

Artificial Intelligence for Conservation of Heritage Buildings

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Abstract :

Artificial intelligence, which is advancing alongside science and technology, has received a lot of attention recently. Deep learning is applied by artificial intelligence technology, demonstrating the trend of rapid development. Artificial intelligence has advanced faster than people's imagination. Artificial intelligence technology is being gradually introduced into several social businesses to provide them fresh life for growth. This is the ideal way to include artificial intelligence technology into the process of protecting cultural resources. Cultural heritage should be protected in the digital age by utilising virtual reality technology and applying segmentation algorithms. This paper introduces the method of artificial intelligence in cultural heritage preservation using virtual reality technology to actualize cultural heritage digitalization, realising that cultural heritage preservation keeps up with the times. World heritage is a kind of affirmation and high honour given by the international community to the important civilization, historical relics, or natural landscape of a country and nation. The newest technique for preserving cultural

heritage is Artificial Intelligence [AI]. AI can be applied to intangible heritage, digital modelling, visual evaluation of structural health, and more. The purpose of this study is to summarise several AI strategies applied to cultural preservation. In addition, the article highlights significant advancements in automatic visual inspection systems for historic structures.

Introduction :

Both concrete and intangible cultures are referred to as being preserved. Architecture, geography, literature, art, and artefacts are all examples of tangible culture. The terms "intangible culture" and "intangible culture" are used interchangeably. The various things and actions that safeguard and preserve culture are collectively referred to by these terms. However, culture may mean different things to different communities. To some, it may simply refer to outlining specific social norms or formal regulations that govern certain behavioural patterns in a given group.

‘Ancient structures are an essential component of the global cultural heritage, a unique carrier of historical and cultural

heritage, and a testament to and creative treasure of human civilisation'.⁽¹⁾ 'Ancient structures are also non-renewable resources and historical information for research into the social economy, culture, art, heritage, and ancient buildings'.⁽²⁾

Therefore, it is necessary for people to undertake research to safeguard their integrity and safety. 'However, due to the rapid development of civilization, particularly the expansion of urban construction, environmental pollution, and tourism, the health status of historic structures has declined'.⁽³⁾

All human kind shares responsibility for the preservation and safeguarding of our natural and cultural heritage. It should be protected for future generations as a common treasure of all humanity because of its timeless value. The fact that its exceptional universal value has been acknowledged and maintained emphasises the growing importance of digital heritage, which is defined by UNESCO as the use of digital media in the service of safeguarding, analysing, and presenting these heritages.

The preservation of the city's identity is fundamentally dependent on its heritage. Any city's physical and cultural heritage conveys its personality and historical significance. Society's heritage is

its core, and it should be protected for next generations. In the digital age, modern technology has become a key determinant for cultural conservation and preservation.

Digital heritage makes it easier to do in-depth research from a variety of angles. The information obtained from physical legacy is crucially important to permanently conserving through digital heritage. In order to aid in their protection, upkeep, and sustainable tourism, cultural heritage sites are also monitored throughout time using digital heritage. It seeks to spot any alterations, ailments, or degeneration that might affect artefacts.

Artificial Intelligence and Cultural Heritage

AI plays a significant function and has a significant impact on society and culture in addition to the scientific community. Ancient structures play a significant role in preserving human civilization as a non-renewable resource and as an important component of the world's cultural heritage. They also provide historical information for the study of the social system, the arts and culture, and religious beliefs that prevailed during the time that these structures were constructed.

However, due to the rapid expansion of society, particularly the

growth of urban development, environmental pollution, and tourism, the health of historic structures is not in good shape. Currently, with the swift advancement of science and technology, information technology has been widely utilised in all facets of the field of cultural heritage, including the preservation of historical sites and relics.

In order to provide current and future generations with on-going access to culturally significant items, including literature, paintings, flora, and fauna, and habitats, both natural and cultural assets must be digitised. 'Additionally, it is employed in the maintenance and accessibility of structures, archaeological sites, and natural phenomena that have enduring or noteworthy historical, scientific, or cultural value.'⁽⁴⁾

Educational Impact of Digital Heritage

There are repercussions from the digitization of these cultural treasures in various fields and around the world. Because to the rise of digital goods, people—especially young people—can now learn about new items and cultures online through a range of channels. They provide visitors a more thorough grasp of a subject or place as opposed to only seeing an image.

The media can also be chosen based on audience demographics or educational background to facilitate learning. Mobile apps, virtual reality, social networking, and video games are just a few of the technological tools employed in education today, particularly in museums. The goal of adopting this technology in cultural heritage institutions is to promote access to, and appreciation for, their collections as well as to obtain fresh perspectives on them.

Additionally, data collection on these things is made possible by digital heritage, which gives historians, professionals, and scientists more knowledge about the past and the objects. 'As new technologies are developed, museums and other historic institutions have additional options for sharing their material with the public and connecting with them. Access to digital heritage may still be hampered by a lack of resources within some groups'.⁽⁵⁾

Virtual Reconstruction and Restoration of Cultural Heritage

The maintenance, repair, and protection of the heritage site can be seen as the preservation and sustainable development of cultural assets from a narrow perspective. From a broad standpoint, it ought to also cover the

comprehension, transmission, and cognition of human civilization based on the protection of the heritage entity. The spread and transmission of ancient civilization are significantly facilitated by the scientific, logical, and vivid realisation of virtual reconstructions of heritage knowledge from many sources as a result of the fast growth of information technology during the internet and big data eras.

Rebuild lost history- The destruction of cultural property due to terrorism or war has created a hitherto unheard-of necessity for digital preservation and virtual restoration efforts. UNESCO has pushed plans to make the restoration easier in the instance of Palmyra. The use of 3D modelling technologies allowed for physical repair. The ruined monuments might be digitally recreated in their entire splendour. 'The digital reconstruction of the damaged artefacts can be used to evaluate various hypotheses for possible anastylosis but, more importantly, to conserve and restore the image of the monuments in its original integrity and make them usable in virtual reality applications'.⁽⁶⁾

Conclusion

The digitalization of cultural heritage can be fruitful in many manners.

It is also helpful in preserving and conserving our heritage for future generations, which is getting extinguished at a very high speed. The digitalization of cultural assets can help in many ways. The promotion of tourism by cultural heritage can boost regional economies, enlighten people about culture and history, and promote social inclusion. Even though it is evident how important it is to preserve cultural heritage, many are having trouble doing so. Artificial Intelligence and other cutting-edge technology can assist in the process of protecting cultural heritages through different means, such as antique restoration, repair, digitalization, etc.

The digitization and preservation of tangible cultural assets can be aided by artificial intelligence and other cutting-edge technology. They support archaeologists and historians in initiatives that are either impossibly time-consuming or impossible for people to do alone. Additionally, they serve as instruments that people can use to enhance and progress their working processes.

As technology advance and experts in the field gain more knowledge and proficiency with them, there is a good probability that human-created cultural heritage preservation and digitalization will be increasingly successful.

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