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Strategi Pemerintah menggunakan AI: Studi Kasus Restorasi Warisan Budaya (Koleksi Foto Prajurit) untuk Peringatan 70 Tahun Gencatan Senjata Korea Selatan

Government Strategies Using AI: A Case Study of Cultural Heritage Restoration (Soldier Photo Collection) for South Korea's 70th Ceasefire Commemoration

Monica Maharani[1*], Tamara Adriani Salim[2]

[1,2] Department of Library and Information Science, Faculty of Humanities, Universitas Indonesia, Depok-Indonesia

monica.maharani@ui.ac.id

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Abstrak

Latar belakang: Pelestarian dan restorasi warisan budaya sangat penting untuk menjaga narasi sejarah dan identitas budaya. **Tujuan:** Penelitian ini mengeksplorasi peran kecerdasan buatan (AI) dalam restorasi foto sejarah Korea Selatan, khususnya dari era Perang Korea, dengan fokus pada teknologi seperti *Face Image Restoration* (GFP-GAN) untuk mengonversi foto hitam-putih menjadi gambar berwarna beresolusi tinggi. Proyek ini, yang dilaksanakan oleh Universitas Sungkyunkwan dan Kementerian Patriot dan Veteran Korea Selatan, menyoroti dampak signifikan AI dalam pelestarian budaya. Peran pemerintah sangat vital dalam proyek ini, dari memilih foto bersejarah hingga memastikan akurasi historis dan penerapan teknologi yang canggih. Kerja sama antara pemerintah dan institusi akademis menunjukkan bagaimana dukungan pemerintah dapat mempercepat dan memperluas teknologi pelestarian budaya. **Metode:** Penelitian ini menggunakan metode penelitian kualitatif dengan pendekatan studi kasus dan tinjauan pustaka yang komprehensif dalam mengumpulkan data. **Hasil:** Hasil penelitian menunjukkan bahwa AI tidak hanya meningkatkan kualitas visual dan aksesibilitas gambar sejarah tetapi juga menghubungkan masa lalu dan masa kini secara lebih relevan. Studi ini menggarisbawahi potensi transformasional AI dalam pelestarian budaya dan menyerukan eksplorasi lebih lanjut tentang penerapannya dalam upaya global. **Kesimpulan:** Penelitian ini juga menekankan pentingnya kolaborasi lintas sektor antara pemerintah, akademisi, dan lembaga swasta untuk mencapai hasil restorasi yang signifikan dan bertahan lama.

Kata Kunci: Kecerdasan Buatan; Restorasi Warisan Budaya; Perang Korea; Korea Selatan; Foto Sejarah.

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Abstract

***Background**: Preserving and restoring cultural heritage is crucial for maintaining historical narratives and cultural identity. **Purpose**: This study investigates the role of artificial intelligence (AI) in the restoration of historical photographs from South Korea, particularly those from the Korean War era. It focuses on technologies such as Face Image Restoration (GFP-GAN) to convert black-and-white photos into high-resolution, colorized images. The project, conducted in collaboration with Sungkyunkwan University and the South Korean Ministry of Patriots and Veterans Affairs, highlights the significant impact of AI on cultural preservation. The government's role is essential in this project, encompassing tasks from selecting historical photographs to ensuring historical accuracy and the application of advanced technology. The partnership between government bodies and academic institutions illustrates how government support can accelerate and expand the application of preservation technologies. **Methods**: This research employed a qualitative methodology, using a case study approach alongside a comprehensive literature review to gather essential data. **Results**: The findings demonstrate that AI not only enhances the visual quality and accessibility of historical images but also creates a more meaningful connection between past and present. This study underscores the transformative potential of AI in cultural preservation and calls for further exploration of its application in global preservation efforts. **Conclusion**: It also emphasizes the importance of cross-sector collaboration among government, academia, and private organizations to achieve significant and enduring results in heritage restoration.*

Keywords: *Artificial Intelligence; Cultural Heritage Restoration; Korean War; South Korea; Historical Photographs*

