particular emphasis shall be upon the development of the DSM-III, as the major trends it embodied have been largely accentuated throughout all subsequent editions of the manual. However, it may

first be worth noting one of the most pervasive, yet often elusive characteristics of any historiological recollection, including this one. We recognize this, and acknowledge that such implicit tendencies may indeed have affected the scope and tenor of the present essay. Still, we hope to shed light on critical developments within and around the DSM throughout its history, and to attempt to make sense of this progression through a didactic approach. We shall also attempt to avoid cursory generalizations, by instead seeking a leveled appraisal of multiple, if at times conflicting, interpretations of the same historical phenomena. Nosological attempts culminating in the DSM-I Some of the first attempts to formally classify psychopathology in the United States were undertaken during the early nineteenth century. For the most part, such efforts were collections of demographic data by the Bureau of the Census, and were intended more for mental health policy to regulate the treatment of the institutionalized mentally ill, rather than for diagnostic purposes [2]. As the perceived role of psychiatry broadened to include mental health beyond the boundaries of mental institutions, interest in devising a viable classification system for psychopathological conditions was strengthened within the psychiatric community. In , under the auspices of the Bureau of the Census and the National Committee for Mental Hygiene, the American Medico-Psychological Association now the American Psychiatric Association , first attempted the creation of a formal, standardized nomenclature of psychopathological conditions. These efforts culminated in the publication of the Statistical Manual for the Use of Institutions for the Insane, what can be considered to be the predecessor of the Diagnostic and Statistical Manual of Mental Disorders series. The volume included 22 diagnostic categories, most of which were psychotic conditions associated with presumed somatic etiology. This biologically-oriented classification approach, consistent with then-dominant Kraepelinian constructs linking abnormal behavior to organic brain dysfunctions, echoed the nature of the psychiatric profession at the time: Nine subsequent editions of the Statistical Manual followed during the interwar years, all of which emphasized the somatic viewpoint, offered relatively broad categorizations of mental disorders, and were of limited diagnostic utility. The psychodynamic approach mostly reflecting the work of Freud in Europe, and Meyer in the United States , which originated at the beginning of the twentieth century but had maintained an initially marginal role, ascended in dominance after the relative successes of this approach in treating military patients who suffered neuropsychiatric trauma [2]. The conceptualization of psychopathology had largely shifted from recognizing mental conditions as discrete disease entities distinct from mental health, to considering mental health and illness on a continuum of variable severity [4]. Psychodynamic theory gained rapid acceptance in both the clinical and academic arenas of psychiatry, and by , was officially acknowledged as the leading school of thought by the American Board of Psychiatry [2]. Respective of changing conceptualizations of mental disease, and a broadening of psychiatric clientele - both of which being for the most part incompatible with earlier nosological frameworks, the APA Committee on Nomenclature and Statistics sought to create a new classification system: This compendium included broadly-construed diagnostic categories that were based upon psychodynamic etiological explanations, and were accordingly subdivided into two major groups of mental disorders: The latter group was further subdivided into psychoses - that is, those disorders constituting relatively severe conditions such as manic-depressive disorder or schizophrenia, and, at the other end of the scale, psychoneuroses, which included conditions such as anxiety, depressive disorders, and personality disorders [6]. A notable figure in the development and promotion of the psychodynamically-oriented "maladjustment model" fostered by the DSM-I was Adolf Meyer, a neurologist by training, whose interests shifted to psychiatry upon his move from Switzerland to the United States in [7 , 8]. While hailed as meaningful by its authors, the DSM-I actually had only limited bearing on psychiatric practice [9], although it did in fact set the stage for increasingly standardized categorization s of mental disorders, if not an implicit standardization of psychiatric approaches to diagnosis and treatment. To compensate for perceived inadequacies of the DSM-I, the second edition of the Diagnostic and Statistical Manual of Mental Disorders was published in , and was still largely reflective of the psychodynamic tradition [10], although this school of thought was already on the decline by the end of the s, and subtle amendments made to DSM-II hinted albeit somewhat inconspicuously at such change. The first was

