Digital Archiving and Preservation of Art: Challenges and Innovation

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ABSTRACT

The Digital Archiving and Preservation of Art project (DARPA) is a collaborative effort involving industrial partners and research institutions aimed at addressing the unique challenges of digital art preservation. This initiative focuses on developing innovative methods and processes for the digitization, documentation, classification, and metadata integration of multimedia artworks, particularly those emerging from new media technologies. Digital art preservation necessitates sustainable solutions that account for the dynamic nature of digital content and its reliance on outdated software and hardware environments. The project aims to provide user communities with optimal access to high-quality visual and functional art experiences within a reasonable timeframe and cost. Ensuring standardized metadata, detailed documentation, and semantic annotations for each object is critical for both long-term and short-term preservation of digital artifacts. Achieving these ambitious goals requires close collaboration between industrial and research partners and cooperation with archives, specialized museums, and the digital art community. DARPA leverages modern IT technologies, such as soft computing and artificial intelligence, over a two-year funding period to advance this field. In the context of Europe and the United States, commercial organizations are implementing technologies and patterns for art collection, storage, and retrieval using Creative Commons business models. This study explores the challenges and innovations in documenting, preserving, and ensuring the usability of digital artworks, providing valuable insights for both the field and the public.
Keywords: Digital archiving, Art preservation, Multimedia artworks, Digitization methods, Metadata integration, New media technologies and Sustainable preservation

INTRODUCTION

The Digital Archiving and Preservation of Art project (DARPA) is a joint initiative of industrial partners and research institutions to collaborate on field-related issues and specific art-related challenges of digital preservation. The research centers on innovative methods and processes for digitization, documentation, classification, and metadata integration of multimedia artworks, particularly originating from new media technologies. Preservation of digital art requires sustainable solutions considering the dynamic nature of content and its dependency on sometimes long-deprecated software and hardware environments. User communities demand optimal access scenarios, wit*h optimal visual and functionality quality within an acceptable time frame and at a reasonable cost for server access and image delivery. All processes are required to convey a standardization of metadata together with detailed documentation and semantic annotations for each object, thus aiming at both long- and short-term preservation of the digital artifact [1, 2]. These ambitious goals can only be achieved through tight collaboration between the industrial and research partners as well as cooperation with the partner network, such as archives, specialized museums, and the digital art community. DARPA's high innovation contents derive from modern IT technology, such as soft computing and artificial intelligence within a two-year funding period. In Europe and the United States, there are some commercial organizations which are providing art collecting, storing, and retrieving technologies and patterns using a Creative Commons business model. Among these, some are specializing in standardizing and target-systemizing digitization and archiving of 2D visual artworks.

However, art is mainly understood as a traditional 2D visual class medium with 3% of art being understood as 3D. This has some influences on the still unsatisfied market for exploring and delivering digitized content of cultural heritage, which could be attracted with some open innovation. This study of the challenges and innovations in documentation, preservation, and usability of digital artworks is therefore relevant for the field but also the public [3].

Importance of Digital Archiving in the Art World

Humans have preserved artifacts for centuries to honor historic events or powers. The methods for this, such as written language or visual representations, have evolved over time, resulting in countless preserved artifacts. The especially creative fields of art, archaeology, and architecture form the common heritage of humanity, representing human intellectual achievement, unique skills, and implicit collective value systems. However, the continual marking of time's passage and the progress of mankind show the increase in the amount and magnitude of his creations and assets, but a loss of control over their utilization and preservation. There is a groundswell of appreciation for the multiple values of past culture, increasingly recognized as unique, non-renewable resources. Society now tends to respect all aspects of the past, particularly if they have not been properly studied, in modern cultural attitudes towards other civilizations and their history and heritage [4, 5]. Archival institutions now have to deal with the mass creation of records. The information society has an obsession with creating records of its activities and public institutions of all kinds, particularly the galleries, libraries, and museums that cater to the world of art, archives, and heritage, spend large sums of money storing and providing access to them. The National Archives in Washington, D.C. is no stranger to the issue of digital preservation. They have had their share of physically bankrupt storage media, inaccessible records, and other horror stories. Their effort is actually focused on long-term access, allowing reference from remote locations, as well as reuse and manipulation. But on a grander scale, national institutions, such as this one, are responsible for the physical and intellectual care of manuscripts, art objects or archaeological artifacts, and heritage materials that record the history and memory of the cultures of all peoples. The amounts of materials at both physical and intellectual risk are vast and much of it is becoming increasingly difficult to access [6].