Introduction

The preservation and restoration of cultural heritage are vital for safeguarding a nation's historical narrative and maintaining its cultural identity. In an increasingly globalized world, where rapid technological advancements are shaping every aspect of life, governments across the globe are recognizing the importance of integrating innovative strategies into their cultural preservation efforts. These strategies have become more critical than ever, as technological tools offer unprecedented opportunities to improve the management and restoration of cultural assets. In South Korea, the preservation of cultural heritage holds particular significance, as it is not only a means of maintaining national identity but also a crucial element in ensuring the continuity of its historical legacy. Preserving and restoring South Korea's cultural heritage collections is essential to guarantee that these valuable historical records remain accessible to future generations, thus safeguarding the nation's rich past.

The advent of the Social 5.0 era—a period characterized by the convergence of digital technology and human society—has further accelerated the need for innovative solutions that can enhance both technical and non-technical processes. This trend is especially evident in the realm of cultural heritage preservation, where the demand for advanced tools and systems has become increasingly urgent. As preservation efforts evolve, the development of sophisticated digital restoration tools has emerged as a key factor in ensuring the effective maintenance, documentation, and revitalization of cultural assets. One of the most transformative innovations in this regard is the integration of artificial intelligence (AI) into the cultural sciences. AI has

Jurnal Ilmu Informasi dan Perpustakaan: 15(2).2024.117—130.

10.20473/pjil.v15i2.65265

proven to be an invaluable tool in the restoration of photo collections, offering state-of-the-art solutions to address complex challenges such as image degradation, the revival of old and damaged photographs, and the enhancement of visual quality (Liu et al., 2019). AI's ability to analyze and restore historical imagery with remarkable accuracy and precision has revolutionized the field of cultural heritage conservation, allowing previously inaccessible or damaged materials to be revived and preserved for future generations.

However, while AI offers promising applications in the restoration of cultural heritage, it is imperative to implement a strong ethical framework to ensure that these technologies are used responsibly and ethically. Such a framework should prioritize the principles of shared responsibility, meaningful participation, transparency, accessibility, sustainability, reliability, and respect for cultural dignity (Pansoni et al., 2023). By addressing potential risks and challenges associated with AI, such as data privacy concerns, bias, and the potential for cultural insensitivity, stakeholders can ensure that AI technologies are employed in a way that upholds the values and integrity of cultural heritage conservation.

This study seeks to address the question: "How is artificial intelligence (AI) utilized in the restoration of cultural heritage, specifically focusing on soldier photo collections in South Korea?" Therefore, this study aims to investigate how artificial intelligence (AI) is being applied to the restoration of cultural heritage, with a particular focus on soldier photo collections in South Korea. By analyzing the use of AI in the restoration of these historical collections, the research will assess the specific AI technologies employed and their broader impact on the preservation of South Korea’s cultural heritage. This case study will provide important insights into the transformative role of AI in cultural preservation, highlighting how these technologies are shaping the future of heritage restoration efforts and contributing to the conservation of South Korea’s historical legacy.

Recent technological advancements have significantly changed the identification and restoration processes of photo collections within cultural preservation and conservation. The incorporation of advanced technologies, including digital terrestrial photogrammetry, 3D laser scanning for precise measurements, and sophisticated cultural heritage modelling, has been shown to enhance restoration and preservation practices dramatically. These innovations not only improve the accuracy and effectiveness of these processes but also facilitate the creation of virtual cyber museums and the development of Geographic Information Systems (GIS) for managing cultural heritage (Pai, 2017).

The integration of artificial intelligence (AI) in artistic fields has notably transformed how artistic images are autonomously generated and how restoration tasks are executed by both professionals and non-experts. This evolution, highlighted by Wan et al. (2023) and Volynets (2023), underscores AI's pivotal role in reshaping these processes. Numerous studies have investigated the application of AI algorithms, such as K-Nearest Neighbor (KNN), Convolutional Neural Networks (CNN), and Generative Adversarial Networks (GAN), specifically concerning the restoration of cultural heritage and archaeological artifacts (Lee, 2022; Mittochi & Jimu, 2023). Among these, GANs have shown particular promise in restoring intricate details in photographs, leading to significant enhancements in restoration quality and outcomes (Shyamala

Jurnal Ilmu Informasi dan Perpustakaan: 15(2).2024.117—130.

