Information Research - Vol. 30 No. iConf (2025)

The smart archive management practicing pipeline: a virtual online learning platform for AI literacy development in archival science

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DOI: https://doi.org/10.47989/ir30iConf47305

Abstract

Introduction. In order to develop AI literacy for Chinese students majoring in archival science, this study presents the design and implementation of the Smart Archival Learning Platform (SAMPP), providing an immersive environment to understand AI-driven archival workflows, develop AI skills, and improve AI competence.

Method. The implementation of the SAMPP follows a three-step strategy: 1) an introductive and immersive 3D virtual environment to fix students' attentions on AI learning; 2) AI-powered archive management tasks for skill development, and 3) an automated online exhibition project to enhance creativity and competency.

Analysis. As an impact evaluation, both questionnaires and interviews are conducted with 55 undergraduate students majoring in archival science at Wuhan University before and after using the SAMPP. The results of the questionnaires are used for sentiment analysis, and students' attitudes toward the platform are explored through interviews.

Results. Before using the SAMPP, 66% of students had negative perceptions of AI learning. Afterwards, 58% reported positive attitudes, showing enhanced confidence in using AI for archive management. Interviews reinforced these findings.

Conclusion. The SAMPP enhances AI literacy and creativity among archival science students, making AI learning accessible and engaging. Future improvements should integrate advanced AI models to expand its capabilities.

Introduction

Archive management can be defined as a process that pertains to the informational value of archives efficiently and systematically (Standardization, 2016) (Ilerbaig, 2019). When artificial intelligence (AI) technologies are rapidly advancing and are impacting all areas of modern industries worldwide (Black et al., 2024), archive management will not be spared from such a fierce technological revolution. While AI technologies empower archive management with unparalleled efficiency and resources, a question that arises is how an archivist defines him/herself in such an era. Is he/she just a skilful practitioner freed from daily archive management routines with the assistance of AI technologies, or a contributor for developing domain specific AI products for archive management, or an empowered storyteller who can produce creative archive-storytelling works using multiple AI models (e.g., pre-trained large language models)?

AI is now at the top of the agenda for many educators who are educating the next generation worldwide. It is undeniable that the more AI-literate a person is, the easier he/she can choose a way to collaborate with AI. As a positive response and with a pilot study, a virtual online learning platform, named the Smart Archive Management Practicing Pipeline (SAMPP), was designed, and developed by educators from the department of archive management and government information of Wuhan University. The platform was envisioned to become a venue for undergraduate students majoring in archival science to gain a comprehensive understanding of how AI is transforming the workflow of archive management.

This paper presents the details involving the design and implementation of the Smart Archive Management Practicing Pipeline, an online learning platform designed and offered by Wuhan University for LIS students, especially those majoring in archival science. The ensuing narrative establishes a brief survey on virtual online learning platforms for educational purposes and gives pertinent information, including the design strategies for progressive AI literacy building, system components, and student feedback based on sentiment analysis.

Related works

Virtual simulation platforms have been widely employed in various disciplines, particularly in fields such as computer science, medicine, and engineering. For example, in dentistry, a virtual simulation platform for teaching pulpotomy has been shown to significantly enhance the effectiveness of educational practices(Lu et al., 2022). In engineering education, the Mars Exploration Control Virtual Simulation Experiment Platform (MEC-vslab) was designed to address the challenge of limited integration between control engineering theory and practice (Wang et al., 2024). Similarly, in the domain of physical education, virtual simulation platforms utilizing optical principles have improved students' understanding of complex concepts(Zhang, 2024). These platforms are valued for their ability to reduce experimental costs, improve efficiency, and enhance safety by simulating real-world scenarios. Furthermore, advancements in technology have enabled real-time monitoring and personalized teaching through these platforms.

The application of AI technology in virtual simulation has also proven to be highly effective in a range of fields. For instance, AI-based virtual robots have been employed to improve simulation efficiency and accuracy, providing valuable data support for enterprise decision-making (Wenjing, 2025). In educational contexts, the integration of AI technology has led to more immersive and realistic simulations, enhancing learning outcomes. However, most of these platforms focus primarily on improving platform performance and creating more engaging experimental environments, rather than on enhancing users' understanding of AI or fostering the development of AI skills, particularly in social sciences.

The primary objective of the Smart Archive Learning Platform (SAMPP) is to address this gap by improving the AI literacy of students with a liberal arts background, specifically those studying archival science. SAMPP seeks to introduce these students to AI technologies and familiarize them with their application within the field of archive management. By doing so, it offers a blueprint for the development of similar platforms in other disciplines that traditionally lack a focus on STEM education.

Design strategy

AI literacy is conceptualized as a holistic construct comprised of proficiency areas of knowledge, awareness, skills, competencies, and experience (Pinski & Benlian, 2024). The goal of SAMPP is to include the above mentioned five 'enabling constructs' as much as possible so students can better situate themselves in this era of AI. Inspired by the AI literacy developing strategy framework proposed by (Black et al., 2024), this section describes a three-step strategy to engage undergraduate students from archival science in AI learning progressively. The strategy provides a conceptual and structured framework for virtual AI learning platform development. Moreover, the strategy was also designed with the contemporary educational background in mind. In an investigation conducted by educators from the department of archival science and government information of Wuhan University, more than 60 percent of students investigated expressed their diffidence or anxiety on developing AI literacy.

The strategy aims to provide students with a full experience that runs in parallel with the lifecycle of record management so they are aware of the power of AI technologies, can acquire relevant knowledge, develop skills, and enhance competencies. The details are illustrated in Figure 1.

