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Research on Innovation Path of Red Culture Service in University Libraries with Artificial Intelligence

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Abstract: Against the backdrop of rapid advancements in artificial intelligence technology, university libraries—as pivotal platforms for knowledge dissemination and cultural preservation—face unprecedented opportunities and challenges in delivering red culture services. This study explores the profound significance of implementing red culture services through AI-driven approaches, analyzes existing issues including monotonous resource presentation methods, insufficient technological integration, and professional talent shortages, and proposes innovative development pathways across three dimensions: resource consolidation, intelligent interaction ecosystem construction, and collaborative education community development. By leveraging deep integration of AI technologies, the research aims to enhance the intelligent capabilities of red culture services in academic libraries, establish a hybrid virtual-physical inheritance paradigm, and ultimately elevate red culture education from knowledge transmission to faith cultivation with enhanced quality and effectiveness.

Keywords: artificial intelligence; university libraries; red culture services; cultural heritage preservation

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1. Introduction

In an era of exponential advancement in information technology, artificial intelligence has permeated every facet of social life through its capabilities to process massive data and deliver intelligent services. As pivotal hubs for knowledge dissemination and bastions of cultural heritage preservation, university libraries should proactively embrace technological innovation by integrating AI into red culture service systems, thereby fulfilling their mission to perpetuate revolutionary legacies. Red culture embodies not only the crystallization of revolutionary spirit and historical depth, but also serves as a spiritual treasure trove that nurtures students' patriotism and reinforces socialist core values. Consequently, leveraging AI as a technological engine to overcome traditional service limitations and achieve qualitative leaps in red culture service efficiency has become a critical challenge that university libraries must urgently address[1].

2. The Deep Significance of Red Culture Service Efficiency in University Libraries

As pivotal platforms for knowledge dissemination, university libraries possess unique resource advantages and operational strengths in delivering red culture services. By revitalizing both physical collections and digital resources to create

multidimensional interactive service ecosystems, libraries can establish a red culture service system that combines intellectual depth with dynamic presentation. This framework not only enriches the essence of red education but also provides robust spiritual support for nurturing contemporary youth imbued with patriotic values and revolutionary spirit[2].

The integration of artificial intelligence technology not only signifies innovative breakthroughs in traditional service models but also represents proactive expansion of red culture inheritance methods. AI applications can significantly enhance the intelligent level of red culture services in university libraries. Through precise data analysis and personalized recommendation systems, libraries can effectively engage target audiences while addressing diverse needs of young students with varying interests and personality traits. This approach ensures red culture permeates daily teaching and campus culture throughout the educational process, substantially improving the practical effectiveness of cultural services. Taking user profiling technology as an example, libraries can deliver tailored recommendations based on students 'academic disciplines and grade levels, aligning red culture resources with their professional backgrounds and interests. For instance, history majors may prefer revolutionary historical documents, while STEM students tend to be interested in stories about revolutionary figures' technological endeavors[3-4].

The integration of cutting-edge technologies like virtual reality (VR) and augmented reality (AR) has revolutionized the presentation of revolutionary culture, shifting from flat narratives to immersive, multidimensional experiences. These technological advancements not only enhance interactive services but also enable students to deeply grasp the spiritual essence and cultural values of revolutionary heritage through personal reflection. Take VR technology as an example: its virtual historical simulations allow students to engage in "virtual dialogues" with revolutionary pioneers across time and space. The emotional resonance generated by this immersive sensory experience far surpasses the impact of traditional didactic methods. Furthermore, leveraging intelligent information retrieval and resource integration technologies, university libraries can establish systematic knowledge maps of revolutionary culture. Through social media platforms, online learning systems, and WeChat official accounts, these tools break down physical and temporal barriers, facilitating widespread dissemination of revolutionary cultural resources while significantly improving accessibility and preservation effectiveness of revolutionary heritage services[5].

3. Challenges Faced by Red Culture Services in University Libraries

Against the backdrop of digital transformation, university libraries face multiple practical challenges in enhancing the service effectiveness of red culture initiatives. Firstly, resource utilization remains inefficient with poor integration efficiency. Although academic libraries have established certain red culture resource reserves, data resources often remain scattered and lack logical connections or systematic management coordination. This "information silo" phenomenon not only results in low resource utilization rates but also hinders the establishment of sustainable, systematic operational mechanisms[6].

Secondly, technological empowerment lags behind and innovation momentum remains insufficient. In the face of iterative advancements in cutting-edge technologies like artificial intelligence, university libraries have demonstrated relatively slow adoption of technology in red culture services. Most libraries still adhere to traditional service paradigms, failing to effectively advance the in-depth digitization of precious documents and audiovisual materials. Due to inadequate resource exploration and algorithm-driven precision recommendation systems, the dissemination and utilization effectiveness of red culture have been significantly constrained[7].

Thirdly, the service model remains monotonous with stagnant content. Current red culture services in universities predominantly rely on traditional formats like lectures and exhibitions, often lacking immersive experiences and frequent interactions. The offerings are typically limited to theoretical analyses of classic works or video screenings, failing to keep pace with contemporary trends or technological innovations tailored to students 'personalized needs. This results in diminished service appeal, making it difficult to effectively engage students' participation and foster their active

involvement[8].