10.20473/pjil.v15i2.65265

et al., 2021).

AI-driven image restoration techniques, like GAN-based paired image-to-image translation, have achieved remarkable success in reviving artworks that have suffered various forms of damage, especially from prolonged environmental exposure. Kumar and Gupta (2023) illustrate how these advanced methodologies effectively tackle challenges related to the deterioration of artworks over time. Additionally, techniques such as Distributed Denoising Convolutional Neural Networks (DDCNN) have excelled in removing distortions from photographic artworks while preserving the fine details essential to their integrity (Sankar et al., 2023).

An additional innovative method in this field is the triplet domain translation network, which employs variational autoencoders to mediate between synthetic and real images. This approach has proven effective in restoring severely degraded photos by targeting and mitigating multiple types of degradation simultaneously (Tilagul et al., 2023). These advancements showcase how AI is transforming not just the restoration process but also the maintenance of artwork fidelity, ensuring that historical and cultural artifacts can be preserved for future generations with greater precision and care.

Beyond restoration, AI has also been pivotal in enriching historical photographic collections with metadata. This semi-automatic process significantly enhances the cataloging, indexing, and overall preservation of these collections, thereby contributing to their long-term value and accessibility (Fornaro & Chiquet, 2020). AI's utility, however, extends beyond mere restoration and preservation; it also plays a crucial role in combatting the illegal trade of cultural heritage items. Through sophisticated image analysis, AI can assess the authenticity and provenance of artifacts, detect patterns related to illicit trade, and trace stolen or trafficked artifacts back to their origins. This makes AI a powerful tool in protecting cultural heritage from the growing threat of illegal trafficking (Abate et al., 2023).

Despite these advancements, ethical considerations surrounding the use of AI in heritage preservation warrant careful examination. Issues such as data privacy, ownership rights of cultural artifacts, and the potential for AI to misinterpret or misrepresent historical contexts need to be addressed to ensure a balanced approach to technological integration. A study by Pavlidis et al. (2016) highlighted the importance of incorporating privacy and trust in cultural heritage models. Privacy-enhancing technologies can mitigate risks associated with data sharing, ensuring that stakeholders maintain control over sensitive information (Bluemke et al., 2023). Additionally, ethical dilemmas arise when wealthier nations digitize the cultural heritage of less affluent countries, raising questions about ownership and representation (Lor & Britz, 2012). Balancing intellectual property rights with public access is essential to uphold ethical standards in heritage preservation (Colley, 2015).

Moreover, the potential for AI to misinterpret historical contexts necessitates a careful examination of the ethical frameworks guiding AI development and deployment in cultural heritage (Bryson, 2012). Engaging communities in the digital public sphere can enhance representation and accuracy in heritage narratives (Colley, 2015). By exploring these ethical dimensions, stakeholders can foster a more comprehensive understanding of how AI can be

responsibly utilized in the preservation of cultural heritage. While technological advancements offer promising tools for heritage preservation, they must be approached with caution to avoid ethical pitfalls that could undermine cultural integrity.

South Korea has made remarkable progress in the preservation and restoration of its cultural heritage, driven by a multitude of initiatives aimed at safeguarding the nation's historical legacy. Cultural heritage is profoundly intertwined with South Korea's national identity and serves as a significant factor in attracting both domestic and international tourists (Son, 2023). This rich heritage includes diverse collections, with historical photographs standing out as particularly notable. These collections offer a visual narrative of South Korea's traditional culture and historical landmarks dating back to the late 19th century, playing a crucial role in preserving and promoting the nation's heritage on a global scale (Pai, 2014; Pai, 2015; Asakura, 2016). These carefully curated photographic collections have not only contributed to cultural preservation but have also shaped the romanticized portrayal of South Korea as the "Hermit Kingdom" (은자의 왕국/隱者王國), a term that has been popularized in both academic discourse and public imagination (Kang et al., 2013).