a further expansion of the definitions of mental illness that was arguably in line with a broadening of psychodynamic theory to be more inclusive of milder conditions seen in the general population. This was indicated by the addition of diagnostic categories such as "Conditions Without Manifest Psychiatric Disorder" for " The second trend was an increased systematic categorization and specificity that suggested a return to the Kraepelinian tradition. This was evidenced by multiple subdivisions of former disorder categories, such as the addition of eight new "alchoholic brain syndromes", an increased number of "qualifiers" from four in the DSM-I to nine in the DSM-II - namely, "acute; chronic; not psychotic; mild; moderate; severe; in remission", and the explicit advocacy that clinicians " Yet another alteration in the DSM-II was the removal of the psychodynamic term "reaction", referring to the maladaptive response of an individual to socio-environmental sources of distress. A disclaimer accompanied the announcement of such modification: A "turning point" in psychiatry: Moreover, the lack of clear demarcations between mental health and illness, and the relatively low reliability of psychiatric diagnoses, were sharply criticized both within the psychiatric community and from without [13]. In addition to the rising discontent towards psychodynamic psychiatry was a significant restriction of resource funding. Concomitantly, a neo-Kraepelinian "invisible college" of more biologically-oriented psychiatrists increasingly and more ardently criticized psychodynamically-oriented psychiatric research and practice [13]. Substantive advances in psychometric instruments for quantitative psychiatric assessment, such as rating scales and checklists for anxiety and depression, had become something of a standard in mental health research and practice. Progress in therapeutics had also ensued, with increasingly more efficient behavioral and brief psychotherapeutic approaches [13], and notably, progress in psychopharmacology, which by the s had developed a significant armamentarium of mood- and behavior-altering agents [15]. In fact, by the mid s, prescribing psychotropic medications had become de rigueur for much of psychiatric practice [16]. Posturing against the challenges facing psychiatry, the research community engaged series of responses; among the most significant being 1 a conference addressing psychiatric classification that was sponsored by the Psychopharmacology Research Branch of the NIMH, 2 the formulation of the Washington University criteria for operational diagnosis in the early s, and 3 the development of the Research Diagnostic Criteria RDC by the NIMH Psychobiology of Depression Collaborative Study, in [17]. Thus, a multitude of factors created a propitious climate for change that culminated in the publication of the third edition of the Diagnostic and Statistical Manual of Mental Disorders in [18]. Perhaps the most telling feature of this trend was the official removal of the psychodynamic term "neurosis". Confronted by an outcry from psychodynamically-oriented psychiatrists, the decision to ban the term from the DSM was only mildly amended: Additionally, an explanation of the distinction between "neurosis" as an etiological explanation, and the expression "neurotic disorder" as a discrete entity was underscored in the Introduction of the DSM-III [19]. This decision involved a categorical reorganization of many of the disorders previously conceptualized in psychodynamic terminology. The latter often entailed ramifications from previous, more broadly construed categories into several individual "subtypes", each considered as a separate and discrete mental disorder. Several single disorders were divided into a number of distinct categories; for example, the DSM-II category "Specific Learning Disturbance" was divided into five different "Specific Developmental Disorders", the category "Tic" gave way to three distinct "Stereotyped Movement Disorders," and the single category "Feeding Disturbance" was replaced by four specific "Eating Disorders". This trend of subdivision and reclassification was most pronounced, however, for the categories previously classified as "neuroses". The single category "Phobic Neurosis" was divided into five classes of "Phobic Disorders", and the single category "Depressive Neurosis" was substituted by four categories of "Major Depression" [20]. One of the amendments that was of greatest impact was the permanent removal of the category "Homosexuality" from the DSM-II. The change was originally made upon the publication of the seventh printing of the DSM-II in , following a vote by the American Psychiatric Association earlier that year [14]. The decision was provocative if not controversial within camps of both advocacy and antagonism: Specifically, elaborate and more explicitly defined operational criteria for inclusion and exclusion were

formulated for each disorder. These included standards for differential diagnosis of several categories of disorder that share similar characteristics, and the minimum duration of signs and symptoms required for a clinical diagnosis to be made. While not compared to inter-rater agreement s on earlier nosologies, the DSM-III classification system was reported to have relatively good diagnostic reliability [11 , 22]. Taken together, the multiple amendments introduced to the DSM-III demonstrate a shift in the conceptualization of mental disorders from psychological "states" to discrete, operationally defined disease categories, and a return to a descriptive, symptom-based classification. As early as , Klerman asserted that " In fact, as Young has stated, "American medical schools and residency programs routinely expected students and physicians to pass examinations based on DSM-III criteria. In an appraisal of the DSM-III a mere six years after its publication, Klerman noted a number of repercussions within several schools of thought in psychiatric research and clinical practice. Klerman claimed that the DSM-III had provided a formal common language that facilitated communication between multiple mental health professionals. While contending that the DSM-III had not become "the final consensus" with which to unify divergent perspectives regarding psychopathology, he acknowledged the "increasing acceptance of this diagnostic framework as the basis for teaching and research" [13]. Indeed, while a torrent of criticism met the publication of the DSM-III, the "revolution" it fostered was quick and its effects durable, and psychiatrists who wished to retain their roles and credibility in the field soon had to conform to its newly introduced, government-sanctioned nosology of mental disorders [14]. The delineation of operationally defined diagnostic categories for mental disorders incurred a surge in epidemiological morbidity studies. Furthermore, while the DSM-III classification system did not explicitly link diagnostic categories to any particular treatment options, the symptom-based, somatically-oriented nature of the classification scheme was particularly compatible with biological therapies customized to discretely constructed disease entities. For any medication to be approved by the FDA, a drug needs to be proven effective in the treatment of a specific disease [14]. The clear demarcation of standardized, purportedly more reliable psychopathological diagnostic categories thus provided researchers, and pharmaceutical companies, an incentive to launch randomized controlled trials RCT to test newly developed psychopharmacological agents in the treatment of specific DSM-III disorders [14]. In the years following the publication of the DSM-III, billions of dollars were allocated by the government and pharmaceutical companies for psychopharmacological research [27]. Insurance providers equally welcomed the arrival of the new nosology, and adopted the DSM-III and its subsequent editions as the standard diagnostic categorization upon which to base reimbursement of therapeutic modalities particularly, psychopharmacologic interventions [14]. The trend toward enhanced specificity of operational criteria has likewise become more pronounced throughout successive editions of the DSM, and information regarding prevalence, age- and sex -differential characteristics, and co-morbidity with other disorders has been added and regularly updated since the DSM-III-R. The significant increase in epidemiological studies based upon DSM criteria following the publication of the DSM-III has allowed for the incorporation of empirical data into the classification of several disorders [18 , 29 - 32]. Additions to the DSMs have also included information gathered from studies of the pathophysiology of mental disorders, and most recently have included data obtained from and based upon neuroimaging studies. The trend toward increased subdivisions of disorders that was originally initiated in the DSM-III has been evident in all subsequent editions of the manual. Other major amendments included the incorporation of a section dealing with "Culture-bound Syndromes" in the DSM-IV and DSM-IV-TR, thereby acknowledging cultural variability in the ways that mental health and illness are expressed and construed [30 , 31]. Rogler has attempted to interpret the increasing size and complexity of the DSM since its first edition until the DSM-IV, and has identified five major changes in its evolution; these are: Of particular interest is the continuing emphasis on the at least implicit incorporation of biological data into the classification of disorders in the DSM, with the intended elaboration of findings from studies in behavioral genetics and neuroimaging in the disorder classifications in the DSM-V. However, the Manual does not explicitly specify what and how neurogenetic, neuroimaging, and neurochemical data can or should be employed in establishing differential

