Digital Exploration of Audio and Video in Archive Management Based on Big Data Era

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Abstract. With the development of the era of artificial intelligence and big data, archive databases have rapidly developed relying on the "information highway", and digital media such as audio and video have become an indispensable part of people's daily lives. Especially in fields such as culture, education, and scientific research, the importance of digital archive management has gradually been recognized and valued by more and more people. However, due to various reasons, the development of digital audio and image processing has always been lagging behind. Only digital information can provide users with comprehensive services of various information. This article uses the Question Star app to understand the actual status of audio and image through questionnaire surveys, Provide practical basis for future research and practice of archive digitization.

1 Introduction

Digital archive management originally originated in European and American countries. It is a technical means of digitizing traditional physical archive data to achieve long-term preservation, convenient retrieval, and shared utilization. With the continuous progress of computer and network technology, digital archive management is increasingly valued and has become an essential part of major institutions, enterprises, and government departments. Through digital means, multimedia resources such as audio and video can be transformed into forms that can be recognized and processed by computers. This not only facilitates storage and transmission, but also greatly improves the efficiency of archive management. The digital archive management system can intelligently classify and annotate massive audio and image resources, enabling users to quickly locate the required resources, greatly improving the efficiency of processing and utilization. Digital archives can be remotely accessed and transmitted through the network, enabling cross spatial and cross temporal information sharing. The digital archive management system can provide a unified interface and specification, making it convenient for users to search and call. Users can search and obtain the required audio and video resources in the digital archive according to their own needs and permissions, achieving the reuse and recreation of information. The promotion and popularization of digital archive management can not only accelerate the creation and dissemination of digital audio and video, but also bring more opportunities and development space for academic research, education and training, cultural heritage, and other fields.

We distributed 340 questionnaires to some enterprises in Shandong Province through the "Survey method for the practical scope of digital information" and all of them were returned. The questionnaire recovery rate is 100%, but the effective response rate is 81.2%. Through analysis, audio and video have been widely applied and developed in the field of digital archive management, but the construction of archive databases is a very challenging project and lacks overall planning. The digitization of audio and video archives varies greatly among different types of carriers, and the processing of audio and video archives has always been lagging behind due to various reasons.

2 Limited digital conversion technology for audio and video

Digital audio image conversion is a great technological innovation, and audio image digitization is the core technology in the field of archive management. The digitization technology of audio and video archives [1] can effectively collect the content of traditional audio, image, video and other files, and store the original information obtained through digital conversion technology in the archive database, making it convenient and efficient for query, retrieval, reference and other operations. Audio and image digitization can be processed, stored, and transmitted by computers. The development of digital audio image conversion is still subject to some limitations, which have had a certain impact on the quality and application range of digital audio. Through the organization and summary of data, Table 1 clearly reflects the limiting factors of audio and video in information archive management, Table 1 clearly reflects the limiting factors of audio and video in information archive management, Lack of technical support is currently a common problem and
we convert the digital signal into a digital encoding format. In this process, we digitize audio and video, encoding. When sound and video are received by the acquisition device, they are converted into electrical signals and transmitted to the computer through an audio and video interface. After receiving the electrical signal, we need to convert it into a digital signal. Due to the limitations of sampling rate and quantization depth required for digitization, digital audio cannot perfectly restore the original analog audio signal. Therefore, in the process of digital audio conversion, there may be quality issues such as distortion and noise, which not only affect the listening experience and objective performance of audio, but also have adverse effects on audio in different application scenarios.

The format issue of audio image digital conversion is also a difficult problem to solve. Traditional analog audio and video technology is stored on magnetic tape or film, which is not easy to save. Digital audio and video can be saved in optical and magnetic storage media, and digital audio and video can be reprocessed for errors. However, the diversity and incompatibility of digital formats have become a major challenge in the digital conversion of audio and video, and there are incompatibilities between different audio and video formats. This not only leads to low conversion efficiency, but also brings great difficulties to the application and sharing of audio and image digital conversion.

The energy consumption issue of audio and image digital conversion is also worth our attention. Currently, most digital audio image conversion chips and algorithms require a significant amount of computational resources and energy. Usually, an AD converter is required, which converts electrical signals into digital signals and stores them in a computer. The final step in digitizing audio and video is encoding. In this process, the digital signal is converted into a digital encoding format. Currently, the most popular audio encoding formats are MP3, AAC, WMA, etc., while the most popular image encoding formats are MPEG-2, H.264, AVC, etc. These encoding formats can compress the original digital signal, thereby reducing storage space consumption. These digital audio image conversions take a long time and also consume a large amount of computer storage and energy resources. In scenarios that require a large amount of digital audio and image processing, these resource consumption may also become an issue that cannot be ignored.