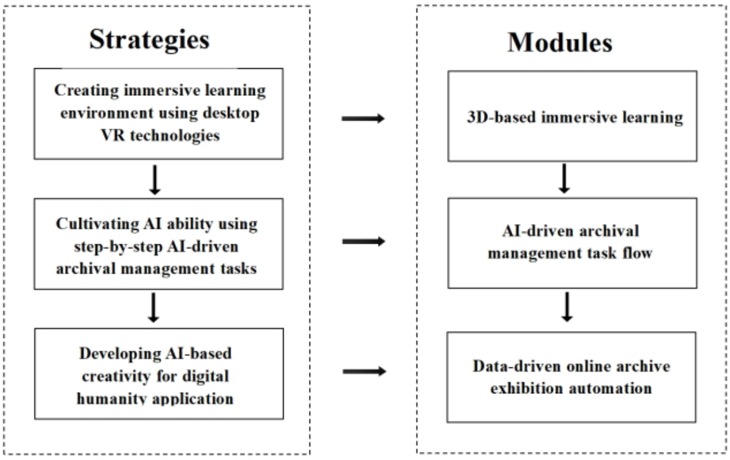


Figure 1. The correspondence between the 3-step AI literacy developing strategy and the SAMPP modules

Critical strategy1-Easing AI learning diffidence

As the first step of the progressive AI literacy developing strategy, the purpose of critical strategy 1 is not to rush the appearance absurd AI models in front of the beginners, but to relieve their unfamiliarity, anxiety, and diffidence when entering into a new world. Immersive learning methods have been shown to increase students' interests and commitments to the task at hand, particularly when combined with role-playing activities, which foster a sense of responsibility (Rowe et al., 2011). The sooner and more deeply that students immense themselves into the learning environment, the more eager and natural they feel to try learning about AI. A 3D desktop environment together with VR devices are on top of the list when building such an immersive environment. VR in training provides the capability of immersing learners in simulated environments that are digital twins of real-world environments, offering training scenarios in a controlled, risk-free setting (Bouloukakis et al., 2019) (Rossau et al., 2019). A typology of role-play learning designs would enable higher education teachers to select role-play approaches which could be best used to provide learning opportunities to promote cognitive, affective and/or psychomotor domains of learning (Rao & Stupans, 2012).

Critical strategy2- Cultivate AI skills and accumulate AI knowledge

It is crucial for students to experience AI through active engagement in activities and projects(Black et al., 2024). Fundamental archive management involves a sequence of atomic tasks.

An atomic task refers to a set of activities that are executed as a whole and as an indivisible unit along the archive management pipeline, which includes decontamination, deviation correction of digital records, metadata registration, retention, and disposal. SAMPP is intrinsically an exploratory digital; environment that lets students comprehend the complex nature of AI and its application in archive management. By integrating AI algorithms into each of these tasks, students can be aware of how AI improves efficiency, accuracy, and decision-making in archive management workflow. The sequential nature of these tasks forces students to engage deeply with AI technologies, encouraging them to think critically about how general AI models can be fine-tuned for domain-specific applications. Besides enhancing the students' technical skills, students can acquire knowledge of AI, e.g., AI models, data for AI, and AI tools.

Critical Strategy3- Facilitate exploratory experiences and apply AI knowledge

The third level of this strategy focuses on introducing students into an exploring experience so they will have the opportunity to apply AI in the field of digital humanities. Archives represent a rich source of historical and cultural information, and this strategy aims to inspire students to think innovatively about how AI can help reveal and present the value of archival data to the public. Through this process, students are encouraged to consider questions such as, 'How can AI help showcase the historical significance of archives to a broader audience?' This final stage of the strategy not only deepens students' understanding of AI's potential in archive management but also enhances their ability to think creatively about the intersection of technology and the humanities.

System overview

The implementation of SAMPP incorporates both the exercise- and the artifact-based learning methods. Both methods are identified as formal learning methods that provide planned and structured learning activities (Marsick, 2001). The exercise-based learning methods use either traditional or interactive exercises to convey AI-specific content that relates to AI's learning abilities, while artifact-based learning utilizes AI as part of the learning method.

Here in SAMPP, the AI concepts/models/algorithms were recontextualized within the archive management process, making them easier to grasp. Critical steps in record management lifecycle are taken into considerations and serve as anchors, which include the creation, maintenance, use and disposition of records (Penn et al., 1994).

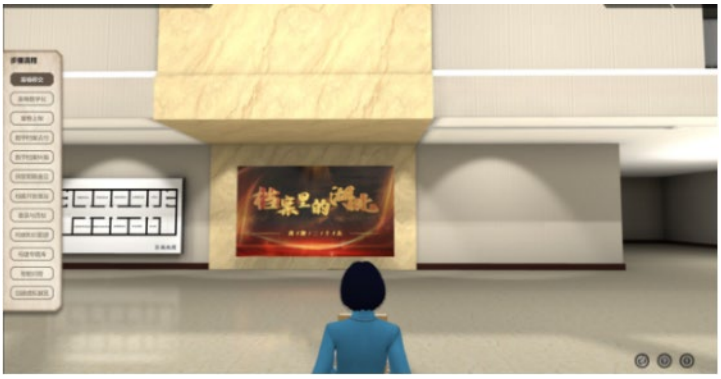
SAMPP consists of three modules that align with each phase of the strategy. It provides a structured pipeline of tasks, each of which expands upon and supports the strategic concepts outlined above. The three modules are as follows:

Module 1: An introductive 3D immersive scenery

In response to the critical strategy 1, a 3D scene is built at the beginning of the experimental procedure not only to create an immersive learning environment but as a simulation of the initial steps of archive management, namely records transfer and appraisal. According to Christian Hartmann et al.'s (Hartmann et al., 2023) experiment, immersive learning methods can increase the perception of presence, thereby obtaining more semantic knowledge. Real scenarios can also stimulate students' interest, inspiring them to explore autonomously, enhancing learning efficiency, and better promoting knowledge acquisition and understanding (Hartmann et al., 2023). At the same time, incorporating 3D technology at the beginning of the experimental procedure enables students to engage with a more immersive manner, moving away from the abstraction of theoretical learning and concretizing management phases. The virtual reality stage stimulates students' confidence in learning and keeps them focused on the learning process.