diagnoses of mental disorders. Moreover, the possibility of employing these largely experimental neuroscientific and neurotechnological methods for diagnostic purposes is not without contention and has become the focus of considerable neuroethical debate see [34] for overview. Critical deliberations The history of the DSM series may certainly be viewed as an attempt to integrate scientific progress to the categorization of psychopathology, thereby reflecting an increased epistemological capital, and compelling psychiatric diagnoses to be better aligned with the medical model. Yet, while elaboration of a standardized nosology for mental disorders may have afforded a major impetus for research on psychopathology, it has also generated particular problems, abuses and possibly unforeseen consequences in the manner in which psychiatric disturbances are understood, diagnosed, and treated [35]. Perhaps one of the most striking corollaries of the symptom-based, somatically-oriented descriptive approach fostered by the DSM-III is the increase in psychopharmacological interventions, applied to conditions ranging from the severest of mental disorders to much milder DSM categories that had previously been treated with psychotherapeutic and behavioral approaches. Research in the neurochemistry and pharmacology of specifically defined psychopathological conditions has enabled the pharmaceutical industry to develop drugs targeting biological markers associated with such conditions. While this has led to the relatively successful treatment of a number of neuropsychiatric conditions e. As well, the potential for misusing the pharmaceutical approach has been decried by several critics [36 - 39], and the phenomenon of "disease mongering" has been noted in the marketing of various drugs e. Similarly, the medicalization of cognition, emotion, and behavior has also generated discourse- if not controversy- about the interpretation of subjective variables, such as what constitutes "normal" or "optimal" function within the context and expectations of society and culture [40]. In this light, the broadening categorization of mental disorders, both in terms of what constitutes "un-health", and who may be a target of psychopharmacological intervention including young children , has paralleled the increase in the number of individuals considered to possess a mental illness [41]. The perplexing conclusion drawn from a recent National Comorbidity Survey for mental disorders in the United States asserts that: Interventions aimed at prevention or early treatment need to focus on youth" [42], and this prompts a renewed interest in questions of what constitutes treatment, enablement, or enhancement- and what metrics, guidelines, and policies need to be established to clarify such criteria [40 , 43].

Chapter 3 : Statistics about the veteran population | Department of Veterans' Affairs

