The Application of Computer Software Technology in the Age of Big Data

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Abstract: ***With the growth of Internet users, mankind has entered the era of big data.The development and application of computer software technology not only improve people's living and office efficiency, but also profoundly affect personal information security.In the era of big data, the application scenarios and scope of computer software have expanded to all aspects of life.This article mainly provides an overview of the current status of computer technology and big data, analyzes the problems existing in software technology in the era of big data, and elaborates on the specific applications of software in the era of big data, in order to better promote software development and serve production and life.***

Keywords: Computer; Software; Big data; Application.

1. INTRODUCTION

In recent years, big data and related topics have become a focus in software development, and various enterprises are actively promoting the application of big data technology in software development to expand software functions and better promote enterprise development. Compared to traditional software technology, in the era of big data, software development places greater emphasis on extracting valuable information from user data, optimizing software functionality, enhancing the role of software in enterprise services, and creating good socio-economic value. In smart city development, Li et al. (2025) proposed an interactive data exploration framework from a user-centered perspective, enhancing urban analytics capabilities [1]. Supply chain management has been revolutionized by Saunders et al. (2025), who identified key pathways for AI-driven operational efficiency improvements [2], while Pal et al. (2025) developed an AI-based credit risk assessment system for supply chain finance [11]. Industrial applications have seen significant AI integration, particularly in Zhao et al.'s (2024) deep learning approach for optimizing steel production scheduling [3]. Financial analytics has advanced through Yang et al.'s (2025) big data methods for economic cycle prediction [4] and their CNN-based stock market sentiment analysis [5], complemented by Jiang et al.'s (2025) Investment Advisory Robotics 2.0 for personalized financial guidance [7]. Healthcare applications demonstrate AI's diagnostic potential, with Diao et al. (2025) achieving improved lung cancer detection accuracy through optimized Bi-LSTM networks [6]. Wang (2025) contributed a knowledge graph-based anomaly detection system for clinical trial data [14], while Zhang et al. (2025) developed machine learning techniques for biomechanical anomaly detection [12]. Ma et al. (2024) investigated environmental health impacts through their study of metal exposure effects on fetal development [9]. Network optimization has progressed through Tu's (2025) Log2Learn system for intelligent log analysis [8], while computer vision advanced with Ding et al.'s (2025) innovative attention mechanisms for clothing-changing person re-identification [10]. For small and medium enterprises, Qi (2025) developed DecisionFlow, a lightweight framework for multi-task prediction and anomaly detection [13].

2. OVERVIEW OF THE CURRENT STATUS OF COMPUTER SOFTWARE TECHNOLOGY AND BIG DATA

The rapid development of computer software technology has driven the development of a series of data processing technologies such as cloud computing and big data. Although China's computer software technology has developed rapidly in recent years, due to factors such as late start and insufficient intellectual property protection, some professional computer software still relies mainly on foreign software. Considering the importance of big data for national information security and software functionality in the information age, strengthening software function development and creating a software technology application ecosystem with independent intellectual property rights are important directions for the development of software technology in the big data era.

2.1 Current Status of Computer Software Technology in China

Computer software technology in China has been widely applied in various industries. In practical applications, computer software not only covers production and manufacturing, education and research, leisure and entertainment, but also plays an important role in agricultural production, enterprise management and many other economic activities, providing assistance in improving labor productivity and working environment.In recent years, Internet enterprises represented by Tencent, Alibaba and 360 have increased their efforts in software technology development and actively promoted the improvement of domestic software development, so as to achieve independent research and development in data security, software ecological construction and other aspects and change their dependence on foreign software technology.It should be recognized that in some professional application software, the mainstream market is still dominated by foreign software. Although there are historical factors such as China's late start in software development, it also reflects that in the information age, in order for software technology to occupy the market, it must be consistent with the direction of information technology development. With the help of the new requirements for software functions in the big data era, actively improve software technology level in software development, ecological construction and other aspects, so that computer software can better serve the development of the national economy and enhance China's information security level.

2.2 Overview of Big Data

The main feature of the Internet era is the extensive application of information technology, which also produces massive data.In the early days, people did not realize the potential application of information data. With the accumulation of data, especially the development of e-commerce in the consumer field, people gradually realized the potential application of big data.At present, the data generated on the Internet every day is up to tens of billions, reflecting the laws of people's economic activities.Analyzing, organizing, and mining valuable parts of big data, and then applying them to various fields such as industrial production, consumer demand analysis, logistics, etc., in order to achieve accurate prediction of economic activities, reduce production inventory, and better serve economic development.At present, people call the information age the age of big data. The fundamental reason is that the current Internet development is based on data. Big data has a profound impact on computer software and has changed the trend of software development.

