Editorial

Bogdan Trifunović*

Editorial: Bridging Innovation and Heritage in Digital Preservation

Welcome to Issue 54(2) of *Preservation, Digital Technology and Culture*, where we present a compelling collection of research that exemplifies the journal's commitment to exploring digital preservation through multiple lenses – technological, social, economic, political, and user-centered perspectives. This issue brings together scholars from across the globe, representing institutions in Indonesia, India, Canada, Ukraine, South Africa, and the United States, demonstrating the truly international scope of our field and the universal importance of preserving our digital and cultural heritage.

The seven articles in this issue collectively address some of the most pressing challenges and innovative solutions in digital preservation today. From the application of cloud computing technologies in libraries to the preservation of indigenous cultural heritage, from automated environmental monitoring systems to community-driven archival practices, these contributions reflect the field's evolution toward more sophisticated, inclusive, and sustainable approaches to preservation.

authors, highly cited publications, and leading institutions in this rapidly evolving field.

The study's findings are particularly noteworthy for their revelation that 2022 marked the most prolific year for publications on cloud computing within Library and Information Science. The research identifies Venezuela, the United States, and China as the most productive nations in this domain, while highlighting foremost authors in the field. The prominence of *Lecture Notes in Computer Science* and *ACM International Conference Proceedings* as leading publication venues underscores the technical sophistication increasingly required in library science research.

This work is valuable for its demonstration of how cloud computing technologies can provide academic libraries with ongoing competitive advantages while addressing the scalability and accessibility challenges inherent in modern information systems. The bibliometric approach employed here offers a methodologically rigorous foundation for understanding the trajectory of cloud computing adoption in library environments, providing essential insights for both practitioners and researchers planning future initiatives.

1 Cloud Computing and Library Infrastructure

Opening this issue, Mohammad Nasir from the Central Library at Kalinga University, India, and Basudeb Jana from Kalinga University present "Mapping Research Trends in Cloud Computing Applications for Libraries: A Bibliometric Approach." This comprehensive bibliometric analysis examines the intersection of cloud computing and library services, analyzing 1,083 articles retrieved from the Scopus database. Using advanced analytical tools including Biblioshiny and VosViewer, the authors reveal significant patterns in the literature, identifying key themes, influential

2 Advances in Digital Character Recognition

The second article, "Evaluating the Impact of Optimizer Hyperparameters on ResNet in Hanacaraka Character Recognition," authored by Egidio Bagus Sudewo, Muhammad Kunta Biddinika, Rusydi Umar, and Abdul Fadlil from Universitas Ahmad Dahlan, Yogyakarta, Indonesia, represents a significant contribution to the preservation of cultural scripts through advanced machine learning techniques. This research addresses the critical challenge of digitizing and recognizing Javanese Hanacaraka script characters, a vital component of Indonesia's cultural heritage.

The study's methodological rigor is evident in its comprehensive evaluation of seven different optimizers – SGD, Adam, RMSprop, Adagrad, Adadelta, NAdam, and Adamax – applied to a ResNet-18 based Convolutional Neural Network model. The research demonstrates exceptional

*Corresponding author: Bogdan Trifunović, KreativaLab, Kraljevačka 76, Belgrade, 11000, Serbia, E-mail: info@kreativalab.org

results, with NAdam achieving perfect performance across all metrics. The implications of this research extend far beyond technical optimization. By enabling more accurate and efficient recognition of historical scripts, this work contributes directly to the preservation and accessibility of cultural heritage materials. The study's findings that NAdam's combination of Nesterov Accelerated Gradient and momentum adaptation provides superior convergence characteristics offer valuable insights for similar character recognition projects worldwide, particularly those involving endangered or historical writing systems.

3 Virtual Museums and Metaverse Technologies

Next, Rusydi Umar, Bambang Robiin, Vera Yuli Erviana, M. Iqbal Taruna, and Afan Kurniawan, all from Universitas Ahmad Dahlan, Yogyakarta, Indonesia, contribute "Analysis of Software Requirement Specification and Use Case Diagram of Metaverse Museum Muhammadiyah." This article presents a detailed technical analysis of a virtual museum platform designed to deliver immersive and interactive experiences within a metaverse environment.

The research methodology focuses on evaluating the alignment between Software Requirement Specification (SRS) documents and Use Case Diagrams, ensuring comprehensive coverage of both functional and non-functional requirements. The authors identify critical functionalities including user navigation, interaction capabilities, content management systems, and customization features, while examining non-functional requirements such as availability, portability, response time, safety, security, and ergonomic design.

The study's findings reveal a strong correlation between the SRS and Use Case Diagram representations, though the analysis also identifies areas for improvement, particularly regarding features like link sharing functionality. The authors' conclusion emphasizes the need for continuous refinement in system design documentation to meet the high standards expected in metaverse environments. This work is particularly significant for its practical implications for cultural institutions seeking to develop virtual museum experiences. The authors' recommendations for developing templates and guidelines for metaverse applications, organizing stakeholder training sessions, and establishing collaborative platforms for sharing best practices provide a roadmap for institutions embarking on similar projects.

4 Indigenous Cultural Preservation in the Digital Age

Todd J. B. Blayone from York University, Toronto, Canada, and Olena Mykhailenko from the Goethe-Institute, Ukraine, present "Using Digital Technologies for Indigenous Sociocultural Advancement in an Era of AI: A Systematic Critical Synthesis." This groundbreaking research synthesizes 69 studies spanning five continents, examining digital technology projects developed by and for Indigenous peoples.