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Shewhart at Bell Laboratories in the early s. Shewhart developed the control chart in and the concept of a state of statistical control. Statistical control is equivalent to the concept of exchangeability [1] [2] developed by logician William Ernest Johnson also in in his book Logic, Part III: The Logical Foundations of Science. Shewhart consulted with Colonel Leslie E. Deming was an important architect of the quality control short courses that trained American industry in the new techniques during WWII. The graduates of these wartime courses formed a new professional society in , the American Society for Quality Control, which elected Edwards as its first president. Common cause and special cause statistics Shewhart read the new statistical theories coming out of Britain, especially the work of William Sealy Gosset , Karl Pearson , and Ronald Fisher. However, he understood that data from physical processes seldom produced a " normal distribution curve"; that is, a Gaussian distribution or " bell curve ". He discovered that data from measurements of variation in manufacturing did not always behave the way as data from measurements of natural phenomena for example, Brownian motion of particles. The notion that SPC is a useful tool when applied to non-repetitive, knowledge-intensive processes such as research and development or systems engineering has encountered skepticism and remains controversial. This implies that SPC is less effective in the domain of software development than in, e. Variation in manufacturing[edit] In manufacturing, quality is defined as conformance to specification. However, no two products or characteristics are ever exactly the same, because any process contains many sources of variability. In mass-manufacturing, traditionally, the quality of a finished article is ensured by post-manufacturing inspection of the product. Each article or a sample of articles from a production lot may be accepted or rejected according to how well it meets its design specifications. In contrast, SPC uses statistical tools to observe the performance of the production process in order to detect significant variations before they result in the production of a sub-standard article. Any source of variation at any point of time in a process will fall into one of two classes. It refers to many sources of variation that consistently acts on process. These types of causes produce a stable and repeatable distribution over time. It refers to any factor causing variation that affects only some of the process output. They are often intermittent and unpredictable. Most processes have many sources of variation; most of them are minor and may be ignored. If the dominant assignable sources of variation are detected, potentially they can be identified and removed. When they are removed, the process is said to be "stable". When a process is stable, its variation should remain within a known set of limits. That is, at least, until another assignable source of variation occurs. When the package weights are measured, the data will demonstrate a distribution of net weights. If the production process, its inputs, or its environment for example, the machines on the line change, the distribution of the data will change. For example, as the cams and pulleys of the machinery wear, the cereal filling machine may put more than the specified amount of cereal into each box. If the manufacturer finds the change and its source in a timely manner, the change can be corrected for example, the cams and pulleys replaced. Understanding the process and the specification limits. Eliminating assignable special sources of variation, so that the process is stable. Monitoring the ongoing production process, assisted by the use of control charts, to detect significant changes of mean or variation. Control charts[edit] The data from measurements of variations at points on the process map is monitored using control charts. Control charts attempt to differentiate "assignable" "special" sources of variation from "common" sources. Using control charts is a continuous activity, ongoing over time. Stable process[edit] When the process does not trigger any of the control chart "detection rules" for the control chart, it is said to be "stable". A process capability analysis may be performed on a stable process to predict the ability of the process to produce "conforming product" in the future. Excessive variations[edit] When the process triggers any of the control chart "detection rules", or alternatively, the process capability is low , other activities may be performed to identify the source of the

excessive variation. The tools used in these extra activities include: Ishikawa diagram , designed experiments , and Pareto charts. Designed experiments are a means of objectively quantifying the relative importance strength of sources of variation. Once the sources of special cause variation are identified, they can be minimized or eliminated. Steps to eliminating a source of variation might include: Process stability metrics[edit] When monitoring many processes with control charts, it is sometimes useful to calculate quantitative measures of the stability of the processes. These metrics can also be viewed as supplementing the traditional process capability metrics. Several metrics have been proposed, as described in Ramirez and Runger. Mathematics of control charts[edit] Digital control charts use logic-based rules that determine "derived values" which signal the need for correction.

Chapter 4 : Key Statistics for Prostate Cancer | Prostate Cancer Facts

Outline Random Variables and Statistical Populations Proportions, Averages, Variances and Percentiles Proportions: Population- and Sample-Averages: Population- and Sample-Variance: Population- and Sample-Sample Percentiles A simpler computational formula for the variance is Ïƒ 2 = 1 N N X i =1 v 2 i-Î¼ 2.

Their aim is to represent a community that interacts together socially and economically. There are 2, SA2 spatial units. In aggregate, they cover the whole of Australia without gaps or overlaps. The design reflects a balance between the respective considerations. Listed below are the criteria in the approximate order of importance. Population SA2s generally have a population range of 3, to 25, persons, and have an average population of about 10, persons. SA2s in remote and regional areas generally have smaller populations than those in urban areas. There are some SA2s outside these bounds, due to other considerations such as: Functional A functional area is the area from which people come to access services at a centre. This centre may be a rural town, a regional city, a commercial and transport hub within a major city, or the major city itself. The concept of a functional area is used at all levels of the ABS Main Structure, but is essential to the design of the SA2s outside major urban areas. A centre and its functional area are represented by one or more SA2s. A rural town and its functional area may be combined into a single SA2. A larger town may be identified by its own SA2 and its functional area by a second SA2. Larger towns and regional cities may be represented by several SA2s, as may their functional areas. Within cities, the SA2s represent gazetted suburbs rather than functional areas. See below for more detail. In remote areas, it is difficult to apply the concept of a functional area without creating regions which are too large and diverse. In remote areas, the SA2s were designed to represent meaningful regions, useful for statistical analysis. Growth SA2s containing regional towns or on the fringes of larger cities have been designed to contain: This is to ensure that the SA2 boundaries remain stable over several Population Censuses. Gazetted Suburbs and Localities Where possible, the SA2s have been designed around whole gazetted suburbs or rural localities. This is to make the regions as meaningful as possible to users unfamiliar with the statistical geography and to facilitate address coding to the various units of the ASGS. In regional and remote areas, gazetted localities were usually too small to represent an SA2 in their own right and were combined on the basis of whether they formed part of a functional area. In the major cities, SA2s often represent single suburbs. Suburb size is variable within and between cities and they do not always make a convenient region to be used directly as an SA2. Where this occurs five general criteria have been used to cluster smaller suburbs together or break up extremely large suburbs:

Chapter 5 : Statistical Distributions

STATISTICAL AREA LEVEL 2 (SA2) The SA2s are a general-purpose medium-sized area built from whole SA1s. Their aim is to represent a community that interacts together socially and economically.

