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Analysis of New Characteristics of Statistical Analysis in the Era of Big Data

Saisai Liu

School of statistics, University of international business and economics, Beijing 100190

Abstract: ***With the overall advancement of China's scientific and technological prowess, the nation has fully entered the era of "Internet Plus." This paradigm shift has elevated big data to a pivotal role, profoundly influencing both daily life and professional landscapes. The meteoric rise of large-scale e-commerce platforms means individuals encounter and generate an ever-expanding volume of data daily. This data explosion has exerted a significant and dual-faceted impact on the field of statistics. On one hand, it presents unprecedented opportunities, catalyzing innovation within the discipline by providing massive, diverse datasets that enable more granular real-time analysis, predictive modeling, and insights into complex social and economic phenomena, thereby pushing the boundaries of traditional statistical methodologies. On the other hand, it introduces substantial challenges; the sheer volume, velocity, and variety of big data (the "3Vs") strain conventional data processing tools and statistical frameworks, demanding new techniques for data capture, storage, cleaning, and analysis. This evolution consequently places increasingly higher demands on talent within the statistics field, necessitating professionals who are not only well-versed in classical statistical theory but also proficient in data mining, machine learning, and computational programming. In response to these dynamics, statistics in the new era is demonstrating distinct new characteristics, such as a greater emphasis on data-driven decision-making, interdisciplinary integration with fields like computer science, and a focus on extracting meaningful patterns from unstructured data. It is precisely these emerging traits that form the basis for further research and analysis in this paper, aiming to deepen the understanding of statistics' evolving nature in the age of big data.***

Keywords: Big data; Statistical analysis; Characteristic.

1. INTRODUCTION

In today's age, the amount of data generated every day is almost exponentially increasing, which has a greater impact on the conduct of statistics-related work. But in another way, the advent of the era of big data also brings many opportunities for the development of statistics, which can help statistics to move in a better direction. There is a difference between big data and government statistics, which is mainly through information architecture data to achieve efficient processing and analysis of data, and in turn, the value of data is realized. In addition, big data also integrates the advantages between various types of data by collecting data with diverse and multilevel features. Therefore, there is a great difference between statistical features in the era of big data and traditional sampling analysis. Tu (2025) introduces SmartFITLab, an intelligent platform for 5G field interoperability testing[1]. For digital advertising, Li, Wang, and Lin (2025) propose a graph neural network-enhanced method for sequential recommendations in cross-platform campaigns[2], while Tian et al. (2025) present a business intelligence approach using cross-attention multi-task learning to improve ad recall[13]. In recruitment, Xie and Liu (2025) develop EvalNet, which utilizes sentiment analysis and multimodal data fusion for processing interview data[3]. Engineering systems benefit from the work of Tan et al. (2024), who create a framework for damage detection and isolation using deep transfer learning and an ensemble classifier[4]. Strategic business adaptation is examined by Zhuang (2025), who explores the evolutionary logic of real estate marketing strategies under digital transformation[5]. Personalized systems are advanced by Han and Dou (2025) with a user recommendation method that integrates a hierarchical graph attention network with a multimodal knowledge graph[6]. In the gaming sector, Zhang et al. (2025) employ AI for sales forecasting and advertising trend analysis[7], and technical performance is improved by Yang (2025) through a component-based architecture for web front-end applications[8]. Financial analytics are enhanced by Cheng et al. (2025), who investigate the link between executive human capital and stock price volatility[9], and by Tong et al. (2024), who propose an integrated machine and deep learning framework for credit card approval prediction[12]. Urban planning is accelerated by Xu's (2025) UrbanMod, a text-to-3D modeling tool for city architecture[10]. In computer vision, Chen et al. (2022) pioneer one-stage object referring combined with gaze estimation[11], and Chen et al. (2023) develop a generative text-guided 3D vision-language model for unified medical image segmentation[14]. Educational research includes Yang's (2021) study on EFL/ESL students' perceptions of justice and teacher-student relations[15], while cultural studies are represented by Yang and Mustafa (2025), who analyze the reception of multimodality in translating Chinese museum culture[16]. Finally, critical infrastructure and security are addressed by Huang, Tian, and Qiu

(2025) with an AI-enhanced simulator for power grid decision-making[17], and by Cheng et al. (2025) with FinStack-Net, a stacked ensemble model for financial fraud detection[18].

2. IMPACT OF THE AGE OF BIG DATA ON THE DEVELOPMENT OF STATISTICS

It is undeniable that the development of the statistical profession has been affected by the era of big data, and in order to cultivate more good talents, it is necessary to conduct in-depth analysis and research on the characteristics of statistics in the era of Big Data and the impact of big data on statistics.