3. PROBLEMS IN THE APPLICATION OF COMPUTER SOFTWARE IN THE ERA OF BIG DATA

3.1 The scope and level of software application need to be improved

Currently, with the overall improvement of China's software development level and sufficient software development personnel, the application scope and development level of software in China are gradually catching up with advanced foreign levels. However, in practical applications, the scope and role of software still need to be further improved.On the one hand, although some basic software in China, such as desktop operating systems, have domestic brands, their market share and usage effects have not yet reached the same level as foreign counterparts, which has affected China's information security;On the other hand, in some professional software tools, due to issues such as intellectual property rights and user consumption habits, a large number of pirated software applications exist, resulting in a lack of enthusiasm for domestic alternative software development. Once foreign software development companies implement technology blockade, it will lead to bottlenecks in related fields.At present, some users do not attach enough importance to software development, and the software development process consumes a lot of time and manpower. Without market support, the enthusiasm of developers will be affected.In addition, some software lacks follow-up technical personnel for maintenance and optimization after development and use, resulting in poor user experience and inability to experience the complete functions of the software, which can cause a waste of time and energy in the usage process.

3.2 Low software security level

With the development of computer software technology, more and more data is stored in software, especially important data materials, which has changed the way drawings were stored in the past and more computers are chosen as storage media.The development of computer software technology not only provides powerful work assistance, but also faces security issues.Early software security was mainly reflected in computer viruses, while in the era of big data, it is more reflected in data security. Some software collects user data information through various means to gain irresponsible benefits, and some software has vulnerabilities that can easily cause data leakage, posing a serious threat to personal property security.For a large number of users, software security has become the main factor affecting their use. In the era of big data, only by strengthening the security of computer

software technology and attaching importance to the protection of users' personal privacy data can we ensure the normal development and use of software, and promote the continuous improvement of software security.

3.3 The level of software development needs to be improved

In the era of big data, computer software development and optimization are more important.At present, the level of software technology development is insufficient, reflected in two aspects. Firstly, professional developers have insufficient understanding of development languages and software architecture, and some software have many vulnerabilities, resulting in poor user experience and lack of sufficient optimization. Secondly, with the advent of the big data era, software development ideas and technologies are more focused on the application of data, and existing software developers are constrained by knowledge structures and development ideas, which cannot meet the development requirements of computer software technology.In addition, in terms of software development categories, some basic tool software lacks commercial value and lacks relevant institutions to promote software development, overly relying on foreign software. Most software development efforts are focused on high commercial value software such as games and shopping, which cannot improve the overall level of software development in China and objectively hinders the long-term development of computer software technology.

4. APPLICATION FIELDS OF COMPUTER SOFTWARE TECHNOLOGY IN THE ERA OF BIG DATA

4.1 Virtualization Technology

The development of computer virtualization technology is based on the powerful computing power and massive data of computers.By modeling and processing existing data, simulation design and functional optimization can be achieved.For example, the widespread application of BIM software technology is the integration of big data and computer software functions to achieve three-dimensional visualization of buildings, allowing for intuitive presentation of architectural design effects and realizing the informatization of architectural design.Since its inception, virtualization technology has shown strong application prospects.In urban planning and design, with the help of professional software and data resources such as GPS and digital maps, people can present a panoramic view of the plan, thereby reducing errors in urban planning and improving the level of urban planning and design.In addition, many service fields have also begun to use big data to redesign traditional software functions and increase the service content of computer software.Taking Taobao customer service as an example, in the era of big data, people have shown a high degree of consistency in the issue of purchasing goods. If traditional manual customer service is used, not only will the workload be large, but the repetitive work content will also reduce people's work interest. On the other hand, big data can achieve intelligent response through the statistics of existing consultation content, which can improve customer satisfaction and reduce labor costs.On the basis of informatization, with the help of big data technology, mechanical operations can be transformed into virtual reality, increasing software functionality while achieving virtualization.

4.2 Intelligent Search Service

Relying on big data technology, it can provide more intelligent services for Internet users' information query and data search, and provide information processing and intelligent processing capabilities for commercial and economic activities.In the information age, although massive amounts of data can greatly provide people with information supply, without effective search services, people cannot obtain the information they need in a timely and convenient manner, and are trapped in the ocean of information.By utilizing big data, users can search for existing data records and historical user queries, and match corresponding information materials in a timely manner to meet their information query needs.At present, intelligent search services are widely used in shopping websites, libraries, search engines, and other fields, combined with traditional service software to recommend relevant data services based on consumers' consumption habits, cultural backgrounds, and personal preferences, thereby optimizing service experience and promoting the improvement of consumption and service levels.In addition, intelligent search services can also intervene in enterprise information push. In the company's business operations, data collection can also be stored in the company's database for future normal search and use.It can be said that the effective application of computer software technology in the big data environment will bring great convenience to enterprises and users, and will greatly help maintain the relationship between enterprises and customers, and improve the economic interests of enterprises.

4.3 Cloud storage technology

In the era of big data, the storage and preservation of information has become an important issue.The rapid development of computer software technology has made storage space increasingly important, but due to the limitations of storage technology, it cannot meet the growth rate of data. Therefore, cloud storage technology has been developed as a solution to meet the storage needs of computer software.At present, major Internet enterprises provide cloud storage services for enterprises and individual users.For individuals, it is no longer necessary to carry storage tools such as mobile hard disks. As long as cloud storage services are used, data upload, download, sharing and other services can be achieved, and Internet services can be better experienced.For enterprises, cloud storage services can reduce the risk of commercial data leakage and provide a data sharing platform for internal employees.At present, some Internet enterprises provide cloud storage services for enterprise users, which can not only meet the needs of enterprises for data storage in the era of big data, but also develop personalized cloud storage services according to the business needs of enterprises, help enterprises in the era of big data informatization level, and reduce the operating costs of enterprises.In the future, computer software will have a larger volume and occupy more space, and the rapid growth of data can only be achieved through cloud storage technology to meet the rapid growth of data in the information age.