Statistical Distributions Every statistics book provides a listing of statistical distributions, with their properties, but browsing through these choices can be frustrating to anyone without a statistical background, for two reasons. First, the choices seem endless, with dozens of distributions competing for your attention, with little or no intuitive basis for differentiating between them. Second, the descriptions tend to be abstract and emphasize statistical properties such as the moments, characteristic functions and cumulative distributions. In this appendix, we will focus on the aspects of distributions that are most useful when analyzing raw data and trying to fit the right distribution to that data. Fitting the Distribution When confronted with data that needs to be characterized by a distribution, it is best to start with the raw data and answer four basic questions about the data that can help in the characterization. The first relates to whether the data can take on only discrete values or whether the data is continuous; whether a new pharmaceutical drug gets FDA approval or not is a discrete value but the revenues from the drug represent a continuous variable. The second looks at the symmetry of the data and if there is asymmetry, which direction it lies in; in other words, are positive and negative outliers equally likely or is one more likely than the other. The final and related question relates to the likelihood of observing extreme values in the distribution; in some data, the extreme values occur very infrequently whereas in others, they occur more often. Is the data discrete or continuous? The first and most obvious categorization of data should be on whether the data is restricted to taking on only discrete values or if it is continuous. Consider the inputs into a typical project analysis at a firm. Most estimates that go into the analysis come from distributions that are continuous; market size, market share and profit margins, for instance, are all continuous variables. There are some important risk factors, though, that can take on only discrete forms, including regulatory actions and the threat of a terrorist attack; in the first case, the regulatory authority may dispense one of two or more decisions which are specified up front and in the latter, you are subjected to a terrorist attack or you are not. With discrete data, the entire distribution can either be developed from scratch or the data can be fitted to a pre-specified discrete distribution. With the former, there are two steps to building the distribution. The first is identifying the possible outcomes and the second is to estimate probabilities to each outcome. As we noted in the text, we can draw on historical data or experience as well as specific knowledge about the investment being analyzed to arrive at the final distribution. This process is relatively simple to accomplish when there are a few outcomes with a well-established basis for estimating probabilities but becomes more tedious as the number of outcomes increases. If it is difficult or impossible to build up a customized distribution, it may still be possible fit the data to one of the following discrete distributions: The binomial distribution measures the probabilities of the number of successes over a given number of trials with a specified probability of success in each try. In the simplest scenario of a coin toss with a fair coin , where the probability of getting a head with each toss is 0. The binomial distribution in this case will be symmetric, reflecting the even odds; as the probabilities shift from even odds, the distribution will get more skewed. The Poisson distribution measures the likelihood of a number of events occurring within a given time interval, where the key parameter that is required is the average number of events in the given interval l. The resulting distribution looks similar to the binomial, with the skewness being positive but decreasing with l. Poisson Distribution Negative Binomial distribution: Returning again to the coin toss example, assume that you hold the number of successes fixed at a given number and estimate the number of tries you will have before you reach the specified number of successes. The resulting distribution is called the negative binomial and it very closely resembles the Poisson. In fact, the negative binomial distribution converges on the Poisson distribution, but will be more skewed to the right positive values than the Poisson distribution with similar parameters. Consider again the coin toss example used to illustrate the binomial. Rather than focus on the

number of successes in n trials, assume that you were measuring the likelihood of when the first success will occur. The resulting distribution is positively skewed and looks as follows for three different probability scenarios in figure 6A. Geometric Distribution Note that the distribution is steepest with high probabilities of success and flattens out as the probability decreases. However, the distribution is always positively skewed. The hypergeometric distribution measures the probability of a specified number of successes in n trials, without replacement, from a finite population. Since the sampling is without replacement, the probabilities can change as a function of previous draws. Consider, for instance, the possibility of getting four face cards in hand of ten, over repeated draws from a pack. Since there are 16 face cards and the total pack contains 52 cards, the probability of getting four face cards in a hand of ten can be estimated. Hypergeometric Distribution Note that the hypergeometric distribution converges on binomial distribution as the as the population size increases. This is the simplest of discrete distributions and applies when all of the outcomes have an equal probability of occurring. Discrete Uniform Distribution The discrete uniform distribution is best reserved for circumstances where there are multiple possible outcomes, but no information that would allow us to expect that one outcome is more likely than the others. With continuous data, we cannot specify all possible outcomes, since they are too numerous to list, but we have two choices. The first is to convert the continuous data into a discrete form and then go through the same process that we went through for discrete distributions of estimating probabilities. The second is to find a continuous distribution that best fits the data and to specify the parameters of the distribution. The rest of the appendix will focus on how to make these choices. How symmetric is the data? There are some datasets that exhibit symmetry, i. The symmetric distribution that most practitioners have familiarity with is the normal distribution, sown in Figure 6A. Normal Distribution The normal distribution has several features that make it popular. First, it can be fully characterized by just two parameters â€" the mean and the standard deviation â€" and thus reduces estimation pain. The normal distribution is best suited for data that, at the minimum, meets the following conditions: There is a strong tendency for the data to take on a central value. Positive and negative deviations from this central value are equally likely The frequency of the deviations falls off rapidly as we move further away from the central value. The last two conditions show up when we compute the parameters of the normal distribution: There is a cost we pay, though, when we use a normal distribution to characterize data that is non-normal since the probability estimates that we obtain will be misleading and can do more harm than good. One obvious problem is when the data is asymmetric but another potential problem is when the probabilities of large deviations from the central value do not drop off as precipitously as required by the normal distribution. In statistical language, the actual distribution of the data has fatter tails than the normal. While all of symmetric distributions in the family are like the normal in terms of the upside mirroring the downside, they vary in terms of shape, with some distributions having fatter tails than the normal and the others more accentuated peaks. These distributions are characterized as leptokurtic and you can consider two examples. One is the logistic distribution, which has longer tails and a higher kurtosis 1. Cauchy Distribution Either the logistic or the Cauchy distributions can be used if the data is symmetric but with extreme values that occur more frequently than you would expect with a normal distribution. As the probabilities of extreme values increases relative to the central value, the distribution will flatten out. At its limit, assuming that the data stays symmetric and we put limits on the extreme values on both sides, we end up with the uniform distribution, shown in figure 6A. Uniform Distribution When is it appropriate to assume a uniform distribution for a variable? One possible scenario is when you have a measure of the highest and lowest values that a data item can take but no real information about where within this range the value may fall. In other words, any value within that range is just as likely as any other value. Most data does not exhibit symmetry and instead skews towards either very large positive or very large negative values. If the data is positively skewed, one common choice is the lognormal distribution, which is typically characterized by three parameters: As the sigma rises, the peak of the distribution shifts to the left and the skewness in the distribution increases. Lognormal distribution The Gamma and Weibull distributions are two distributions that are closely related to the