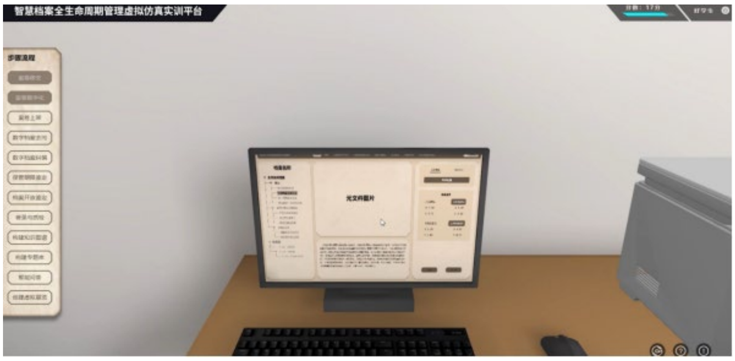
In this module, a 3D replica of Hubei provincial archives is created using the 3Ds MAX software package. Immediately after logging in the SAMPP, a student is assigned with the role, who is on duty of transferring archive files to Hubei provincial archives, as it is illustrated in Figure.2-(a). This provides a first-person perspective allowing students to carry out the experiment at the very beginning. The role switching takes place when archive files are transferred between the girl in blue and the girl in white. The student is assigned to the role of the future archivist, in order to continue with the following experimental tasks, as it is illustrated in Figure.2-(b). Also in this 3D scene, we should change to let students focus on what a future archivist should do, as it is illustrated in Figure.2-(c), which enables a smooth transition from the immersive 3D environment to AI technique learning.

The highly realistic scenery enhances the visual attraction of the experiment, thereby focusing more on knowledge acquisition and improving their learning efficiency.



(a) A 3D replica of Hubei provincial archives

(b) Role switching, the girl in white acts as the future archivist



(c) A Shot cut of the 3D scene to AI-driven archive management task flow

Figure 2. Module 1-The 3D immersive scene at the beginning of the AI-learning procedure for students majoring in archival science.

Module 2: AI-driven archive management task flow

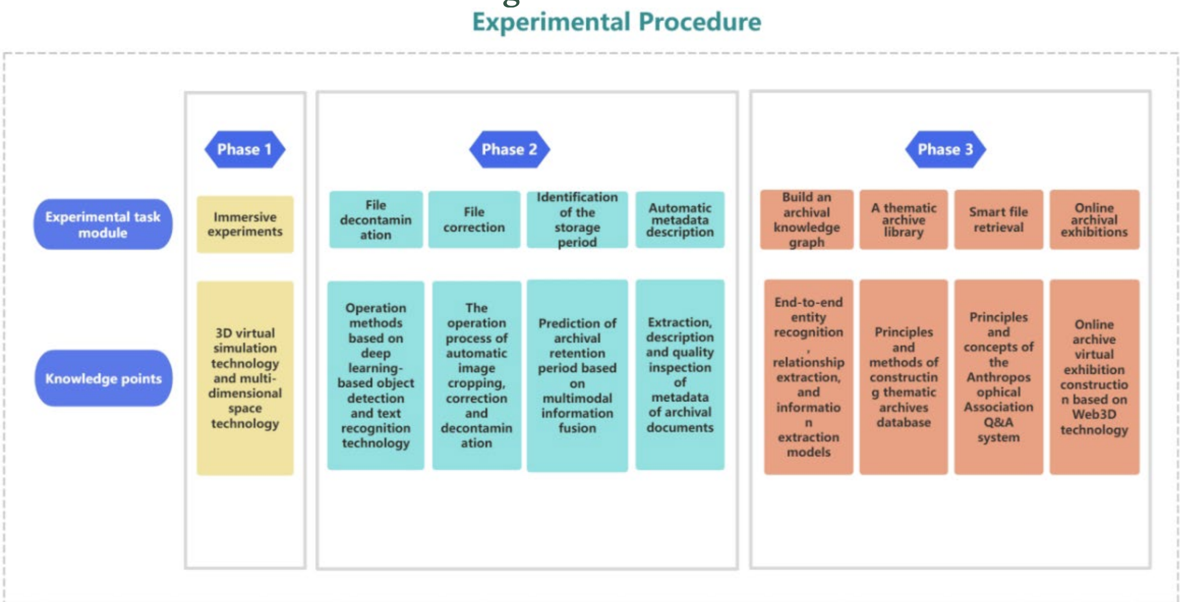


Figure 3. The archive management workflow of SAMPP

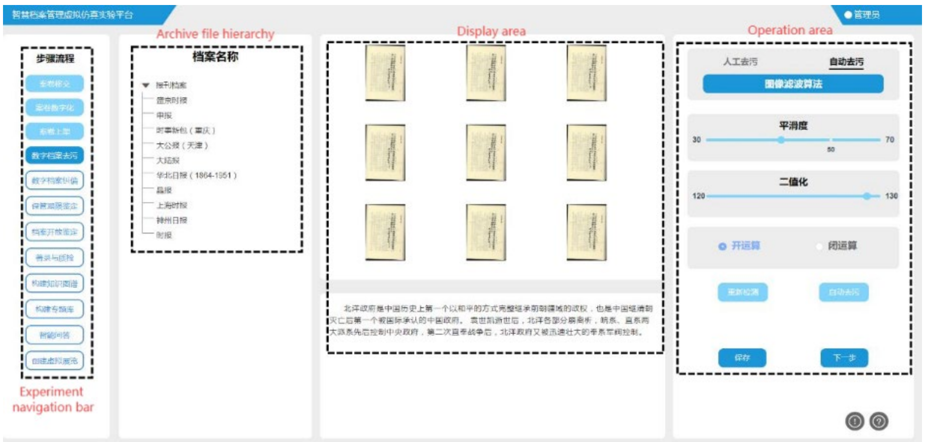
In response to the critical strategy 2, a task flow composed of archive management routine tasks is organized so students can have a preliminary comprehension over AI's impacts on archive management, as it is illustrated in Figure.3. The task flow begins with the intelligent image correction, and decontamination using computer vision algorithms, following by metadata registration based on object detection and text recognition, ending with the retention and disposal prediction based on information fusion. In each task, both manual and AI methods are presented for comparison. Combining algorithm principles with application results in the experimental process helps students fully understand each algorithm's workings and develop habits of applying technology to archival decontamination. Close interaction with AI technologies facilitates students' exploration of AI-enabled archive management, teaching them to carry out archive management activities with edgy technologies, developing their management skills, and establishing a knowledge base for AI applications. Screenshots of the module-2 is presented in Figure.5.