On a national scale, the creation of cultural institutions such as the National Research Institute of Cultural Heritage has been pivotal in guiding archaeological research, managing the restoration of important historical sites, and preserving ancient artifacts and architectural treasures across South Korea. The preservation of historically significant sites, such as the Ganghwa Dondae fortification, underscores the importance of academic research, government intervention, and community engagement in maintaining the integrity of cultural resources (Kim et al., 2014; Lee & Lee, 2023). These efforts ensure that the rich cultural history of South Korea remains accessible to current and future generations, allowing them to appreciate and learn from the country's storied past.

On the international stage, South Korea's government has been actively involved in heritage diplomacy, sharing its conservation expertise through global platforms such as UNESCO. These efforts have allowed South Korea to not only safeguard its own cultural heritage but also contribute to the global discourse on preservation, positioning the country as a leader in cultural conservation initiatives (Sîntionean, 2023). These institutions play a central role in coordinating efforts to protect and revitalize cultural heritage, ensuring that the country's invaluable assets are preserved for future generations.

In addition to traditional heritage, South Korea has also focused on the preservation of modern cultural sites, with initiatives aimed at transforming public perceptions and promoting active community involvement in conservation projects. For instance, Professor Dongjin Kang's work in documenting and advocating for modern heritage sites, such as Busan's Port Pier 1, highlights the importance of protecting sites from more recent history. This expanding focus on modern heritage emphasizes the evolving nature of cultural preservation, which now encompasses not only ancient sites but also more contemporary cultural landmarks.

Recent research has highlighted the critical role that advanced image restoration technologies play in maintaining the high quality of cultural heritage preservation, particularly in South Korea (Kim et al., 2014). The application of artificial intelligence (AI) has opened up new

Jurnal Ilmu Informasi dan Perpustakaan: 15(2).2024.117—130.

10.20473/pjil.v15i2.65265

avenues for the restoration of cultural artifacts, offering innovative tools for preserving South Korea's invaluable cultural assets (Abate et al., 2023; Pansoni et al., 2023). AI-driven technologies, including object detection, high-resolution image conversion, and text analysis, are being increasingly employed to restore and preserve South Korea's traditional cultural heritage (Lee et al., 2022). These techniques involve intricate processes such as the pre-processing of images, mapping them into coordinate systems, and generating panoramic visuals, all of which contribute to the comprehensive restoration of cultural relics (Li et al., 2022). The integration of AI in these efforts not only enhances the accuracy and quality of restorations but also ensures the preservation of cultural heritage for future generations, reflecting South Korea's ongoing commitment to innovation in cultural conservation.

Research Methods

The research employed a qualitative methodology, using a case study approach alongside a comprehensive literature review to gather essential data. Qualitative research methods are widely recognized for their effectiveness in exploring intricate and multifaceted phenomena, making them particularly suitable across various fields such as health and social sciences, environmental studies, social work, education, and business (de Vries, 2020; Khan, 2022). In this study, data collection was facilitated through the use of newspaper articles and photographs as primary sources of information (Närvänen et al., 2014; Debout, 2016).

Qualitative content analysis was integrated into the data examination process, serving as the core analytical tool for this case study research (Kohlbacher, 2006). The focus of the investigation centered on the application of Artificial Intelligence in the restoration of cultural heritage, specifically examining a collection of soldier photographs related to South Korea's 70th Ceasefire Commemoration. To enhance the depth and scope of the research, data collection also involved an extensive literature review that encompassed a thorough analysis of pertinent book chapters and journal articles. This literature review followed a methodologically structured analytical process, incorporating documentary analysis to ensure a rigorous alignment with qualitative research principles (Casasempere-Satorres & Vercher-Ferrándiz, 2020).