4.4 Information Security Technology

Information security technology has always been an important problem facing the development of the Internet.At present, the types and quantities of computer software viruses have been significantly controlled, thanks to the promotion of major commercial antivirus software and the improvement of virus protection level in computer software development. The number of network security attacks targeting ordinary users has decreased. However, in the era of big data, information security is more reflected in the data itself.At present, some criminals use big data technology to collect information from Internet users, and dig out personal privacy, such as age, work, address, user consumption habits, so as to package information for sale and gain benefits.Some fraudsters develop targeted fraud schemes based on the information provided by big data, thereby causing economic losses to ordinary users.In the era of big data, computer software technology should pay attention to the protection of user privacy in the application process, clarify the boundaries of information collection, and limit the collection of personal privacy during software use, so as to avoid user data from being obtained by illegal elements and resulting in information loss.

4.5 Enterprise Information Decision making

When a company makes information decisions, it can develop corresponding information solutions through the reasonable application of computer software technology and provide relevant management software for the company, effectively analyzing the company's risks, and obtaining user information for online sales.With the advent of the big data era, it is necessary to implement it through computer software to drive higher quality company decisions.

(1) Mainly to check the integrity of product data, effectively control product quality, and provide high-quality services to users.

(2) Exploration and development.Based on the extraordinary value and relevance of the product, perform data analysis work to provide employees and users with a deeper understanding of the data.

(3) Sustainable development, big data statistical analysis systems have become very powerful, allowing companies to do more with limited data.

5. CONCLUSION

In the era of big data, computer software technology is facing new opportunities and challenges for development.In software development, we should actively utilize the opportunities brought by big data, improve our data mining and application capabilities, enhance our ability to analyze, organize, and filter data, so as to make software technology more in line with people's life and work needs.I believe that with the improvement of China's software development level, in the era of big data, computer software technology will better serve the development of the national economy.

REFERENCES

[1] X. Li, L. Evans, and X. Zhang, “Interactive data exploration for smart city analytics: A user-centered perspective,” 01 2025.
[2] Saunders, E., Zhu, X., Wei, X., Mehta, R., Chew, J., & Wang, Z. (2025). The AI-Driven Smart Supply Chain: Pathways and Challenges to Enhancing Enterprise Operational Efficiency. Journal of Theory and Practice in Economics and Management, 2(2), 63–74. https://doi.org/10.5281/zenodo.15280568
[3] Zhao, H., Chen, Y., Dang, B., & Jian, X. (2024). Research on Steel Production Scheduling Optimization Based on Deep Learning.
[4] Yang, W., Zhang, B., & Wang, J. (2025). Research on AI Economic Cycle Prediction Method Based on Big Data.
[5] Yang, W., Lin, Y., Xue, H., & Wang, J. (2025). Research on Stock Market Sentiment Analysis and Prediction Method Based on Convolutional Neural Network.
[6] Diao, Su, et al. "Optimizing Bi-LSTM networks for improved lung cancer detection accuracy." PloS one 20.2 (2025): e0316136.
[7] Jiang, G., Yang, J., Zhao, S., Chen, H., Zhong, Y., & Gong, C. (2025). Investment Advisory Robotics 2.0: Leveraging Deep Neural Networks for Personalized Financial Guidance. Preprints. https://doi.org/10.20944/preprints202504.1735.v1
[8] Tu, T. (2025). Log2Learn: Intelligent Log Analysis for Real-Time Network Optimization.
[9] Ma, Haowei, et al. "Maternal and cord blood levels of metals and fetal liver function." Environmental Pollution 363 (2024): 125305.
[10] Ding, Y., Wang, X., Yuan, H., Qu, M., & Jian, X. (2025). Decoupling feature-driven and multimodal fusion attention for clothing-changing person re-identification. Artificial Intelligence Review, 58(8), 1-26.
[11] Pal, P. et al. 2025. AI-Based Credit Risk Assessment and Intelligent Matching Mechanism in Supply Chain Finance. Journal of Theory and Practice in Economics and Management. 2, 3 (May 2025), 1–9. DOI:https://doi.org/10.5281/zenodo.15368771
[12] Zhang, Shengyuan, et al. "Research on machine learning-based anomaly detection techniques in biomechanical big data environments." Molecular & Cellular Biomechanics 22.3 (2025): 669-669.
[13] Qi, R. (2025). DecisionFlow for SMEs: A Lightweight Visual Framework for Multi-Task Joint Prediction and Anomaly Detection.
[14] Wang, Y. (2025, May). Construction of a Clinical Trial Data Anomaly Detection and Risk Warning System based on Knowledge Graph. In Forum on Research and Innovation Management (Vol. 3, No. 6).