Intelligent Decontamination of Digital Archives: Two major steps are presented: manual decontamination and correction of individual documents and intelligent decontamination and correction. This allows students to experience the differences between manual and AI methods in digital archive management in terms of efficiency and quality. Students can choose from AI processing algorithms, such as the projection profile method, the RGB processing, and the integer Bresenham algorithm, for students to choose from. By matching algorithm types and adjusting parameters to achieve optimal results, students can more intuitively experience the different effects of various technologies.

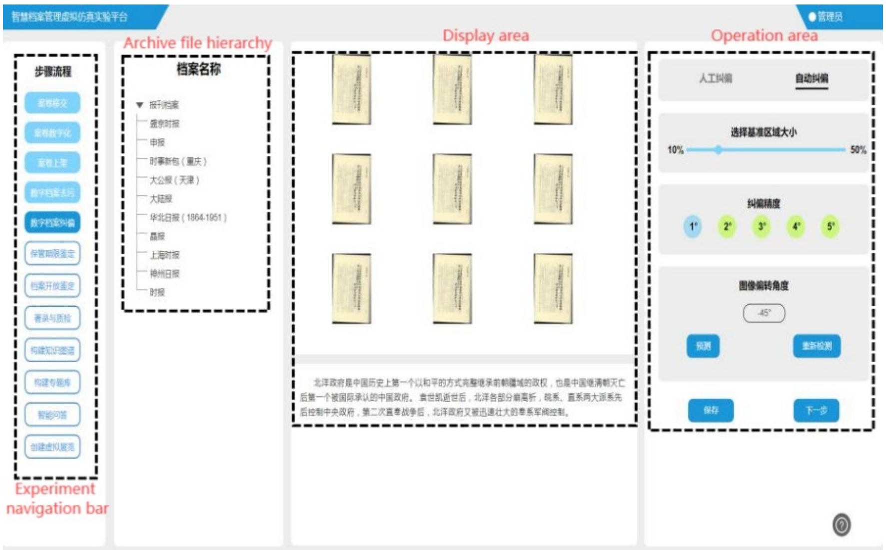
Intelligent Correction of Digital Archives: In manual correction, students select algorithms, adjust the 'detection accuracy adjustment' slider, preview the correction level, and save upon completion. In the automatic correction phase, students select correction algorithms and adjust the 'reference area size' slider to choose an appropriate reference area. The algorithm calculates the offset based on the selected reference area, and students select one of five accuracy options based on the offset size. Students can preview the correction results; if the reference area is inappropriate or the correction accuracy is too high, leading to poor results, they can click 're-detect' and proceed to the next step upon completion. This approach enhances correction accuracy using AI while combining AI and manual methods to ensure quality and efficiency.

Retention & Disposal: The experimental platform offers automatic classification and auxiliary retention& disposal prediction based on information fusion. An OCR recognition model is presented. The text parameters and sensitive words can be adjusted to modify the algorithm parameters in an interactive way to obtain different retention period suggestions. In addition, students can make final decision on how long an archival file should be retained or be disposed based on algorithmic results in an AI-human collaboration manner. This process allows students to participate in practical applications of retention period prediction and further optimize algorithms to improve prediction accuracy and efficiency.

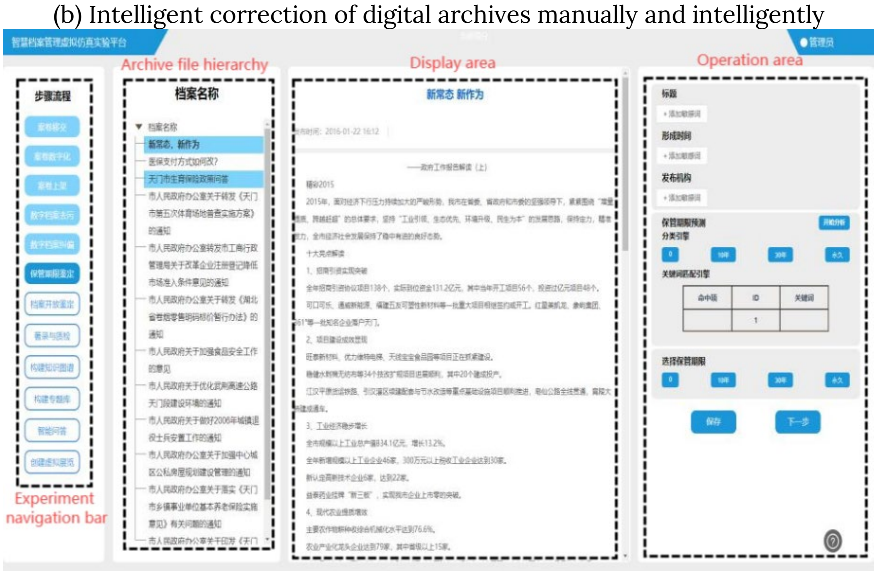
Metadata registration: On one hand, students manually register metadata such as titles, authors, institutions, and abstracts by checking archive file contents per-file one by one. As a comparison, an OCR based data recognition approach is presented where the metadata items are automatically recognizes. Students can choose to save manual or automatic registration results based on accuracy.