Finally, collaborative education initiatives remain insufficient, resulting in inadequate talent support. Red culture education constitutes a complex systemic project requiring deep integration among multiple departments including libraries, secondary colleges, and Youth League committees. However, current challenges include loose interdepartmental coordination, persistent resource-sharing barriers, and difficulties in forming cohesive educational efforts. Concurrently, there is a critical shortage of interdisciplinary professionals with digital humanities literacy, leaving university libraries struggling to effectively utilize advanced technologies for revitalizing red cultural resources. This has led to rigid service mechanisms that fail to adapt to the evolving demands of intelligent service transformation[9].

4. Innovative Approaches of Artificial Intelligence Empowering Red Culture Services in University Libraries

4.1. Intelligent Technology Leadership in Building a Red Culture Service Chain

University libraries are leveraging intelligent technologies to pioneer innovative paradigms for integrating red cultural resources. By harnessing professional expertise, they establish smart resource databases and employ big data analytics and knowledge graph construction techniques to digitally reconstruct fragmented red cultural materials—including historical documents, audiovisual archives, and oral histories. Through developing resource indexing systems, they achieve precise classification and targeted resource delivery, creating intelligent search platforms and personalized recommendation systems. By incorporating red cultural resources aligned with institutional educational missions, universities build distinctive red cultural knowledge systems that form a complete service chain: "resource integration → knowledge mining → precision delivery." This transformation enables the transition from basic services to knowledge-driven services, elevating cultural dissemination through systematic integration[10].

Meanwhile, we establish learning behavior analysis models to precisely deliver ideological and political education resources tailored to different disciplines, achieving a profound transformation of red culture education from resource provision to value guidance, thereby cultivating the spiritual character of teachers and students in the new era. By employing artificial intelligence-assisted cataloging systems, we conduct intelligent indexing and knowledge reorganization for multi-source heterogeneous resources, while building a distributed resource management platform based on blockchain technology to ensure the security and traceability of red cultural resources. Innovatively adopting digital twin technology, we create virtual-real integrated red culture service spaces, developing immersive service systems featuring 3D artifact exhibitions, historical scenario simulations, and XR spatial reading of red classics, providing teachers and students with richer and more vivid red cultural experiences.

4.2. Establishing Intelligent Interaction Environments to Explore New Paradigms of Virtual-Physical Coexistence

Currently, red culture service spaces in university libraries remain confined to traditional document reading rooms or temporary educational zones. This monotonous and static physical layout significantly limits the educational potential of red culture. To overcome this limitation, libraries should actively leverage artificial intelligence technologies to digitally redesign service environments, creating immersive red culture spaces with strong emotional resonance. Such innovations not only revolutionize the transmission of revolutionary spirit but also serve as crucial measures to strengthen value guidance and inspire patriotic sentiments among faculty and students. These efforts hold profound strategic significance for cultivating well-rounded socialist builders and successors who excel in moral, intellectual, physical, aesthetic, and labor development.

Meanwhile, efforts should focus on establishing an interconnected framework for red cultural heritage. By leveraging intelligent navigation systems and personalized narrative pathways, thematic spaces can be endowed with three integrated functions: smart exhibition design, situational teaching, and value transmission. Through in-depth analysis of user learning

behavior data and interest preferences, the system can precisely deliver customized learning routes, thereby transforming the paradigm of red cultural resources from "passive retrieval" to "active provision." In practical implementation, libraries may deploy intelligent navigation robots to provide companion-style personalized interpretation services, or adopt augmented reality (AR) technology to enhance physical exhibits. This enables teachers and students to instantly access detailed historical events through mobile device scanning, achieving seamless integration of physical spaces with digital information[11].

4.3. Establishing a Bidirectional Driving Collaborative Education Model of "Subject Librarians + Professional Teachers"

University libraries should fully integrate into the comprehensive ideological and political education framework, adopting a strategic perspective to establish a collaborative innovation system that incorporates all elements of red culture education. This system aims to break down resource barriers by fostering deep integration and coordinated collaboration among multiple stakeholders, thereby expanding access to red culture resources across various dimensions. Simultaneously, it focuses on cultivating a multidisciplinary educational team with both exceptional digital literacy and profound understanding of red culture heritage, ultimately creating a powerful synergy in educational outcomes[12].

On one hand, we established a Red Culture Heritage Mentorship Workshop utilizing virtual simulation teaching laboratories to conduct immersive professional ethics training, thereby enhancing educators' value guidance capabilities and cultural dissemination influence. On the other hand, we developed an educational intelligent technology matrix featuring AI-assisted lesson preparation systems and red-themed teaching resource mapping platforms, empowering teachers to precisely align with ideological education curriculum requirements. Simultaneously, we implemented a three-tier collaborative mechanism involving museums, academic institutions, and educators, forming cross-departmental red-themed teaching research alliances to leverage educational synergy. This initiative developed intelligent-era red education product clusters including revolutionary spirit quantification evaluation systems and digital historical event narrative tools, creating a closed-loop teaching model of "theoretical learning-practical immersion-value internalization." These efforts have achieved qualitative leaps in red culture education, transitioning from knowledge transmission to faith cultivation through enhanced effectiveness[13].

5. Conclusion

Artificial intelligence provides robust technological support for the innovative development of red culture services in university libraries. By integrating red cultural resources, establishing intelligent service ecosystems, and fostering collaborative educational efforts, academic libraries can significantly enhance the intelligentization of red culture services, thereby strengthening the cultivation of socialist core values among students. In the future, deeper integration between university libraries and AI technologies will continuously drive innovative approaches to red culture services, keeping pace with evolving trends while making greater contributions to nurturing new generations capable of shouldering the mission of national rejuvenation.

Disclosure statement

The author declares no conflict of interest.

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