lognormal distribution; like the lognormal distribution, changing the parameter levels shape, shift and scale can cause the distributions to change shape and become more or less skewed. In all of these functions, increasing the shape parameter will push the distribution towards the left. In fact, at high values of sigma, the left tail disappears entirely and the outliers are all positive. In this form, these distributions all resemble the exponential, characterized by a location m and scale parameter b , as is clear from figure 6A. Weibull Distribution The question of which of these distributions will best fit the data will depend in large part on how severe the asymmetry in the data is. For moderate positive skewness, where there are both positive and negative outliers, but the former and larger and more common, the standard lognormal distribution will usually suffice. As the skewness becomes more severe, you may need to shift to a three-parameter lognormal distribution or a Weibull distribution, and modify the shape parameter till it fits the data. At the extreme, if there are no negative outliers and the only positive outliers in the data, you should consider the exponential function, shown in Figure 6a. Exponential Distribution If the data exhibits negative slewness, the choices of distributions are more limited. One possibility is the Beta distribution, which has two shape parameters p and q and upper and lower bounds on the data a and b. Altering these parameters can yield distributions that exhibit either positive or negative skewness, as shown in figure 6A. Beta Distribution Another is an extreme value distribution, which can also be altered to generate both positive and negative skewness, depending upon whether the extreme outcomes are the maximum positive or minimum negative values see Figure 6A. Extreme Value Distributions Are there upper or lower limits on data values? There are often natural limits on the values that data can take on. Using a distribution that does not constrain the values to these limits can create problems. When data is constrained, the questions that needs to be answered are whether the constraints apply on one side of the distribution or both, and if so, what the limits on values are. Once these questions have been answered, there are two choices. One is to find a continuous distribution that conforms to these constraints. For instance, the lognormal distribution can be used to model data, such as revenues and stock prices that are constrained to be never less than zero. For data that have both upper and lower limits, you could use the uniform distribution, if the probabilities of the outcomes are even across outcomes or a triangular distribution if the data is clustered around a central value. Triangular Distribution An alternative approach is to use a continuous distribution that normally allows data to take on any value and to put upper and lower limits on the values that the data can assume. Note that the cost of putting these constrains is small in distributions like the normal where the probabilities of extreme values is very small, but increases as the distribution exhibits fatter tails. How likely are you to see extreme values of data, relative to the middle values? As we noted in the earlier section, a key consideration in what distribution to use to describe the data is the likelihood of extreme values for the data, relative to the middle value. In the case of the normal distribution, this likelihood is small and it increases as you move to the logistic and Cauchy distributions. While it may often be more realistic to use the latter to describe real world data, the benefits of a better distribution fit have to be weighed off against the ease with which parameters can be estimated from the normal distribution. Consequently, it may make sense to stay with the normal distribution for symmetric data, unless the likelihood of extreme values increases above a threshold. The same considerations apply for skewed distributions, though the concern will generally be more acute for the skewed side of the distribution. In other words, with positively skewed distribution, the question of which distribution to use will depend upon how much more likely large positive values are than large negative values, with the fit ranging from the lognormal to the exponential. In summary, the question of which distribution best fits data cannot be answered without looking at whether the data is discrete or continuous, symmetric or asymmetric and where the outliers lie. Tests for Fit The simplest test for distributional fit is visual with a comparison of the histogram of the actual data to the fitted distribution.

Chapter 6 : Amazing Instagram Statistics and Facts (September)

The Diagnostic and Statistical Manual (DSM) of the American Psychiatric Association, currently in its fourth edition and considered the reference for the characterization and diagnosis of mental disorders, has undergone various developments since its inception in the mid-twentieth century.