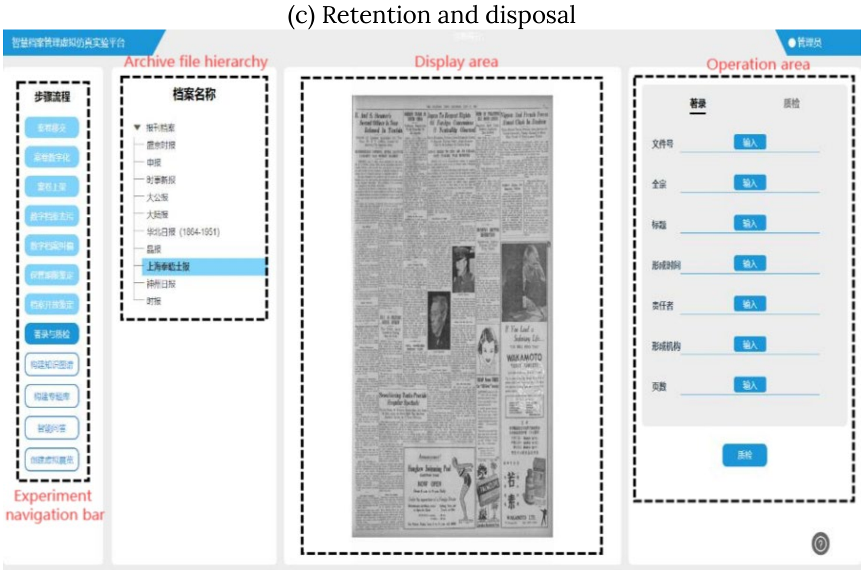
(a) Decontamination of digital archives manually and intelligently



(b) Intelligent correction of digital archives manually and intelligently



(c) Retention and disposal



(d) Metadata registration

Figure 4. Module 2-Interactive AI-models with adjustable parameters during archive management workflow

Module 3: AI-powered online archive exhibition automation

There are many approaches in which digital humanity applications can be developed from archives. However, with the assistance of AI technologies, a more intelligent development aiming at online exhibitions automation was proposed in this module. In addition, the experimental platform demonstrates multidimensional outcomes of AI-empowered archival development through constructing knowledge graphs, building thematic databases, developing a Q&A system from archive repository, and creating virtual exhibitions.

Knowledge graph building: the purpose of building a knowledge graph is to extract data and relate them from independent archive files for knowledge discovery etc. It is an important and intermediate step for developing digital humanity applications from archives. An ontology-based method is presented for students to build knowledge graph from archive files simply because we think it is quite a classic way to inform the students the basic structure of a knowledge graph other than large language model-based knowledge graph generation. By designating a topic beforehand, students construct their own ontology models by defining concepts, relationships, and properties. To complete the knowledge graph, specific data from archive files are extracted. SAMPP prefers to have students extract the data manually so they can understand how a knowledge graph is constructed step by step. The recognized archive data and metadata registered in previous steps are linked to the defined concepts and relationships for the completion of the themed knowledge graph. SAMPP also contains a built-in knowledge graph, and students' constructed graphs are compared with this built-in graph for similarity scoring.

Archive clustering: archive clustering is to group archive files with similar topics or contents. It is considered a downstream task of knowledge graph building. Based on specific keywords, combined with semantic similarity calculation, students can precisely locate semantically related nodes in the knowledge graph. Using these nodes, students can identify thematically and semantically similar topics and group the corresponding archival files. These files are then put into the thematic database. As a preparation, the clustered archive files can be put in the same area when setting up the online archive exhibition.

Q&A: on one hand, the Q&A task is a supplementary to archive clustering in case that some archive files are missing due to the natural imperfection of computer algorithms. On other hand, it is also a way to 'let the archive talk' and fill in the gap between the public and the mysterious archive files. The purpose of such an experimental task is to help students learn some fundamentals about data retrieval. The pre-built knowledge graph also plays a significant role in this task. With the semantic matching algorithms, students identify keywords from the textual questions and adjust parameters to locate candidate answer nodes in the knowledge graph. Once candidate answer nodes are found, students perform further aggregation analysis to synthesize and refine the information, ultimately generating responses in natural language.

Online 3D Exhibition: currently, online exhibition is a widely used way to show collections from museums, archives and library to the public(Kuo et al., 2013). That's why we chose to have online exhibition as the last but not the least task in SAMPP. As the foundations laid by the previous steps, archives files are grouped under a certain theme, which can also be the theme of our online virtual exhibition. A virtual exhibition template design component is given so the exhibition style and layout can be decided but also an automatic tour, real-time positioning, and exhibit zooming for interaction optimization can be determined by the student. Such a process provides a chance for students to integrate their creativity and appreciation of the beauty in showing the historical and cultural values from archive files.