Results and Discussion

The integration of artificial intelligence (AI) in the restoration of South Korea's historical cultural heritage is exemplified by a groundbreaking project led by Sungkyunkwan University in partnership with the South Korean Ministry of Patriots and Veterans Affairs. Launched to commemorate the 70th anniversary of the Korean War armistice, this initiative employs advanced AI technologies, including Face Image Restoration (GFP-GAN) and Face Restoration tools, to transform aged black-and-white photographs of Korean War heroes and UN forces into vibrant, high-resolution colorized images. This technological advancement aims to present these historical figures in a more impactful and engaging manner, enhancing their visibility and emotional resonance with contemporary audiences.

The success of this project not only demonstrates AI's technical capabilities in addressing

Jurnal Ilmu Informasi dan Perpustakaan: 15(2).2024.117—130.

10.20473/pjil.v15i2.65265

the degradation of historical imagery but also underscores its potential to reinvigorate cultural heritage by preserving and enhancing visual records of the past. Sang-Ho Yun's article, "Photos of Korean War Heroes to Be Restored by AI," offers a comprehensive analysis of the technological processes involved, illustrating how AI-driven restoration serves as a critical tool in safeguarding cultural history. The project reflects the broader significance of AI in cultural preservation, showcasing its ability to bridge the gap between historical preservation and modern technological innovation.

Figure 1. Example of South Korean soldier photo restoration
Source: Yun (2023)

Building upon the aforementioned example, the restoration of historical photographs in South Korea is carried out through a detailed, multi-step process that carefully ensures the preservation and revitalization of cultural heritage. This process unfolds through several key stages, each of which contributes to the overall success of the project:

1. The first stage of the process is Photo Identification, which begins with the careful selection of photographs by the Ministry of Patriots and Veterans Affairs. In this phase, the Ministry focuses on identifying black-and-white photographs of South Korean and United Nations (UN) troops from the Korean War. Particular attention is given to images that depict soldiers who played significant roles in upholding freedom and peace during the conflict. These images, which capture the bravery and sacrifices of the war heroes, serve as the foundation for the entire restoration project. Without accurate identification, the integrity and historical value of the project would be compromised,
2. The next stage is Agreement and Sponsorship, a crucial component of the project that enables its execution through strategic partnerships and financial backing. One of the main sponsors is the Jaseng Medical Foundation, which agrees to design and sponsor the initiative, providing the necessary financial resources and logistical support. Collaboration with Sungkyunkwan University, known for its expertise in digital technology, is vital in carrying out the technical aspect of the project. Sungkyunkwan University assumes responsibility for the task of colorizing the monochrome images, ensuring that the colorization process is conducted with historical accuracy while employing advanced technological methods. This partnership between the Ministry, the Jaseng Medical Foundation, and Sungkyunkwan

University is a testament to the importance of cross-sector collaboration in successfully preserving cultural heritage,

