Research on the Application of Intelligent Technology in Document and Archives Management

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Abstract: *With the arrival of the information and digital age, traditional document and archives management methods have gradually revealed a series of issues, such as low efficiency, easy loss of information, and difficulties in storage and retrieval. The rise of intelligent technology has provided a new solution for document and archives management. Particularly, the combination of technologies like artificial intelligence, big data, and cloud computing has greatly improved the level of intelligence in archives management. This study aims to explore the application of intelligent technology in document and archives management, analyzing its advantages in improving management efficiency, ensuring data security, and optimizing storage and retrieval. At the same time, the challenges and issues faced in the application of these technologies are discussed. Through an in-depth analysis of intelligent technologies, this paper proposes key application paths such as intelligent classification, automated storage, intelligent retrieval, and security assurance, while exploring innovative management models in the context of digital transformation. The goal is to provide theoretical support and practical guidance for the modernization and intelligent development of document and archives management.*

Keywords: *Intelligent Technology; Document and Archives Management; Artificial Intelligence; Big Data; Digital Transformation; Data Security*

Introduction

Currently, many enterprises and government departments around the world are actively exploring the application of intelligent technologies in archives management. The wave of digital transformation has also compelled researchers in related fields to delve deeply into the application of intelligent technologies in document and archives management. By enabling automatic classification, intelligent storage and retrieval, real-time monitoring, and security assurance, intelligent technologies have driven a comprehensive upgrade in archives management. However, despite the promising prospects of intelligent technologies in document and archives management, there are still many challenges in their implementation and application, such as system compatibility, data security, and staff training. Therefore, researching the application of intelligent technologies in document and archives management not only has theoretical research value but also significant practical implications.

1. Background and Significance of Intelligent Technology in Document and Archives Management

1.1 Limitations of Traditional Document and Archives Management

Traditional document and archives management methods often rely on manual operations and paper-based storage. Although this approach effectively supported archival needs over the past decades, with the rapid increase in information volume and the diversification of management needs, the traditional model has gradually shown significant limitations. First, paper-based archives require a vast amount of storage space, and documents are easily damaged by human error, natural disasters, or other factors, leading to the loss of information. Second, traditional archives management methods typically involve cumbersome manual data entry, search, and filing processes, which are prone to errors and inefficiency. Furthermore, with the rapid development of information technology and the diversification of management subjects, the traditional model struggles to meet the needs of modern archives management for quick updates and efficient retrieval. In this context, the digital and intelligent transformation of archives management has become increasingly urgent. [1]

1.2 The Rise of Intelligent Technology and Its Application Background

With the rapid development of technologies such as big data, artificial intelligence (AI), cloud computing, and the Internet of Things (IoT), intelligent technologies have gradually permeated various industries, becoming a driving force for industry innovation and development. In the field of document and archives management, the application of intelligent technologies signifies a revolutionary transformation in archival practices. Through AI's semantic recognition, image processing, and machine learning techniques, combined with big data analysis, archives management can not only achieve digital storage but also enhance the intelligent processing capabilities of archives, such as automatic classification, intelligent retrieval, and content analysis. The application of cloud computing and IoT further solves the traditional problems of limited storage space and data silos, providing reliable support for sharing, collaboration, and remote access to archives. The rise of intelligent technologies has ushered document and archives management into a new era of digitalization and intelligence.

1.3 The Role of Intelligent Technology in Advancing Document and Archives Management

The role of intelligent technology in advancing document and archives management is primarily reflected in improving management efficiency, optimizing resource allocation, ensuring information security, and supporting intelligent decision-making. First, intelligent technologies, by introducing automated classification, storage, and intelligent retrieval systems, have significantly enhanced the efficiency of archives management, reducing the complexity of manual operations and the rate of errors. AI applications, such as natural language processing (NLP) and machine learning (ML), help managers automatically classify large volumes of textual data, extract keywords, and understand semantics, thereby greatly improving the accuracy and efficiency of information processing. Second, intelligent technologies provide more flexible and secure methods for document storage and management. For instance, cloud-based document storage not only effectively solves the problem of limited storage space but also enhances data security through encryption and permission management mechanisms, preventing information leaks and losses. Additionally, intelligent technology introduces real-time data analysis and decision support in archives management, helping managers optimize workflows and resource allocation based on data trends and patterns, thereby improving decision-making capabilities. [2]

1.4 The Significance of Applying Intelligent Technology

The application of intelligent technology in document and archives management not only effectively enhances management efficiency and security but also has far-reaching social and economic significance. From a social perspective, intelligent archives management enables the high-level sharing and collaboration of archival resources, promoting the process of social informatization and enhancing public service levels. Through intelligent analysis and mining of archival data, it can provide more data support and decision-making bases for governments, enterprises, and other institutions, helping optimize public governance, corporate management, and social resource allocation. From an economic perspective, intelligent technology, by increasing the automation of archives management, reducing labor costs, and lowering management risks, can significantly reduce the expenditures of enterprises and government departments on archives management. A more intelligent and efficient archives management model can release a large amount of human resources, allowing institutions to focus on their core business and improving overall operational efficiency.