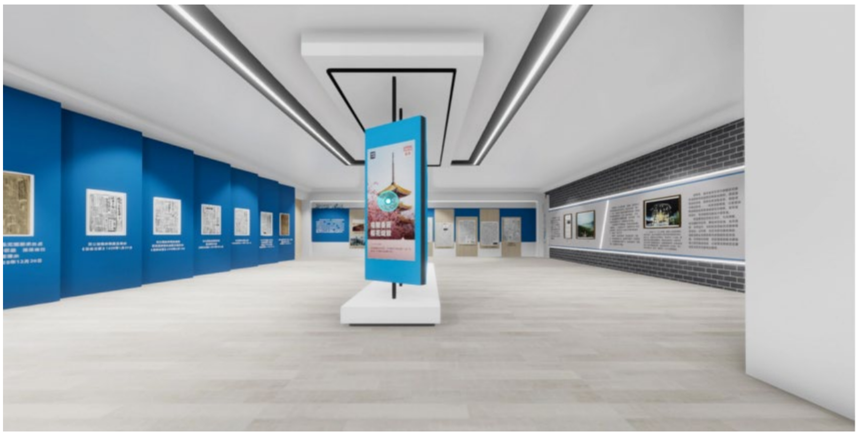
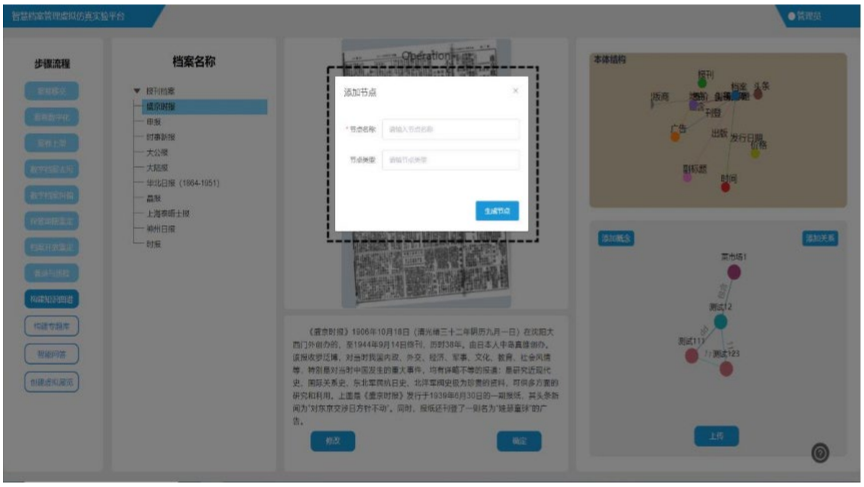
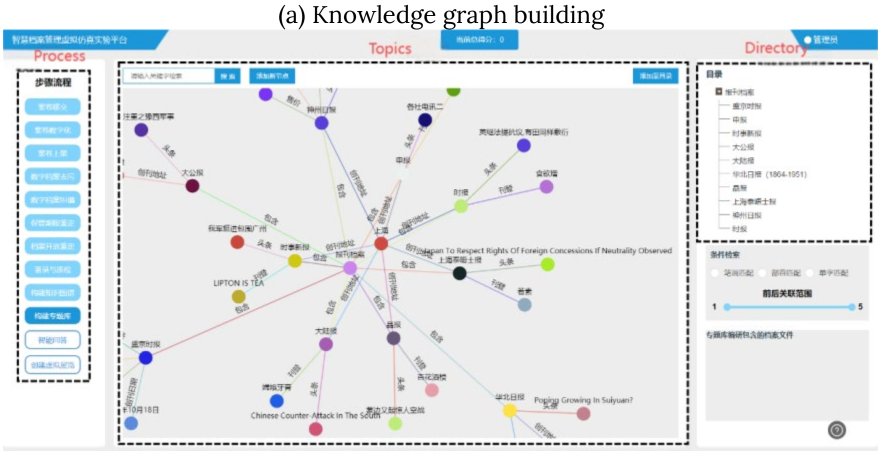


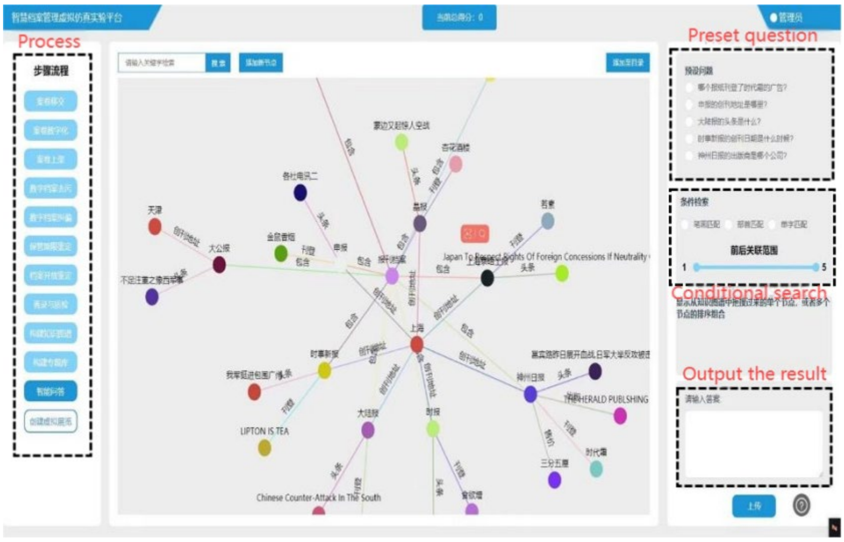
Figure 5. A Virtual exhibition hall of Wuhan urban memory



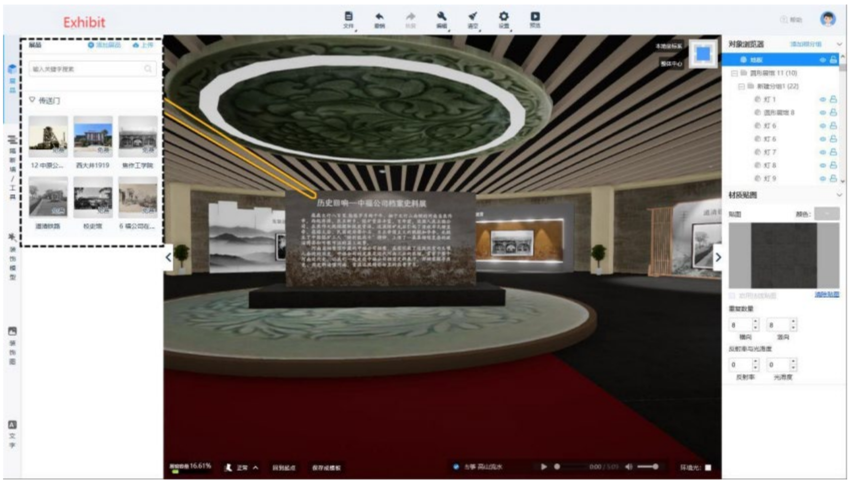
(a) Knowledge graph building



(b) Archive file clustering



(c) Developing a Q&A system



(d) Virtual exhibition design component

Figure 6. Module 3-Digital humanity application development from archive files

Student feedback

Sentiment analysis

By distributing questionnaires to undergraduates majoring in archival science at Wuhan University and conducting sentiment analysis on the responses, we compared the students' attitudes towards AI-learning before and after using SAMPP to explore the impact of the platform on students' attitudes and acceptance of technology.