Challenges in Digital Archiving and Preservation of Art

The inherent challenge in preserving digital and new media art relates to technological obsolescence. Improvements and development in digital tools and platforms occur at a rapid pace. Newer versions of software are often not compatible with earlier versions. This may make artworks created with the older version of tools and software difficult to view or access at some point in time. In addition, as the digital medium, unlike a painting or sculpture, does not have a stable physical form, digital art can be very fragile [7, 8]. In the case of performance art using digital media, the memory of the work is not tied to the experience of performance. The object may only be the catalyst, the empty vessel for temporal experience that will never be the same again. Memorable art evokes strong feelings, a unique response, and can change someone's attitudes and perspectives; can digital art do the same? To preserve digital art, the effort is to preserve the context, some part of the concept, and elements of the form, so it can be experienced in some way. Art conservators, the sound preservation community, and a number of multi-disciplinary digital preservation research projects are grappling with the field to develop open-source tools, workflows, and best practices [9].

Technological Obsolescence

Other significant issues for media art practitioners and custodians are technological extensions and the problem of spare parts for artistic, perhaps unique, or deeply idiosyncratic technological assemblages. Maintenance of technological knowledge, through the periodic restoration and re-animated preservation of these works, constitutes another substantial investment for future generations and demands a careful approach as it may lead to irreversible changes of the unique character of a work or the 'dying wish' of an already deceased artist [10, 11]. The long-term conservation conundrum for many complex media installations will change "from being primarily about physical elements such as hardware or software, and will become more concerned with the invisible critical components to these works, such as the knowledge and intent of the artist and the broader contextual aspects of the works", as thoroughly explained by Dunn. To this end, a new collaboration of conservators, knowledge-holders, and caretakers managing human involvement, technology, infrastructure, flexibility, and change management, is a smart choice, as done at several museums when moving from reinstallations to software updates [12].

Innovations in Digital Archiving and Preservation of Art

The innovation in digitalization processes of meaningful cultural resources, such as art, are entirely dependent on their specific contents. Traditionally, when it comes to understanding art, beyond image geometry and chromatic representation, the additional use of rich digitized information makes the

knowledge of such resources increasingly consistent and effective. Advanced digital technologies allow the capturing, processing, and exhibition of high-quality data which, together with a strong cross-disciplinary collaboration, enable us to investigate different types of artwork, giving a very good understanding of their characteristics and state of conservation. These provide good access to the work, supporting decisions relevant to restoration or migratory exhibitions in good conditions, reducing financial investments and time work, and contributing to the democratization of new cultural technologies [13, 14]. By analyzing the results, we can conclude that we are able to obtain a multitude of highly specialized information from a single opto-digitized artwork. Indeed, the appeal of this initiative is that for unique high added value paintings that are seldom exposed but which have a much-required historical and artistic value, the circulation of such a body of data minimizes handling risks and provides significant cultural benefits. Such digital systems of optically recorded paintings can later be placed on remote kiosks in museums with clearly guaranteed lighting conditions, becoming an invaluable source of knowledge instantly accessible to students or sensitive visitors.

Blockchain Technology

Over the past few years, blockchain technology has caught the imagination of different creators and players in the art world, and researchers examine its relevance for both digital art archiving and preservation. They explain that "a blockchain is a growing record, called blocks, which are linked using cryptography." Each block contains a cryptographic hash of the previous block, a timestamp, and transaction data, and is virtually "proof" to be a reliable way to ensure data integrity [15, 16].