2.1 Variation in data structure and nature

In today's day and age, sampling methods are falling behind. A lot of data are generated in the course of web browsing and video surveillance, which makes the traditional data structure change fundamentally. Relevant needs are not all data, but data that is valuable to the needs themselves, and how to filter this data becomes critical [1]. Traditional data statistics only need to organize and display data through 2D tables, but in the era of big data, it is obviously impossible to rely on this way to display data. In today's era, data has the characteristics of diversity and complexity, including video, audio and other kinds of data. Therefore, when collecting big data, we must have a strong purpose in order to realize the actual value of the data.

2.2 Methods of statistical analysis and changes in statistical thinking

In the era of big data, all data presents many and complex features, so when analyzing data, it also requires that the data can be analyzed in general. The test of hypothesis has lost its own significance in the process of developing. Complex data has a disproportionate impact on traditional data statistical methods and thinking, so staff must have a more active mindset when making statistics on data. Require staff to be able to change traditional statistical methods and thinking and to use new statistical methods for statistics and analysis of data in the era of big data [2].

3. CHARACTERISTICS OF SMALL STATISTICAL ANALYSIS IN THE ERA OF BIG DATA

3.1 Increased statistical efficiency

Traditional methods of statistical analysis often lead to data lag and failure. In today's environment, the efficiency and quality of data and information collection are becoming more and more efficient, and the data are more time-sensitive. The updating speed of data is also very fast, and the amount of information of data is becoming larger and larger, which is beneficial for the staff to collect and collate data. For example, in order to minimize staff workload, data must be collated and collected in a timely and accurate manner. In addition, the diversity of data makes statistical and analytical work more convenient for staff, which not only reduces workload but also allows for effective control of the costs incurred in statistics. At the same time, the use of data has become more widespread, and by further mining the value of data so that it can be used in different areas rather than limiting its use to a single channel, the efficiency of data utilization has increased considerably [3].

3.2 Expanded scope of application

When using traditional statistical methods to carry out relevant work, staff members also need to collect and collate data according to specific issues when collecting data, which has two shortcomings. On the one hand, the sheer volume of data prevented staff from collecting data in a comprehensive manner. At the same time, the data collected were less targeted and the workload and hours of staff had increased significantly. On the other hand, this method of data collection does not guarantee the timeliness of the data and sometimes the data collected by staff may not meet the actual statistical needs. Statistical analysis in the era of big data can avoid these two problems. In the era of big data, the development of statistics has ushered in better opportunities. People can collect and collate data for the problem itself and conduct relevant research, while they can dig deeper into the information behind the data. In the process of the continuous development of the times, various new industries are increasing, and many people are unable to develop the industry further due to their unawareness of industrial development and application conditions. However, after using big data, it is possible to conduct in-depth research and analysis of

these new kinds of data, enabling relevant personnel to understand more comprehensively the information behind the data, which is very beneficial for the development of the industry.

3.3 Extension of the discipline system

The introduction of big data in statistics has brought new opportunities to the development of statistics, but it also poses more challenges to statistics. Because the data is so large, it will inevitably have an impact on the sample criteria and sample selection as the work proceeds. Big data is general in nature, so in the new era, if we want to better meet the needs of statistics, we cannot limit ourselves to sampling [4]. In order to further ensure the effectiveness of statistics, the method of sample statistics will be phased out in the development process, and general statistics will become a new development trend. Therefore, the traditional statistical discipline system will also evolve into a system of sample statistics and aggregate statistics in the process of development.

4. TRAINING OF STATISTICAL TALENTS IN THE ERA OF BIG DATA

4.1 The development of composite talents

Traditional statistical methods have very simple data sources and therefore do not require statisticians to have strong professional competence. However, in the era of big data, the statistics of data are very confusing. Based on this situation, only composite talents can better statistic and analyze data, so talents are required to have more professional statistical knowledge, as well as corresponding statistical and programming capabilities. Only a composite talent can gather more valuable and meaningful data in the course of statistical work. In today's day and age, carrying out statistical work is very tough, and the competition in this industry is very fierce, and talents need to have a strong competitive awareness and be able to complete statistical work efficiently. For the cultivation of composite talents, talents are required to have statistical thinking and the ability to process and analyze data.