Data collection: two separate questionnaires were designed for pre- and post- experiment survey, focusing on the understanding of AI technology and its application in the field of archives. The questionnaires were distributed to 55 undergraduates majoring in archival science at Wuhan University. The pre-experiment questionnaire, shown on the left column in Table.1, consists of three open questions: 1) The basic understanding of AI; 2) Their impressions of archive management work; and 3) Their confidence in learning and applying AI technology in the field of archival science. The post-experiment questionnaire, shown on the right column in Table.1, is also comprised three open questions: 1) Their understanding of integrating AI technology into the field of archives after completing the experiment; 2) The most impactful AI technology; and 3) Their confidence in learning smart technology and applying it to archive management after completing the experiment.

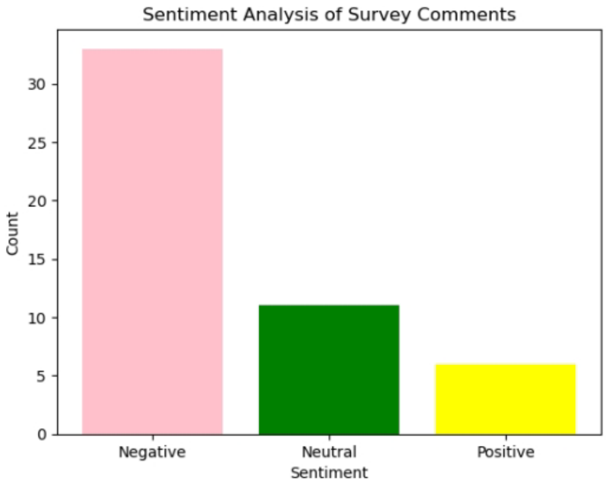
Name	Name
Gender	Gender
College Entrance Exam Major	College Entrance Exam Major
Question 1: What is your understanding of artificial intelligence before completing the experiment? Please describe in no less than 50 words.	Question 1: After completing the experiment, what is your understanding of the integration of artificial intelligence into the archival field? Please describe in no less than 50 words.
Question 2: Before completing this experiment, what was your impression of archive management? Please describe in no less than 50 words.	Question 2: Through this experiment, which type of smart technology or artificial intelligence technology did you experience the most? What is the reason?
Question 3: Before completing this experiment, do you have confidence in learning artificial intelligence technology? If not, what do you think is the biggest challenge? Please describe in no less than 50 words.	Question 3: After completing this experiment, do you have confidence in learning and applying artificial intelligence technology? Please explain the reason in no less than 50 words.

Table 1. The pre- and post- questionnaire

Data preprocessing: the collected questionnaires underwent a basic quality examination, excluding those not seriously answered or left unanswered, leaving 51 valid questionnaires. The responses were categorized by question and similar answers were merged. Given the unstructured nature and irregularity of the responses, they were segmented using the Jieba package for Chinese words tokenization, and data cleaning and preprocessing were performed using NLTK's stopwords, resulting in 306 usable sample data entries.

Sentiment Analysis: a sentiment dictionary is built for the sentiment analysis. For the third question in both pre- and post-experiment questionnaires, the students' confidence in learning and applying the technology was compared using sentiment analysis. Keywords expressing clear positive sentiments (‘*confidence*,’ ‘*like*,’ ‘*love*,’ ‘*determined*,’ ‘*certain*,’ ‘*confident*’) and negative sentiments (‘*no confidence*,’ ‘*dislike*,’ ‘*pessimistic*,’ ‘*hate*,’ ‘*worry*,’ ‘*confused*’) were identified. The domain sentiment dictionary in Python, SnowNLP was used for sentiment judgment training and testing. After satisfactory test results, the prepared dataset was imported for sentiment analysis, and visualized using matplotlib.pyplot, resulting in a sentiment bar chart.

Results: firstly, among the 51 pre-experiment questionnaires, 33 responses (66%) were categorized as negative emotions, 11 (22%) were neutral, and only 6 (12%) were identified as positive emotions, as it is shown in Figure.7.



Sentiment	Count	Percentage
Negative	33	66.0
Neutral	11	22.0
Positive	6	12.0

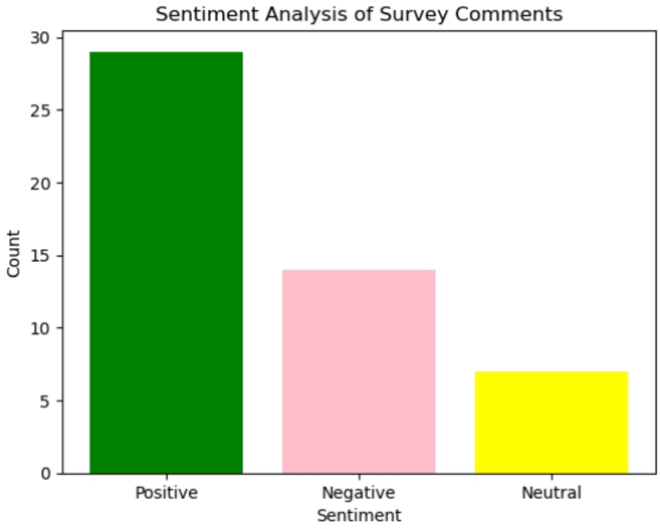
Figure 7. The sentiment analysis results from the pre-experiment questionnaire

Most students initially showed negative attitudes towards technology learning, considering AI techniques to be extremely difficult to master and beyond their capabilities. One student remarked, 'I think AI technology is very STEAM-based; it requires a lot of domain-specific knowledge and is very difficult to understand. As a liberal arts student, I may find it challenging.' Loads of similar responses indicated that undergraduates in archival science felt nervous and reluctant to accept technology due to their liberal arts background and preconceived notions about the complexity of technology.