The development of digital audio and image conversion technology, while facing a series of limitations, also requires continuous technological innovation and breakthroughs. Only by addressing these limitations can we promote the further development of digital audio conversion technology. Therefore, in future research on digital audio conversion technology, we need to pay more attention to technological innovation and breakthroughs, continuously improve the quality and application range of digital audio, and achieve wider application of digital audio in various fields.

### 3 Lack of platform support for digital audio and image archive management

Audio image digitization platform refers to a platform that digitizes audio image archives and stores, manages, and transmits them through a network [2]. It is implemented based on digital archive management. This platform can digitize traditional materials such as audio and video tapes, convert them into digital format files, and store them on the network. This method can greatly improve the storage capacity and sharing efficiency of archives. The construction of an audio and image digitization platform needs to consider specific application requirements. Show in table 2, it can be seen that, for different types of files, different digitization methods need to be adopted to ensure the accuracy and completeness of digital archives. At the same time, it is also necessary to consider factors such as network bandwidth and storage capacity to ensure the efficiency of platform usage.

### Table 1. The influencing factors of electronic audio image conversion

<table>
<thead>
<tr>
<th>Serial number</th>
<th>Information Types of electronic document</th>
<th>Proportion</th>
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<tbody>
<tr>
<td>1</td>
<td>Lack of technical support</td>
<td>55.2%</td>
</tr>
<tr>
<td>2</td>
<td>Carrier function is not powerful</td>
<td>52.4%</td>
</tr>
<tr>
<td>3</td>
<td>Lack of professionals</td>
<td>50.1%</td>
</tr>
<tr>
<td>4</td>
<td>Leaders do not pay attention</td>
<td>26.3%</td>
</tr>
</tbody>
</table>

1. The accuracy of audio image digital conversion technology has always been a focus of academic attention. The process of digitization requires the use of a series of technical means and equipment, such as digital scanners, sound acquisition cards, etc. Sample continuous sound signals. Two basic parameters are used for sampling: first, how many audio samples are collected per second; The second is the sample size. As shown in the formula: \((f_s)=2f\) \((f\) is the highest frequency of the sampled signal). When sound and video are received by the acquisition device, they are converted into electrical signals and transmitted to the computer through an audio and video interface. After receiving the electrical signal, we need to convert it into a digital signal. Due to the limitations of sampling rate and quantization depth required for digitization, digital audio cannot perfectly restore the original analog audio signal. Therefore, in the process of digital audio conversion, there may be quality issues such as distortion and noise, which not only affect the listening experience and objective performance of audio, but also have adverse effects on audio in different application scenarios.

2. The format issue of audio image digital conversion is also a difficult problem to solve. Traditional analog audio and video technology is stored on magnetic tape or film, which is not easy to save. Digital audio and video can be saved in optical and magnetic storage media, and digital audio and video can be reprocessed for errors. However, the diversity and incompatibility of digital formats have become a major challenge in the digital conversion of audio and video, and there are incompatibilities between different audio and video formats. This not only leads to low conversion efficiency, but also brings great difficulties to the application and sharing of audio and image digital conversion.

The energy consumption issue of audio and image digital conversion technology is also worth our attention. Currently, most digital audio image conversion chips and algorithms require a significant amount of computational resources and energy. Usually, an AD converter is required, which converts electrical signals into digital signals and stores them in a computer. The final step in digitizing audio and video is encoding. In this process, the digital signal is converted into a digital encoding format.
Audio and video archives are easily saved, disseminated, and managed in digital form. In terms of digital archive management for audio and video archives, we need to prioritize two aspects: the technical details of the digitization process, and the systems and services for managing digital archives. Firstly, the technical details of the digitization process are crucial for achieving digital archive management of audio and video. The acquisition process requires the use of high-quality acquisition equipment, which converts audio and video into digital data through high-fidelity digital technology. Through the editing process, we can edit, organize, and organize data to make it easier to manage and use. In some cases, we also need to perform post processing on audio and video to ensure the quality and integrity of the data. The transmission, storage, and retrieval processes also require the use of high-end technology to ensure the efficiency and security of data transmission, storage, and retrieval. Secondly, the system and services for digital archive management are equally crucial. The management platform for digital archives needs to have strong functional performance, including data management, data retrieval, data integration, data retention, data output, and other aspects. The security and guarantee of digital content require the use of high-level encryption technology and key management technology to ensure that archive information is not stolen or lost. Advanced data backup and recovery technologies are required for the backup and recovery of digital archives to ensure that materials are not accidentally lost.