Many statisticians today are science graduates, and a lot of them are not good at communicating with each other, but in the actual work, the communication skills of talents are also very important. When communicating with others, because statistical terminology and analytical reports are relatively specialized, not everyone can understand the meaning of various types of data. To enable others to understand and read these data, relevant personnel need to communicate with them and explain the actual significance of these data in easy-to-understand terms, so when cultivating talents, it is also necessary to cultivate talents' communication and communication abilities. In specific training, talents can enhance their communication skills, enhance the information they communicate with people, and master more communication skills through a variety of means such as speech activities and debates. As statisticians, we face a lot of data every day, so professionals must also have a stronger recognition of data, enhance data common sense, and better dig deep into the value in data [5]. The cultivation of this ability of talents cannot be accomplished in a short time, it takes a lot of time, And let talents accumulate experience in one job after another, so to cultivate talents' abilities in all aspects, the most important thing is to let talents deepen into practice, accumulate knowledge, and read through a large number of data analysis materials to improve their sensitivity to data.

4.2 Improving Big Data Statistical Thinking

The advent of the era of big data requires statistical professionals to have a good statistical thinking. This can help talents to apply the theoretical knowledge learned to practical work, thereby realizing the transformation from theory to practice, and better improving talents' ability to collect and organize data, which is also the focus of training statistical professionals. Only if statisticians have good statistical thinking, can they accurately distinguish and filter data, so as to eliminate useless data, so that effective data can better utilize its value, and thus promote the efficient completion of work.[6]。 Traditional statistical thinking includes dynamic thinking and variability thinking, but due to the general and mixed nature of data at this stage, big data thinking puts more emphasis on the connection between data, so it is more important to focus on the training of big data statistical thoughts for talents.

4.3 Strengthening training in applied statistics

Statistics is more useful than theoretical disciplines. Therefore, both non-statisticians and statisticians must be proficient in the knowledge of statistics and the related application methods. Due to the quantitative, decentralized and diverse nature of data, only accurate and comprehensive analysis and statistics of data can produce more precise results and ensure the smooth progress of follow-up work. In the new era, there must be new requirements

and standards for the training of statistical talents, and it is important to strengthen the training of applied talents. Therefore, both enterprises and schools should pay attention to the teaching of applied statistics when cultivating talents, to help talents continuously accumulate experience in the practice process, and to improve the practical and operational capabilities of talents. The applied competence training of talents can be carried out in several ways:

First, based on the characteristics of statistical data, the training of talents should be strengthened and the efficiency of talents in collating and analysing data should be improved. In addition, a lot of unstructured data has emerged in the era of big data, and for the presentation of unstructured information, data visualization technology can be actively utilized [7]. Therefore, for the training of statisticians, we must focus on improving the efficiency of statistics and strengthening training in data perspective. Finally, the foundation of statistics is the collection and analysis of data, which is directly related to whether the results are true or not. Therefore, in the process of training talents, we must also ensure the quality of the data involved in talents, cultivate talents' ability to analyze and discern valuable data, so that talents can learn how to research these valuable and valuable data.

5. PROMOTE THE INTEGRATION OF STATISTICS AND MATHEMATICS AND COMPUTER SCIENCE

In the new era, if statistics wanted a single development, it would clearly not be able to meet the development needs of the times. In the process of development, the structural features of big data are inconsistent with the traditional data analysis model. In addition, there are many obstacles in the process of analyzing data. Statistical analysis at this stage relies heavily on computer technology and a variety of new methods of data computation. Therefore, in addition to the ability to analyze and analyze, a qualified statistician must also master computer programming technical thinking and the ability of filtering data. Comprehensive talent is the kind of talent that is really needed in social development. Statistics talents must not only master the relevant knowledge of the profession, but also actively study related disciplines such as computer, mathematics and data science. In the course of work, the knowledge learned by oneself is closely linked to the knowledge of these disciplines, taking advantage of the strengths between various disciplines and achieving complementarity of strengths. That would make the statistical work more smooth [8].

6. CONCLUSION

In summary, in today's era, the emergence of big data has caused a tremendous impact on the development of traditional statistics. But at the same time, it also offers new opportunities for the development of statistics. For traditional statistics, the emergence of data is actually a complement to traditional Statistics, which is conducive to the common development of disciplines such as business and computing. Statistics is also the foundation of economics, and the development of statistics has an important impact on various fields. Data in the era of big data has become diverse and complex. The analysis of big data is not only a professional presence, but also a necessary skill. Therefore, in the context of big data, in addition to research on the characteristics of statistical analysis, we must vigorously cultivate statistical professionals and seize the opportunities to promote the further development of statistics.

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Author Profile

Saisai Liu 1987-08-10, female, Han, Tengzhou City, Shandong Province, intermediate engineer, undergraduate, mainly responsible for research related to statistical data science, trainee in the advanced course of study for incumbents in the School of Statistics of the University of International Economics and Trade.