2. Advantages and Challenges of Intelligent Technology in Document and Archives Management

2.1 Advantages of Intelligent Technology

The application of intelligent technology in document and archives management has greatly optimized the efficiency, accuracy, and security of archives management. Its advantages are mainly reflected in the following aspects:

2.1.1 Improving Management Efficiency and Precision

The introduction of intelligent technology, especially artificial intelligence (AI) and machine learning (ML) technologies, has enabled the automation of document and archives processing. Traditional manual operations, such as data entry, classification, storage, and retrieval, often require a lot of time and labor, and are prone to human errors. Intelligent technology, through automation, not only significantly shortens

the time required for processing documents but also improves operational accuracy. For example, intelligent document classification and content extraction based on natural language processing (NLP) technology can quickly identify the document's category, topic, and key content, apply automatic tagging, and organize documents, making archives management more precise and efficient.

2.1.2 Optimizing Storage and Resource Management

Traditional document and archives management often faces problems such as insufficient storage space and information silos, especially when dealing with large volumes of documents. Intelligent technology, particularly archives management systems based on cloud computing and big data, can provide efficient digital storage and management solutions for documents. Cloud storage technology not only breaks the limitations of physical storage space but also improves the security and durability of archive data through methods such as data redundancy backup and encrypted storage. Additionally, intelligent technology can enable intelligent sorting, classification, and tagging of archive data, enhancing the optimization and utilization efficiency of storage resources. [3]

2.1.3 Intelligent Retrieval and Fast Querying

With the sharp increase in the volume of information, traditional document retrieval methods can no longer meet the needs for quick queries and accurate pinpointing. The application of intelligent technology, especially semantic search, image recognition, and intelligent recommendation systems, has made document retrieval more intelligent and personalized. Leveraging artificial intelligence and big data analysis, archives management systems can understand query intentions, provide more accurate search results, and support content-based intelligent recommendations. This intelligent retrieval not only improves querying efficiency but also helps users quickly access relevant information, enhancing the user experience in archives management.

2.1.4 Enhancing the Security and Reliability of Archives Management

Intelligent technology provides more robust security measures for document and archives management. AI-based anomaly detection and risk assessment systems can monitor data access behaviors in archives management systems in real time, detecting potential security risks and providing early warnings and protection. Furthermore, the combination of cloud platforms and blockchain technology ensures that archive data can be stored and transmitted more securely and reliably. For instance, blockchain technology can guarantee the immutability and traceability of archives, providing a higher level of security for archive data.[4]

2.2 Challenges in the Application of Intelligent Technology

Despite the many advantages of intelligent technology in document and archives management, there are still some challenges in its practical application, mainly in the following areas:

2.2.1 Technological Adaptability and Implementation Costs

The application of intelligent technology requires a complex system architecture and technical support, particularly when it involves advanced technologies such as artificial intelligence, big data, and cloud computing. The initial technological investment and implementation costs can be high. For many small and medium-sized enterprises or government agencies, choosing and applying the right technology within a limited budget remains an issue that needs to be resolved. Moreover, technological updates and upgrades demand constant system maintenance, raising further concerns about technological adaptability and financial investment.

2.2.2 Data Privacy and Security Issues

With the application of intelligent technology, the storage, transmission, and use of archives data increasingly depend on cloud platforms and the internet, which makes data security and privacy protection a significant challenge. Although intelligent technology offers various encryption and protection measures, there are still potential risks, such as external attacks and internal data breaches. Issues like hacking, data leaks, and unauthorized access could pose serious threats to the security of archive data. Therefore, ensuring the privacy, integrity, and availability of data in intelligent archives management remains a critical problem in the application of this technology.

2.2.3 Staff Training and Technical Proficiency

The application of intelligent technology not only relies on advanced technological platforms but also requires professional personnel to operate and manage the systems. However, many archives

management personnel still have gaps in applying and operating information technology. Especially when using complex intelligent systems, some staff members may lack the technical background and operational experience to effectively manage the new tools, which may affect the actual application of intelligent technology. Therefore, improving the information literacy and technical skills of archives management personnel has become an essential task in the promotion of intelligent technology.

2.2.4 Popularization of Intelligent Technology and Implementation Barriers

Implementing intelligent technology requires consideration of various factors such as technology, funding, and personnel. However, in some organizations with outdated archives management systems, the lack of infrastructure and weak technical support create significant obstacles to the implementation of intelligent technologies. In addition, some organizations are still in the early stages of understanding intelligent technologies, lacking a comprehensive strategy and long-term planning for intelligent transformation, which leads to substantial resistance both internally and externally in adopting and promoting these technologies.