The digital platform can quickly convert archive files into digital format and store them, reducing the time and workload of manual processing. Digital archive management can also facilitate the access and utilization of archive data, which has increased efficiency several times compared to traditional paper archive management methods. It can effectively protect archives from tampering or leakage, and ensure the integrity and security of archive data. Digital archive management can promote archive sharing and cooperation, especially for archive sharing across multiple departments and regions. The digital platform can achieve the sharing of archival data, reduce the situation of repeated collection by multiple departments, improve the efficiency of archival sharing, and better contribute to the process of social informatization.

### Table 2. Support for Electronic Document Information in Universities

<table>
<thead>
<tr>
<th>Serial number</th>
<th>Electronic Document Support Platform</th>
<th>Proportion</th>
</tr>
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<tbody>
<tr>
<td>1</td>
<td>Information Supporting Situation of electronic document</td>
<td>42%</td>
</tr>
<tr>
<td>2</td>
<td>Digital information network construction</td>
<td>32.2%</td>
</tr>
<tr>
<td>3</td>
<td>Cooperative Information Technology Company</td>
<td>33.1%</td>
</tr>
<tr>
<td>4</td>
<td>Lack of funds</td>
<td>23.4%</td>
</tr>
</tbody>
</table>

Digital archive management of audio and video also faces many challenges. The main challenge lies in the information security and reliability of digital archives. Once digital archive materials are damaged, they may have irreparable impacts on multiple fields such as academia, culture, history, and so on. Therefore, digital archive management must strengthen the security and technical guarantee of archive materials to ensure the integrity, credibility, and availability of digital archives.

In addition, digital archive management also needs to address technical issues such as data storage, data transmission, and data format conversion. Especially for multimedia data such as audio and video, there are more issues that need to be addressed. Multimedia data not only has a large amount of data and complex formats, but also requires effective compression and encoding to meet the needs of data transmission and storage. In addition, it is necessary to overcome the compatibility and sustainability issues of digital archives to ensure the long-term preservation and use of archival data shown in Table 3.

### Table 3. Factors affecting digital audio and imaging

<table>
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<th>Serial number</th>
<th>Factors affecting digital audio and imaging</th>
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</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Capacity requirements for digital archives</td>
<td>55.2%</td>
</tr>
<tr>
<td>2</td>
<td>Classification and indexing</td>
<td>45.6%</td>
</tr>
<tr>
<td>3</td>
<td>Copyright security</td>
<td>33.4%</td>
</tr>
<tr>
<td>4</td>
<td>Sharing and utilization</td>
<td>32.5%</td>
</tr>
</tbody>
</table>

With the convenience of digitization and online dissemination, the problems of piracy and infringement would be reduced.
have become increasingly serious. Copyright protection of digital audio and video is also an important challenge. Huan (2019) [5] Another issue discovered in digital archive management is the issue of copyright protection. Sheng (2003) [6] Copyright is an important aspect in digital archive management. Yang (2017) [7] Discovering that digitization of archives requires copyright protection and avoidance of infringement. We can use digital watermarking technology and copyright authentication technology to protect copyright and ensure the legality and reliability of digital archives. Digital archive management needs to find effective ways to protect copyright, prevent the spread of piracy, and maintain the interests of legitimate content and the healthy development of the industry.

The construction and maintenance of databases are also crucial for the digital management of audio and video archives. The digitization of audio and video archives requires support for multiple data formats and access to terminal devices. Therefore, how to build and maintain an efficient database is the core issue of digital archive management [8].

In digital archive management, the application of big data is becoming increasingly important [9]. With the continuous growth of data volume, the information in the database becomes increasingly complex, so more advanced technologies need to be adopted for processing [10]. Big data technology can provide more accurate and efficient processing methods for digital archive management, providing us with more accurate, comprehensive, and reliable historical and cultural information.

5 Conclusion

In short, the implementation of digital archives is conducive to the modern transformation of traditional archive protection and management, providing new paths and directions for social development and cultural inheritance. Digital archives, as an important component of information construction, play an irreplaceable role. The promotion of digital archives construction also requires cooperation and joint promotion from all walks of life to achieve sustainable development and innovation in digital archive management. By strengthening copyright protection, data security, data efficiency, and data sharing, digital archive management can be made more comprehensive and reliable.

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References