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Contingency analysis definition

Agresti's 3rd edition of "An introduction to categorical data analysis" was published in 2019 through Wiley-Interscience. The book is a valuable resource for understanding multivariate data analysis, especially when dealing with categorical variables. Other notable works on the subject include Bishop et al.'s (2007) "Discrete multivariate analysis", which explores the theory and practice of discrete multivariate methods, as well as Efron's (2003) article on the bootstrap in Statistical Science. Fahrmeir and Tutz's (2001) book on multivariate statistical modeling using generalized linear models is another influential work in this field. Everitt's (1992) "The analysis of contingency tables" provides a comprehensive introduction to the subject, while Goodman and Kruskal's (1954) article in the Journal of the American Statistical Association discusses measures of association for cross-classifications. Zeisel's (1985) book "Say it with figures" offers practical advice on presenting data visually, and Fienberg's (2007) "The analysis of cross-classified categorical data" provides an introduction to this specific area of study. Kateri's (2014) book "Contingency table analysis – methods and implementation using R" offers a more modern approach to the subject. Multivariate data analysis is crucial for extracting valuable information from complex datasets, making it essential in various fields like business and science. This book aims to provide an easy-to-understand introduction to relevant multivariate methods, with each chapter featuring interactive case studies solved using IBM's SPSS statistical software package. The original German version of the book has been published 16 times since its inception and was recognized by the Federal Association of German Market and Social Researchers as a "textbook that has shaped market research and practice in German-speaking countries" in 2015. A Chinese version of the book is available in its 3rd edition. On its website, additional material is provided to assist with understanding multivariate methods using Excel and R. Interactive flashcards are also available for review purposes. The authors offer exclusive content through the Springer Nature Flashcards App to test your knowledge. The Institute of Business-to-Business Marketing at the University of Münster, Germany, is headed by Professor Dr. Klaus Backhaus. Additionally, Professor Dr. Bernd Erichson has worked in market research and held a marketing chair at Otto-von-Guericke-University Magdeburg, Germany. Professor Dr. Sonja Gensler teaches at the University of Münster, Germany, as an extraordinary professor. Professor Rolf Weiber is the head of the Chair of Marketing and Innovation and managing director of the Competence Center E-Business at the University of Trier, Germany. Dr. Thomas Weiber has a Ph.D. from WHU, Otto Beisheim School of Management, Koblenz, and works on corporate strategy, pricing, sales, and marketing topics in different companies. A contingency analysis is intended to address several objectives: determine the point representing equal probability of overestimation and underestimation (Pmean), define accuracy using predetermined points such as P10 to P90, and assess confidence levels. Monte Carlo simulation is typically used for this type of analysis, which can be applied to projects nearing full funding approval or pre-feasibility studies. Events may occur, but uncertainties abound due to lacking info or ambiguity. This covers both risks and opportunities. Risk differs from contingencies as it can't be entirely eliminated, whereas contingencies can theoretically approach zero if info is sufficient. Risks involve uncertain future events that are abnormal and outside planning boundaries. Contingency reserves don't cover all potential risks, such as changes in facility output, revenue losses due to delays, project acceleration, labour disruptions, or closure during a COVID-19 lockdown. Another issue with contingency analysis is the failure to separate less well-defined aspects of estimation, leading to overly optimistic ranges. Monte Carlo simulations also present inherent biases that influence results. To avoid these pitfalls, contingency modelling should be performed independently and without preconceived notions, and range narrowing should be avoided. A structured contingency analysis should identify project elements with lower engineering or cost maturity and those involving higher complexity. Contingency terms should generate broad ranges to cover potential growth in quantities, pricing, and construction hours. From the feasibility study stage onwards, contingency analysis should define the central estimate, present contingency amounts as a probability of cost underrun, and establish a level of confidence meeting target accuracy. The project should include a risk assessment workshop, establishing a risk log, and conducting a risk analysis before finalizing the estimate. Ideally, the estimate plan would define differences between cost and schedule contingencies and risks, along with methodology to determine recommended cost contingency and residual risk amounts. Contingency analysis is used to test associations between categorical variables, similar to the goodness-of-fit test using a chi-square statistic. The power system's steady-state behavior after a fault or equipment outage is crucial to ensure it meets the load without violating voltage and equipment loading limits. It's unrealistic to design a failure-free system, so isolating faults quickly is vital to prevent disturbances. Post-fault conditions show significant changes in power flow and voltage compared to pre-fault states. Hence, studying the steady-state behavior after faults and outages is recommended. Contingency analysis involves simulating various equipment outages individually to predict their consequences and analyze operating procedures under different scenarios. This includes loss of generators, transmission lines, transformers, or loads. Analyzing possible outages to predict their consequences is essential for power system security. The N-1 contingency standard assesses the system's ability to withstand any single component failure without violating other component constraints while supporting all loads. However, this may not be sufficient when multiple failures occur simultaneously, making N-K contingency analysis necessary for multiple component failures. The power system must ensure reliable operation during equipment outages. Load flow studies should consider scenarios like transformer and motor maintenance or failure, grid supply failure, and other special circumstances. Typical