3. At the heart of the initiative is the Restoration Technology itself. Sungkyunkwan University utilizes state-of-the-art artificial intelligence (AI) technologies to restore and colorize the faded black-and-white photographs. Two key AI tools are employed for this task: AI Face Image Restoration (GFP-GAN) and Face Restoration technologies. These tools are instrumental in transforming the old photographs into high-resolution, colorized images. The use of AI allows for the preservation of the original authenticity and detail of the photographs while enhancing their visual clarity and impact. Through this technology, the once-faded and monochrome images are brought back to life, making them more engaging and accessible to contemporary audiences. The restored images not only help the public to connect emotionally with the past but also breathe new life into the photographs, allowing them to be appreciated for generations to come,
4. Participant Selection is another important aspect of the project, as it involves contributions from notable individuals, whose personal stories add an emotional and human dimension to the effort. Among the participants are prominent figures such as Air Force legend Kim Doo Man, singer Jin Mi Ryeong, and Benjamin Pony, the great-grandson of U.S. Marine Colonel Edward Pony. These individuals attend the commemorative ceremony and provide their own black-and-white photographs for restoration. Their involvement in the project adds an emotional layer to the initiative, highlighting the significance of personal contributions in preserving the historical memory of the war and its heroes. By including photographs from prominent figures, the project not only honors their legacy but also deepens the emotional resonance of the restoration efforts,
5. The next phase involves Photo Selection, where the Ministry plays a critical role in choosing the specific photographs to be restored. Among the selected images are photographs of four notable Korean War heroes: General Douglas MacArthur, General Matthew Ridgeway, General Baek Sun Yup, and Colonel Kim Dong Seok. Additionally, the project expands to include the restoration of approximately 100 photographs of South Korean and UN veterans, who have been designated as "Heroes of the Month." The inclusion of surviving veterans' photographs further broadens the scope of the restoration effort, ensuring that the project has a far-reaching impact on both the public and those directly affected by the war. These carefully selected images serve to commemorate and honor the immense sacrifices made by the veterans and military leaders during the Korean War, and
6. The final phase is the Collection and Restoration Process, which marks the culmination of the project's various stages. From March to April 2023, the Ministry, in cooperation with branches of the Korean War Veterans Association and veteran offices across the country, works to collect photographs from surviving veterans. This collaborative collection effort ensures that a wide range of photographs is included in the restoration process, making the project as comprehensive and inclusive as possible. The actual restoration work, which takes place between May and June 2023, involves the meticulous application of AI technologies to restore and colorize the selected images. The AI technology employed ensures that each photograph is restored to its highest possible quality, preserving the visual legacy of Korea's war heroes. The success of this stage ensures that the photographs, once fully restored, are

ready to be displayed to the public, allowing future generations to vividly remember the sacrifices and contributions of Korea's war heroes.

The findings from the case study highlight significant advancements in the use of artificial intelligence (AI) for photo restoration, demonstrating the transformative potential of this technology. One of the most notable outcomes is the successful conversion of original black-and-white photographs into high-resolution, colorized images. This achievement emphasizes the capacity of AI technology to enhance the visual quality of historical photographs, making them more accessible, engaging, and relevant to contemporary audiences (Närvänen et al., 2014; Debout, 2016). Moreover, this supports theories such as Kohlbacher's (2006) qualitative content analysis approach, which underscores the adaptability of AI in improving cultural artifacts.

Furthermore, the involvement of students in this restoration project has been particularly advantageous. By engaging directly with AI applications, students acquire valuable hands-on experience, which not only sharpens their technical abilities but also deepens their practical understanding of how AI can be effectively applied in real-world scenarios (Casasempere-Satorres & Vercher-Ferrándiz, 2020). Such participatory approaches, as de Vries (2020) and Khan (2022) have argued, enhance learning and enrich educational experiences through practical application of technology.

The societal impacts of this project are profound. Transforming black-and-white war hero photographs into color is expected to significantly enhance public awareness and appreciation of historical events and figures, reaffirming the value of these images (Kim et al., 2014). By revitalizing historical imagery, the project creates a tangible connection between the past and the present, fostering a deeper recognition of the sacrifices made by these heroes. As suggested by Lee et al. (2022), the updated and preserved photographs elevate public appreciation and concern for cultural heritage, strengthening national identity and pride.

Additionally, this initiative showcases the critical role of AI technology in preserving and maintaining cultural heritage, underscoring its importance in safeguarding cultural assets for future generations (Abate et al., 2023; Pansoni et al., 2023). This innovative application of AI technology not only highlights its current capabilities but also sets a benchmark for future technological advancements in cultural preservation (Li et al., 2022). The collaboration between government agencies, academic institutions, and medical organizations in this project sets a strong example for future cross-sector partnerships (Kang et al., 2013). Such collaborations, as Sîntionean (2023) has discussed, are essential for advancing cultural heritage preservation efforts and establishing resilient networks that support ongoing and future initiatives. This project not only illustrates the power of AI in cultural preservation but also underscores the importance of cooperative efforts in achieving meaningful and lasting impacts in this field.