He became only the seventh player in NBA history to score more than 30, points, in a game against the San Antonio Spurs in January Nov 5, - Internet Instagram accounts with the most followers worldwide This statistic presents a ranking of the most popular Instagram accounts as of November , sorted by the highest numbers of followers. Footballer Cristiano Ronaldo was the most-followed person on the photo sharing app platform with more than million followers. Instagram is a photo-sharing social networking service that enables users to take pictures and edit them with filters. The platform allows users to post and share their images online and directly with their friends and followers on the social network. As of June , the cross-platform app reported more than 1 billion monthly active users. Currently, there are almost million Instagram users in the United States and experts project this figure to surpass million users in Instagram audiences are predominantly young â€" recent U. Spring data reveals that Instagram is also one of the second-most important social networks of teenage internet users and one of the most-visited social networks among teenagers in the United States. Brands are keen to reach Instagram audiences as users of the social network show high engagement rates with the displayed content. As of December , the most popular fashion brand on Instagram, Nike, had over 69 million followers on the social network. Super Bowl wins by team The statistics ranks the teams of the National Football League by the number of Super Bowl titles won from to The games were originally created as part of a merger agreement between the American Football League AFL and the National Football League, with the first Super Bowl being played on January 15, , following the football season. With six championships wins, the Pittsburgh Steelers are the most successful NFL franchise in terms of the number of championships, as shown in the graph above. Charles Haley, who played from to , and Tom Brady have won the most Super Bowls as players with five each. Oct 30, - Internet Facebook: As of the third quarter of , Facebook had 2. In the third quarter of , the number of active Facebook users had surpassed one billion, making it the first social network ever to do so. Active users are those which have logged in to Facebook during the last 30 days. Furthermore, as of the previous quarter the social network had 1. The platform is also the most popular social network worldwide. Facebook Founded in , Facebook is currently the biggest social networking service based on global reach and total active users. Launched by Harvard student Mark Zuckerberg and some of his contemporaries, the service was initially only available to Harvard students but soon expanded to regional universities, the Ivy League and further universities before opening up to high school students and global users aged 13 or over. Facebook users must register before using the social network and are free to create a personal profile in order to interact with other users which they can add as friends. Furthermore, Facebook users may join user groups based on workplace, college or school and can also categorize their Facebook contacts into lists. Users can post status updates or other content and message each other. Facebook users can also interact with a wide selection of applications including social games or other services like the photo-sharing app Instagram. In September , Facebook announced over one billion active users across all platforms. The social network is also accessible to mobile web users and has published a series of apps based on original Facebook features such as Facebook Messenger , which had 1.

Chapter 7 : â€¢ Statista - The Statistics Portal for Market Data, Market Research and Market Studies

Illinois, historical and statistical, comprising the essential facts of its planting and growth as a province, county, territory, and state. Derived from the most authentic sources, including original documents and papers.

Denver visited his namesake city in and in This was the first historical settlement in what was later to become the city of Denver. The site faded quickly, however, and by the summer of it was abandoned in favor of Auraria named after the gold-mining town of Auraria, Georgia and St. The location was accessible to existing trails and was across the South Platte River from the site of seasonal encampments of the Cheyenne and Arapaho. The site of these first towns is now the site of Confluence Park near downtown Denver. Larimer, along with associates in the St. Charles City Land Company, sold parcels in the town to merchants and miners, with the intention of creating a major city that would cater to new immigrants. Denver City was a frontier town, with an economy based on servicing local miners with gambling, saloons, livestock and goods trading. In the early years, land parcels were often traded for grubstakes or gambled away by miners in Auraria. Offering daily service for "passengers, mail, freight, and gold," the Express reached Denver on a trail that trimmed westward travel time from twelve days to six. The Colorado Territory was created on February 28, , [22] Arapahoe County was formed on November 1, , [22] and Denver City was incorporated on November 7, With its newfound importance, Denver City shortened its name to Denver. A daunting miles away, citizens mobilized to build a railroad to connect Denver to the transcontinental railroad. Fundraising stalled before enough was raised, forcing these visionary leaders to take control of the debt-ridden railroad. Despite challenges, on June 24, , citizens cheered as the Denver Pacific completed the link to the transcontinental railroad, ushering in a new age of prosperity for Denver. The young city grew during these years, attracting millionaires with their mansions, as well as the poverty and crime of a rapidly growing city. Denver citizens were proud when the rich chose Denver and were thrilled when Horace Tabor , the Leadville mining millionaire, built an impressive business block at 16th and Larimer as well as the elegant Tabor Grand Opera House. Luxurious hotels, including the much-loved Brown Palace Hotel , soon followed, as well as splendid homes for millionaires like the Croke, Patterson, Campbell Mansion at 11th and Pennsylvania and the now-demolished Moffat Mansion at 8th and Grant. Soon, in addition to the elite and a large middle class, Denver had a growing population of German, Italian, and Chinese laborers, soon followed by African-Americans and Spanish-surnamed workers. Unprepared for this influx, the Silver Crash of unsettled political, social, and economic balances, laying the foundation for ethnic bigotry, such as the Red Scare and the rise of the Ku Klux Klan, as well as corruption and crime. A ruling by the Colorado Supreme Court , subsequent legislation, and a referendum delayed the creation of the City and County of Denver until November 15, The Colburn Automobile Company made cars copied from one of its contemporaries, Renault. A major fire at the facility in , as well as leakage from nuclear waste stored at the site between and , resulted in the contamination of some parts of Denver , to varying degrees, with plutonium , a harmful radioactive substance with a half-life of 24, years. Carl Johnson, in , linked the contamination to an increase in birth defects and cancer incidence in central Denver and nearer Rocky Flats. Later studies confirmed many of his findings. Downtown Denver cityscape, The movement against hosting the games was based largely on environmental issues and was led by State Representative Richard Lamm , who was subsequently elected to three terms â€”87 as Colorado governor. Denver has also been known historically as the Queen City of the Plains and the Queen City of the West, because of its important role in the agricultural industry of the High Plains region in eastern Colorado and along the foothills of the Colorado Front Range.