load flow configurations include scenarios such as N-1 (Transformer Outage), N-1 (Grid Outage), and Not Available scenarios. System representation shows a system consisting of various components, including LV Bus Couplers, DG, transformers, and more. Load flow scenarios and switching modes may vary depending on the specific system design. The power system operates at voltage levels of 33kV and 0.4kV. It receives a supply from two 33 kV grid incomers. The system features high-voltage (HV) buses, including HV Bus-1 and HV Bus-2, as well as low-voltage (LV) buses, LV Bus-1 and LV Bus-2, connected via a bus coupler. Two 33/0.4kV transformers, T1 and T2, with a capacity of 3.15 MVA each, are utilized within the system. Additionally, one 0.4 kV, 250 kVA diesel generator is present, with its output connected to LV Bus-2. Four 630 kW induction motors are also part of the system's configuration. Assumptions were made in accordance with IEC 60076-5 for transformer characteristics and data sheets for other equipment such as generators, motors, and cables (modeled using ETAP Library). In emergency scenarios: - Emergency load is shared across LV Bus-1 and LV Bus-2 at 100 kVA each. - Contingency analysis reveals details about grid outages, transformer T1 failures, and system performance under various conditions. Results indicate: - During normal operation, loads are managed with the bus coupler opened between LV buses. - Upon T1 transformer outage, system relies on Transformer T2 to power all loads while closing LV bus couplers. - In case of grid outage, diesel generators ensure emergency load supply across both LV buses without a functioning bus coupler. The analysis referenced multiple sources for statistical modeling and contingency table analysis, including works by Agresti (2019), Bishop et al. (2007), Efron (2003), Everitt (1992), Fleiss et al. (2003), Goodman & Kruskal (1954), Fienberg (2007), Kateri (2014), and Zeisel (1985). This chapter provides an overview of multivariate data analysis methods in a concise manner. The authors, Klaus Backhaus, Bernd Erichson, Sonja Gensler, Rolf Weiber, and Thomas Weiber, have written this book specifically for readers with limited mathematical and statistical knowledge. The text highlights the importance of extracting valuable information from complex datasets and presents practical applications using SPSS software. A comprehensive introduction to various multivariate methods such as regression analysis, discriminant analysis, and factor analysis is included, along with case studies and interactive flashcards for review. The importance of multivariate data analysis for extracting valuable information from complex datasets cannot be overstated. This subject is explored in various statistical publications, including "Discrete Multivariate Analysis" by Bishop et al., which delves into the theory and practice of the field. Other notable texts include Efron's work on the bootstrap and its applications in statistical science. Books like Everitt's "The Analysis of Contingency Tables" and Fahrmeir and Tutz's "Multivariate Statistical Modelling Based on Generalized Linear Models" offer comprehensive overviews of categorical data analysis techniques. Fleiss, Levin, and Paik's "Statistical Methods for Rates and Proportions" provides an in-depth look at statistical methods for analyzing rates and proportions. Goodman and Kruskal's pioneering work on measures of association for cross-classifications remains a foundational text in the field. The book "Say It with Figures" by Zeisel offers practical advice on presenting data effectively. More recent publications, such as Kateri's "Contingency Table Analysis – Methods and Implementation Using R," provide hands-on guidance using contemporary software tools. For those looking for an accessible introduction to multivariate data analysis, the provided textbook offers a step-by-step guide through various methods, including regression analysis, analysis of variance, discriminant analysis, logistic regression, contingency analysis, factor analysis, cluster analysis, and conjoint analysis. Each method is illustrated with real-world examples using SPSS statistical software. The original German edition of this book has become a standard reference in the field, having been published in 16 editions and earning recognition from the Federal Association of German Market and Social Researchers as "the textbook that has shaped market research and practice in German-speaking countries." The 3rd edition of the book is available on the website www.multivariate-methods.info, where the authors use Excel and R to further analyze the data and provide supplementary materials for better understanding. Interactive flashcards can also be accessed to review key points. The Springer Nature Flashcards App offers exclusive content for testing knowledge. The authors include Professor Dr. Dr. h.c. Klaus Backhaus, a renowned expert in Business-to-Business Marketing, who is affiliated with several prestigious universities in Germany. Other contributors are distinguished professors and experts in their fields, each bringing unique perspectives to the table. The bibliography lists key references from notable researchers, including Agresti (2019), Bishop et al. (2007), and Efron & Tibshirani (1994). These resources provide a solid foundation for understanding multivariate data analysis methods and their applications in various fields. Multivariate data analysis is essential for business and science, and can provide valuable insights if properly extracted from large datasets. This book offers a practical introduction to the most relevant methods of multivariate data analysis, focusing on applications rather than mathematical foundations. With numerical examples and case studies using IBM's SPSS software package, readers can gain hands-on experience with regression analysis, discriminant analysis, logistic regression, and other techniques. The book includes chapters on contingency analysis, factor analysis, cluster analysis, and conjoint analysis, providing a comprehensive overview of multivariate methods. An introductory chapter reviews the basics of statistical concepts relevant to all methods. The authors also provide links to additional procedures and recommendations for application, as well as resources for further study. Originally published in German, this book has been widely acclaimed as a leading textbook on market research and practice in Germany, with its 16th edition now available. A Chinese version is also available in its third edition. For added support, the authors offer interactive flashcards and supplementary materials to facilitate understanding of multivariate methods, including Excel and R analysis.