However, while this project demonstrates the power of AI in cultural preservation, it is crucial to critically analyze AI's limitations, including the potential for historical inaccuracies and the costs of implementation. AI applications may introduce biases and inaccuracies in the interpretation and digital replication of cultural artifacts, raising ethical concerns about their reliability and accuracy (Pansoni et al., 2023). Moreover, the financial burden of deploying AI technologies can be significant, potentially limiting their accessibility and widespread adoption (Pansoni et al., 2023). Implementing AI in cultural heritage involves overcoming technical challenges and ensuring ethical considerations, such as explainability and reliability, are met

Jurnal Ilmu Informasi dan Perpustakaan: 15(2).2024.117—130.

10.20473/pjil.v15i2.65265

(Kumar & Tiwari, 2024).

On the other hand, it is also important to consider the potential benefits of AI in this context. AI can enhance the sustainability of intangible cultural heritage by increasing interest and participation, as seen in the case of AI-generated cultural products in Tianjin, China (Zhang et al., 2023). Its ability to analyze large datasets and identify objects can significantly aid in the management and exhibition of cultural heritage (Hortal, 2024). Additionally, AI fosters global collaborations and technological advancements, which are crucial for preserving cultural heritage (Kumar & Tiwari, 2024).

Furthermore, AI has the potential to positively impact cultural identity and social inclusion by making cultural heritage more accessible and engaging to modern audiences (Zhang et al., 2023; Li, 2024). To ensure that AI applications do not compromise the values and significance of cultural heritage, establishing sector-specific ethical guidelines is crucial (Pansoni et al., 2023). While AI offers promising opportunities for cultural heritage preservation, it is vital to address its limitations, including potential historical inaccuracies and high implementation costs, to ensure a balanced and ethical integration in this field (Zhang et al., 2023; Hortal, 2024; Kumar & Tiwari, 2024; Pansoni et al., 2023; Li, 2024). Reflecting on the global implications for cultural heritage preservation would further strengthen this discussion, ensuring a more comprehensive perspective on the integration of AI in this vital field.

Conclusion

The AI-driven restoration project discussed in this study stands as a compelling example of the powerful impact that technology can have on the preservation of cultural heritage. By harnessing advanced artificial intelligence (AI) technologies, this initiative not only breathes new life into historical images of South Korea's war heroes but also ensures that their stories and sacrifices are maintained in a visually striking manner for generations to come. This effort represents a successful collaboration between government bodies, academic institutions, and private organizations, showcasing how various sectors can come together to achieve meaningful and enduring outcomes in the realm of cultural heritage restoration. This study highlights the central role of AI in the restoration and conservation of cultural heritage, with a particular emphasis on the significance of historical photographic collections in South Korea. The findings from this project act as a foundation for expanding the conversation surrounding restoration practices, advocating for a deeper and more nuanced exploration of how AI can be leveraged to safeguard cultural treasures. The project stresses the importance of conducting further research to explore the numerous technical, methodological, and contextual aspects of applying AI in the restoration of cultural photos. Such research is essential to fully grasp the capabilities, limitations, and ethical considerations tied to AI technology in the field of heritage preservation.

Moreover, this study enriches our understanding of AI's potential by placing it within a broader, global context of cultural heritage preservation. It points out that AI, with its sophisticated capabilities, can serve as a transformative force in efforts to protect, rejuvenate, and restore cultural artifacts around the world. By emphasizing the expansive possibilities of AI, the study not only contributes to the ongoing dialogue about the role of AI in cultural preservation

Jurnal Ilmu Informasi dan Perpustakaan: 15(2).2024.117—130.

10.20473/pjil.v15i2.65265

but also opens the door for future innovations and investigations in this area. It encourages scholars, practitioners, and policymakers to reflect on the broader implications of AI technology and to consider its integration into global preservation strategies. This broader view is crucial to the advancement of the field, as it ensures that cultural heritage is not only preserved in innovative ways but is done so with a deep respect for its historical importance. By situating AI within this wider framework, the study signals the potential for AI to be a vital tool in global efforts to safeguard cultural heritage for future generations. Therefore, the project serves as both an inspiration and a call to action for future research and development, encouraging continued exploration of AI's transformative power in the preservation of cultural history and heritage across the world.

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