The study employs a sophisticated bifocal critical apparatus, utilizing activity theory to explore project ecologies while revealing ideopolitical framing patterns at the interface of Euro-Western and Indigenous cultures. The research identifies eight distinct project types and highlights the predominance of consumer technologies, though many complex IT assemblages are also documented. A particularly important finding concerns the tension between technological complexity and local control. The authors note that while sophisticated technologies offer enhanced capabilities, they often require "outsider" expertise, potentially limiting Indigenous communities' control over processes, data, and outcomes. The study identifies three primary ideopolitical frames: cultural bridging, countering Euro-Western dominance, and technical problem-solving, with key political themes including digital empowerment, data sovereignty, identity expression, and online activism.

This research is especially timely given the parallel emergence of Indigenous cultural resurgence and generative AI technologies. The authors' critical synthesis provides essential insights for researchers and practitioners working at the intersection of technology and Indigenous cultural preservation, offering new pathways for exploring culturally transformative IT applications.

5 African Rock Art Digital Preservation

Next, Mduduzi I. Maseko, Mbongeni Tembe, Sello Mocumi, Sibongiseni Lukhele, and Yola Nzimela from the Rock Art Research Institute at the University of the Witwatersrand, South Africa, contribute "Digital preservation and access to cultural heritage in South Africa: the case of the African Rock Art Digital Archive." This article describes the crucial work of the African Rock Art Digital Archive (ARADA) in preserving one of southern Africa's most significant forms of cultural heritage.

The research emphasizes rock art's importance as a statement of indigeneity for marginalized peoples and its role in providing access to the lifeways and thoughts of people across millennia. ARADA's digitization efforts encompass rock art collections and related materials from cultural heritage sites across the African continent, utilizing state-of-the-art scanning equipment and robust data management systems.

The authors detail the tools and strategies employed by ARADA, including the creation of digital records in various formats – photographs, drawings, and historical documents. The repository's user-friendly interface and comprehensive metadata enhance accessibility, supporting research, education, and public engagement initiatives. However, the study also acknowledges significant challenges, including limited funding, technological obsolescence, and the ongoing maintenance requirements of digital media. The authors emphasize that addressing these challenges requires sustained investment, inter-institutional collaboration, and adherence to best practices in digital preservation and access.

6 Post-Custodial Community Archives

Krystyna K. Matusiak from the University of Denver, USA, and A. R. Flynn from the University of Colorado Boulder, USA, examine "Sustaining Community Archives in the Post-Custodial Digital Environment." This research presents a case study of a local community archive in rural Colorado, focusing on the impact and sustainability implications of "scan and return" practices.

The "scan and return" approach, wherein original materials are returned to owners after digital surrogates are created, offers significant benefits for diversifying archival collections and expanding community collaboration. However, the authors' case study reveals important risks to the sustainability of community archives, particularly for organizations where volunteers may lack access to adequate scanning equipment, technical expertise, and digital preservation systems. The research emphasizes the importance of responsible digital stewardship and highlights the critical role of collaboration in sustaining community archives. The authors demonstrate that maintaining digital presence and long-term collection sustainability requires careful consideration of both social and technical factors, with particular attention to partnerships with committed local organizations.

This work is relevant given the increasing adoption of post-custodial approaches in archival practice. The authors'

insights into the challenges and opportunities of scan-and-return practices provide valuable guidance for community archives seeking to balance accessibility, representation, and sustainability concerns.

7 Environmental Monitoring and Preservation Science

Concluding this issue, Eka Ratri Noor Wulandari, Hafrida Rahmah, Salnan Ratih Asriningtias from the Faculty of Vocational Studies at Universitas Brawijaya, Indonesia, along with Iwan Permadi from the Faculty of Law and Heri Prayitno, Pitoyo Widhi Atmoko, and Pipit Tunjungsari from UB Library, present "Automated Prediction of Preservation Index in Library Environments through Multiple Regression Analysis."

This innovative research develops a predictive model using multiple linear regression to enhance Preservation Index (PI) calculations for library collections. Building upon previous IoT-based monitoring research, the study incorporates critical environmental variables including temperature, humidity, and light exposure, with data collected over three months across three distinct library environments. The model's development involved sophisticated interpolation of existing PI data and analysis through multiple regression frameworks. Results demonstrate remarkably high precision with a Mean Absolute Percentage Error (MAPE). While light exposure showed minimal contribution to predictive capability, the study confirms the predominant influence of temperature and humidity in PI forecasting. The research includes correlation heatmaps that elucidate variable interrelationships, providing visual interpretation of complex data interactions.

8 Looking Forward

The articles in this issue collectively demonstrate the field's increasing sophistication and global reach. From bibliometric analyses revealing research trends to advanced machine learning applications for cultural heritage preservation, from virtual museum development to Indigenous digital empowerment initiatives, these contributions reflect the multifaceted nature of contemporary digital preservation challenges and solutions.

Several key themes emerge across these works: the critical importance of community engagement and local control in preservation initiatives, the growing role of artificial intelligence and machine learning in heritage preservation, the need for robust technical infrastructure balanced

with sustainable practices, and the ongoing challenge of ensuring equitable access to digital preservation technologies and expertise.

As we continue to navigate the rapidly evolving landscape of digital preservation, the research presented in this issue provides both theoretical foundations and practical guidance for addressing the complex challenges facing our field. We encourage readers to engage with these works not only as individual contributions but as part of a broader dialogue about the future of cultural heritage preservation in an increasingly digital world.

We extend our gratitude to all the authors for their significant contributions to this issue and to the global community of researchers, practitioners, and institutions working to preserve our digital and cultural heritage for future generations.