However, after completing the experiment, the number of positive answers increased significantly. Many students felt that immersive, hands-on experience demonstrated the convenience of integrating AI technology into archive management practice and gained a deeper understanding of AI technology, as it is shown in Figure.8. Although 14 students still maintained a pessimistic attitude and 7 remained neutral, with mixed feelings of anticipation and anxiety over technology learning, the majority experienced a shift in attitude. Positive sentiments accounted for 58% of the responses (29 records). One student expressed her change in attitudes towards AI learning during the interview:

> *before completing the experiment, I thought that AI technology was extremely difficult to learn and master. But after the experiment, I deeply understood the significance of technology-enabled archival management. Not only did I build strong confidence in learning and applying technology, but I also released that it is an essential skill that we must master.*

This shows that instructive virtual learning can help students over stereotypes, develop new skills and a sense of closeness to technology, and become willing to learn and master and apply them to practical archive management work.



Sentiment	Count	Percentage
Positive	29	58.0
Negative	14	28.0
Neutral	7	14.0

Figure 8. The sentiment analysis results from the post-experiment questionnaire.

Deep interviews

Next, in order to further understand the students' perceptions after using the platform and its impact on their AI literacy, we conducted interviews. We randomly selected 22 students who had previously participated in the questionnaire survey and focused on two aspects: the application of AI technology during the experiment and the students' understanding of AI technology after the experiment.

Number	Perspective	Question
1	Application of AI technology in the experiment	In which stages of the experiment did you use AI technology?
2		What are the differences between using AI technology and not using it in these stages?
3	Understanding of AI technology	What role do you think AI technology plays in archive management after completing the experiment? Why?
4		Would you consider using AI technology in actual management work in the future?

Table 2. Questions for deep interviews

From the analysis of the interview results, it is evident that students could keenly perceive the use of AI technology during the process. A small number of students could even specify the technologies used in tasks such as decontamination, registration, and application development. Most students perceived differences in archive management with and without AI technology, with the consensus being that AI improves the efficiency and quality of archive management, especially in repetitive tasks where AI can complete them more accurately and quickly. One student responded:

> *in most stages, we need to complete tasks using both intelligent and manual methods. Comparing the two, I can clearly feel the convenience of intelligent technology-enabled management. Especially in the rectification stage, if I were to correct errors manually, the results would be poor. I might miss many issues and not know how to fix them. However, using technology, I found that if I set the accuracy high, it could quickly and comprehensively address the issues, far better than my manual corrections.*

Such an attitude was not isolated; 18 out of the 22 students believed that using AI technology is superior to purely manual methods, enabling quicker problem identification and resolution, and resulting in higher scores during the task evaluation phase. Regarding their understanding of AI, nearly 60% of the students viewed AI technology as an assistant in archive management, helping humans identify, judge, and respond more quickly. One student noted:

> *it's clear that the use of AI can help us complete tasks better and improve efficiency. It acts like a smart and responsive assistant, handling complex and repetitive work, making preliminary judgments, and providing suggestions. I believe that if used correctly, AI technology can significantly enhance the quality of our management work.*

Students who maintained a strongly positive attitude towards AI technology before its actual application believed in its widespread promotion to aid human decision-making. However, some students were cautious, arguing that in certain aspects, the use of technology might be counterproductive. They speculated that the excellent performance of AI in the experiments might be due to controlled settings and adjustments. In real-world scenarios, where archive management is more complex, the outcomes might not be as expected. One student said:

> *archives cover a wide range of content. Apart from regular and formatted document archives and specialized archives, most contain diverse societal content. AI technology struggles to possess such a comprehensive knowledge base to judge the authenticity of archives. In the identification stage of these archives, AI technology may not be reliable.*

Some students also expressed concerns about privacy leaks or security issues with extensive use of AI technology, advocating for a moderate and controlled application of technology. This indicates that students have a comprehensive understanding of AI technology in archive management, recognizing both its advantages and uncertainties, reflecting the platform's success in fostering AI literacy while also highlighting its design flaws:

- The knowledge base is highly predetermined, with many tasks preset. AI can leverage the prepared knowledge base to respond effectively, showcasing impressive results. However, in practical applications, the primary challenge is the incompleteness of the knowledge base, which students might not perceive during practice, leading to overly aggressive attitudes toward AI adoption.
- The experimental process is cumbersome, with numerous designed stages and tasks, making the experiment lengthy. Many students struggled to maintain focus in the later stages, showing impatience with manual problem-solving, potentially skewing their judgments and choices. Additionally, the experiment cannot be saved midway, requiring completion in one go, which can cause fatigue in the later stages.

Conclusion

In this paper, a virtual online learning platform, the Smart Archive Learning Platform (SAMPP), for students lacking a STEAM course learning experience is developed. The development of this platform follows a progressive 3-level strategy. The strategy fully considers the educational background of students majoring in archival science and puts the 3D immersive learning at the first level. The second level emphasizes mastering the AI techniques for daily archive management routine and the third level highlights building the creativity in developing digital humanity applications using AI techniques. SAMPP has three modules which has a 1 to 1 mapping to the 3-step strategy. A pre- and post- experiment questionnaire and deep interview are carried out to verify the usefulness of SAMPP in buildup students' confidence in AI-learning and developing their AI skill and show positive results. In future, we will be delicate in putting more AI models into each task to let students know the state-of-art progress of AI technology.

Acknowledgement

This paper is supported by the National Natural Science Foundation of China (No. 72374161); 2023 Provincial Teaching Reform Research Project of Hubei Higher Education Institutions 'Development and Application of Virtual Simulation Training Platform of Intelligent Archives for Digital-Intelligent Interaction'; First-class Undergraduate Specialty Construction Project of Wuhan University 'Archival Science Driven by 'Integrated' National Security Strategy'.

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