One of the benefits of using this technology in the art world is in relation to theft and fraud in postmodern art. It guarantees "providing evidence" for creators facing art plagiarism. In some applications, for example Mycryptons, artists can tokenize digital art via a custom vision for Minter, making digital art products extremely valuable and tradable. The use of blockchain technology in the art market can be considered a response to the need to maintain the material value of physical works of art that often end up having a greater commercial value than the intrinsic aesthetic and cultural value of the work [17, 18]. Because art, compared to traditional financial or transactional asset classes, is not used meaningfully, does not generate any return, and for someone to invest a large sum of money in digital art with authenticity guaranteed by a certificate of creation and registration costs in the national and neighboring countries, he or she wants to lay the foundation for the existence of the purchase, to lay the foundation for the solidity of economic connections. Digital archives, therefore, dismiss the possibility of owning material tokens and gaining commercial resellability via blockchain, and thus allow or possibly generate a collection category in the market of virtual works as well [19].

Best Practices in Digital Archiving and Preservation of Art

Converting the original artwork into digital format is the first step in the preservation of art. Here are best practices in terms of file storage, creation, and management that might help in preserving art [20].

Familiarize ourselves with tools to generate, manage, and store digital files that present art: Seek familiarity with desktop computer conferencing tools, Adobe Creative Suite, vector and bitmap graphics software, Windows and Macintosh Font Management tools, PowerPoint or similar presentation software, TIFF Image Filenaming Protocol, xMP metadata and Bridge, Index and digital asset management software such as Canto Cumulus, Adobe Bridge, Extensis Portfolio, ResourceSpace, Luna Insight. Develop workflow diagrams or protocols for the stages of creation, storage, and management of key digital and digitized art file forms. Ensure that these methods are fully supported and maintained [21]. Use secure file types like TIFF, actually store files as secure file types. Limit the file types that are used to a small number of open sustainable file types. The preservation of digital art starts at the acquisition phase: Data protection claims to begin at the very act of art collection. Stored digital asset collections comprise customized high-end production files (proprietary/proprietary imaging format, printing equipment, customized color profiling, retouching, formatting of art for printing, PDF creation), supported artwork files, and artwork derivatives. Each art acquisition step should be thought of in terms of risk management for the digital asset, guided by comprehensive standardized procedures. Artwork and value-oriented controls should be embedded into asset acquisition procedures to assure quality and security. Indeed, the library model approach fits well a proactive role [22, 23].

CONCLUSION

The DARPA initiative represents a significant step forward in addressing the complex challenges associated with the digital archiving and preservation of art. By developing and implementing innovative digitization, documentation, and metadata integration techniques, DARPA aims to ensure the sustainable preservation of digital artworks. The collaboration between industrial partners, research institutions, archives, museums, and the digital art community is essential for achieving these goals. The project

highlights the importance of standardizing metadata and providing detailed documentation to support both the long-term and short-term preservation of digital artifacts. The use of modern IT technologies, including soft computing and artificial intelligence, enhances the ability to manage the dynamic nature of digital content. Moreover, the study underscores the need for open innovation and collaboration to address the unsatisfied market for digitized cultural heritage. The integration of blockchain technology offers promising solutions for ensuring data integrity and addressing issues related to theft and fraud in the art world. As digital archiving and preservation practices continue to evolve, the lessons learned from DARPA will be invaluable in guiding future efforts to protect and maintain the rich cultural heritage embodied in digital art.

REFERENCES

1. Chien AA, Kaplan SM, Reed DA, Canaday RF. A Proposal for a Broadband Network Infrastructure (High-Speed Networks, Data Archives, and Collaborative Work). choices.cs.illinois.edu. . illinois.edu

2. BULLECER SGC, DOCTOR J. … THE NEW WORLD: AN EXAMINATION OF THE APPLICATION OF COPYRIGHT LAWS TO THE DIGITIZATION OF ARCHIVE AND LIBRARY COLLECTIONS. libpros.com. . libpros.com

3. Guo S, Li X. Computer aided art design and production based on video stream. Computer-Aided Design and Applications. 2020. cad-journal.net