3. Specific Applications of Intelligent Technology in Document and Archives Management

3.1 Intelligent Classification and Automated Storage

Intelligent classification and automated storage are foundational applications of intelligent technology in document and archives management. Traditional methods of document classification and storage often rely on manual operations, which are not only inefficient but also prone to human error, leading to the loss or misclassification of archive information. Intelligent technologies, especially automated classification algorithms based on artificial intelligence (AI) and machine learning, can automatically classify and tag documents based on their content, format, topic, and other characteristics. By using natural language processing (NLP) technology, systems can analyze the semantics and structure of documents, automatically identify document types (e.g., contracts, reports, meeting minutes), and categorize them accurately. [5]

Automated storage, integrated with cloud computing and big data technologies, enables digital storage of documents. The archive management system can analyze the storage needs of document data, such as storage space and access frequency, and automatically store documents in the most appropriate location (e.g., hot and cold data tiered storage). This optimizes the use of storage resources and reduces data redundancy. Additionally, storage solutions based on technologies like blockchain can enhance data security by ensuring the immutability and traceability of archive contents.

3.2 Intelligent Retrieval and Knowledge Management

Intelligent retrieval and knowledge management are crucial functions of intelligent archives management systems that can significantly enhance the utilization of archive resources and the value of knowledge. Traditional document retrieval relies on keyword matching and manual classification, which are inefficient and inaccurate. Intelligent technology, combining natural language processing, semantic analysis, and deep learning, enables document retrieval to go beyond simple keyword queries and perform deep searches based on semantic understanding. This allows users to quickly retrieve related documents through fuzzy queries, voice input, or image recognition, greatly improving retrieval efficiency and accuracy.

Knowledge management uses intelligent technology to deeply mine and analyze documents, structuring and connecting scattered knowledge from various archives, thus enabling knowledge sharing and reuse. Intelligent archives management systems can construct knowledge graphs, integrating the interconnections, information flow, and knowledge value between different documents, helping organizations better manage and utilize their knowledge assets in a rapidly changing environment. For example, through intelligent analysis, the system can identify potential knowledge points embedded in archives and automatically recommend them to relevant personnel, promoting cross-department collaboration and knowledge sharing.

3.3 Security Assurance in Intelligent Archives Management

As the digital transformation of archives management progresses, data security and privacy protection have become key challenges. Intelligent technology provides more advanced security assurance

mechanisms for archives management. First, AI-based anomaly detection systems can monitor data usage in real time and identify and block unauthorized access behaviors. The system analyzes user access patterns, establishes a normal access behavior model, and immediately alerts and takes restrictive actions when abnormal behaviors (e.g., large-scale downloads, frequent modifications) are detected.

Secondly, the application of blockchain technology provides documents with characteristics of immutability and traceability. Every document's creation, modification, storage, and usage process is recorded on the blockchain, ensuring the authenticity and integrity of the archive contents. This distributed ledger technology effectively prevents data tampering, loss, and leakage, ensuring the security and trustworthiness of archives management. [6]

In addition, data encryption and identity authentication technologies are key components of intelligent archives management systems. By encrypting archive data end-to-end, even if data leaks during transmission, unauthorized personnel will not be able to read the contents. At the same time, identity verification systems based on biometrics, two-factor authentication, and other methods can effectively prevent external attacks and inappropriate actions by internal personnel, further enhancing the security and protection capabilities of archives management.

3.4 Archive Lifecycle Management and Intelligent Process Optimization

The lifecycle management of documents covers the entire process from creation, storage, usage, modification, and destruction. Traditional archives management is often limited to static storage and simple manual management, which cannot meet the rapidly changing business needs and the complexity of archives management. Intelligent technology optimizes the entire lifecycle management of archives through automation and intelligence.

First, intelligent technology can automatically extract key information and generate archive metadata during the document creation phase, reducing human input errors and improving the efficiency of document creation. During the storage phase, intelligent systems can classify and store documents in the most suitable storage media based on their content, importance, and access frequency, enabling dynamic management.

In the usage and modification phases, intelligent systems, through data analysis and deep learning, can track and record document usage in real time, monitoring the lifecycle of documents. For example, based on intelligent process management, the system can predict when documents will reach the end of their lifecycle, automatically prompting for periodic archiving, destruction, or transfer, thus effectively controlling storage space and ensuring compliance with regulations.

Finally, in the document destruction phase, intelligent systems use encryption deletion and file fragmentation techniques to ensure the thorough destruction of documents, preventing data leakage. Intelligent process optimization not only enhances the efficiency of archives management but also makes the management process more standardized, transparent, and intelligent, meeting the modern organization's requirements for efficiency, security, and compliance.

Conclusion

In today's digital transformation and deepening informatization, the application of intelligent technology in document and archives management has undoubtedly brought revolutionary changes to management models. Through intelligent technological means, document and archives management demonstrates clear advantages in improving efficiency, reducing costs, and enhancing information security. Particularly in core areas such as classification, storage, and retrieval, the application of intelligent technology greatly simplifies management processes and reduces the risks associated with manual operations. However, the advancement of intelligent technology in archives management still faces many challenges, such as high implementation costs, system compatibility issues, and the reliance on skilled personnel. Future research should further promote the deep integration of artificial intelligence, big data, cloud computing, and other technologies, driving continuous innovation and improvement in intelligent archives management systems. Strengthening the application of data encryption, blockchain technology, and other security measures will ensure the safety and reliability of archive information.

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