Chapter 8 : Denver - Wikipedia

The United States Office of Management and Budget (OMB) delineates metropolitan and micropolitan statistical areas according to published standards that are applied to Census Bureau data.

Their purpose is to represent a community that interacts together socially and economically. There are 2, SA2 regions covering the whole of Australia without gaps or overlaps. Large areas without permanent population such as international airports, large commercial areas and national parks etc. The SA2s were designed using a number of criteria which reflect a balance between respective considerations. Listed below are the criteria in the approximate order of importance. Population SA2s generally have a population range of 3, to 25, persons. SA2s have an average population of about 10, persons and include towns with a population in excess of this. SA2s in remote and regional areas generally have smaller populations than those in urban areas. There are some SA2s outside these target population ranges, due to other considerations such as: Functional A functional area is the area from which people come to access services at a centre. This centre may be a rural town, a regional city, a commercial and transport hub within a major city, or the major city itself. The concept of a functional area is used at all levels of the ABS Main Structure, but is essential to the design of the SA2s outside major urban areas. A centre and its functional area are represented by one or more SA2s. A rural town and its functional area may be combined into a single SA2. A larger town may be identified by its own SA2 and its functional area by a second SA2. Larger towns and regional cities may be represented by several SA2s, as may their functional areas. Within cities, the SA2s represent gazetted suburbs rather than functional areas. In remote areas, it is difficult to apply the concept of a functional area without creating regions which are too large and diverse. In remote areas, the SA2s were designed to represent meaningful regions, useful for statistical analysis. Growth SA2s containing regional towns or on the fringes of larger cities have been designed to contain: This is to ensure that the SA2 boundaries remain stable over several Population Censuses. Gazetted Suburbs and Localities Where possible, the SA2s have been designed around whole gazetted suburbs or rural localities. This is to make the regions as meaningful as possible to users unfamiliar with the statistical geography and to facilitate address coding to the various units of the ASGS. In regional and remote areas, gazetted localities were usually too small to represent a SA2 in their own right and were combined on the basis of whether they formed part of a functional area. In the major cities, SA2s often represent single suburbs. Suburb size is variable within and between cities and they do not always make a convenient region to be used directly as a SA2. Where this occurs five general criteria have been used to cluster smaller suburbs together or break up extremely large suburbs:

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Chapter 9 : Statistical Analysis - What is it? | SAS

For a listing of historical statistical reports see Historical listing of statistical publications. Obtaining more information or information in a different format.

Statistical Computing Traditional methods for statistical analysis â€" from sampling data to interpreting results â€" have been used by scientists for thousands of years. Affordable storage, powerful computers and advanced algorithms have all led to an increased use of computational statistics. Popular statistical computing practices include: Statistical programming â€" From traditional analysis of variance and linear regression to exact methods and statistical visualization techniques, statistical programming is essential for making data-based decisions in every field. Econometrics â€" Modeling, forecasting and simulating business processes for improved strategic and tactical planning. This method applies statistics to economics to forecast future trends. Operations research â€" Identify the actions that will produce the best results â€" based on many possible options and outcomes. Scheduling, simulation, and related modeling processes are used to optimize business processes and management challenges. Matrix programming â€" Powerful computer techniques for implementing your own statistical methods and exploratory data analysis using row operation algorithms. Statistical visualization â€" Fast, interactive statistical analysis and exploratory capabilities in a visual interface can be used to understand data and build models. Statistical quality improvement â€" A mathematical approach to reviewing the quality and safety characteristics for all aspects of production. But why is there so much talk about careers in statistical analysis and data science? It could be the shortage of trained analytical thinkers. Or it could be the demand for managing the latest big data strains. Or applying statistics to win more games of Axis and Allies. It is often these early passions that lead statisticians into the field. As adults, those passions can carry over into the workforce as a love of analysis and reasoning, where their passions are applied to everything from the influence of friends on purchase decisions to the study of endangered species around the world. Learn more about current and historical statisticians: Celebrating statisticians commemorates statistics practitioners from history. Join our statistics procedures community, where you can ask questions and share your experiences with SAS statistical products.