4. Zhang X, Zhang Y, Zhong M, Ding D, Cao Y, Zhang Y, Zhang M, Yang M. Enhancing state-of-the-art classifiers with api semantics to detect evolved android malware. InProceedings of the 2020 ACM SIGSAC conference on computer and communications security 2020 Oct 30 (pp. 757-770). github.io

5. Masood M, Nawaz M, Malik KM, Javed A, Irtaza A, Malik H. Deepfakes generation and detection: State-of-the-art, open challenges, countermeasures, and way forward. Applied intelligence. 2023 Feb;53(4):3974-4026. [PDF]

6. Ortolja-Baird A, Nyhan J. Encoding the haunting of an object catalogue: on the potential of digital technologies to perpetuate or subvert the silence and bias of the early-modern archive. Digital Scholarship in the Humanities. 2022. oup.com

7. Paul C. Digital art now: histories of (im) materialities. International Journal for Digital Art History. 2020. uni-heidelberg.de

8. Rinehart R, Ippolito J. Re-collection: Art, new media, and social memory. 2022. academia.edu

9. Skublewska-Paszkowska M, Milosz M, Powroznik P, Lukasik E. 3D technologies for intangible cultural heritage preservation—literature review for selected databases. Heritage Science. 2022 Jan 4;10(1):3. springer.com

10. Otero J. Heritage conservation future: where we stand, challenges ahead, and a paradigm shift. Global Challenges. 2022. wiley.com

11. Korro Bañuelos J, Rodríguez Miranda Á, Valle-Melón JM, Zornoza-Indart A, Castellano-Román M, Angulo-Fornos R, Pinto-Puerto F, Acosta Ibáñez P, Ferreira-Lopes P. The role of information management for the sustainable conservation of cultural heritage. Sustainability. 2021 Apr 13;13(8):4325. mdpi.com

12. Doh J, Budhwar P, Wood G. Long-term energy transitions and international business: Concepts, theory, methods, and a research agenda. Journal of International Business Studies. 2021. springer.com

13. Hedrick BP, Heberling JM, Meineke EK, Turner KG, Grassa CJ, Park DS, Kennedy J, Clarke JA, Cook JA, Blackburn DC, Edwards SV. Digitization and the future of natural history collections. BioScience. 2020 Mar 1;70(3):243-51. oup.com

14. Navarrete T. Digitization in museums. Teaching cultural economics. 2020. eur.nl

15. Gadekallu TR, Wang W, Yenduri G, Ranaweera P, Pham QV, da Costa DB, Liyanage M. Blockchain for the metaverse: A review. Future Generation Computer Systems. 2023 Jun;143:401-19. cityu.edu.hk

16. Tullin P. A Changing World: Culture Disrupted. mccy.gov.sg. . mccy.gov.sg

17. Bianco P. Blockchain as a Technology Applied to Authenticity Issues: A Possible New Resource for Building up a Catalogue Raisonne?. Art Antiquity & L.. 2020. [HTML]

18. Tiunova A, Rozhkova M, Isaeva O, Kulakova O, Kasyanov R, Puchkova A, Alferova A. DIGITAL LAW JOURNAL. Журнал издается с. 2020. wikimedia.org

19. Fallucchi F, Gerardi M, Petito M, De Luca EW. Blockchain framework in digital government for the certification of authenticity, timestamping and data property. 2021. hawaii.edu

20. Hunter GS. Developing and maintaining practical archives: A how-to-do-it manual. 2020. [HTML]

21. Berens K, Gakey A, Jaillant L, Kirschenbaum M, Nielsen K, Brian O. Books. Files: Preservation of Digital Assets in the Contemporary Publishing Industry (A Report). academia.edu

22. Popescu AD. Non-fungible tokens (nft)–innovation beyond the craze. In5th International Conference on Innovation in Business, Economics and Marketing Research 2021 May (Vol. 32, pp. 26-30). academia.edu

23. Guadamuz A. The treachery of images: non-fungible tokens and copyright. Journal Of Intellectual Property Law and Practice. 2021. oup.com

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