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IMMERSIVE PRESERVATION: UTILIZING VIRTUAL REALITY TO SAFEGUARD CULTURAL HERITAGE

Virtual reality is a rather underutilized technique when it comes to the preservation of cultural heritage. This trait comes from VR on its own being a harder tool to justify using when compared to than traditional archival techniques, prevalence of which, however, is immensely helpful in cases when a digital archive is to be created. Immersive experiences can serve as yet another avenue by which we can safeguard and preserve our common culture or history in their many parts ranging from clothes, architecture, works of decorative and fine arts to landscape itself. It is immensely useful because it provides us with a way to popularize our own cultural achievements and tell the world about them in a way that is second best after live visits to our museums and galleries. It will also require entirely new kinds of research, categorisation and presentation, but this is true about any new methods, but also indirectly benefits adjacent fields of study. For example, to showcase architectural complexes, they would need to be scanned, modeled digitally and appropriately textured, which will also give us not only a 3D model for VR environment, but a usable model for non-invasive studies. In a scenario when building itself ceases to exist, we will have enough data to restore it to its original condition if it is decided to be the best course of action. Through VR however, history itself can be brought back to life through recreation of real events in their surroundings, that could be used to engage people with their own country's past and in an indirect way preserve it through generations in much the same ways as it was done before. As the process itself needs further research and is expected to be highly tailored to each case, we will leave it outside of the scope of this article. Instead we will take a look at modern, mostly freely available, projects that have successfully done this and can be used as examples for the future work in this field.

Key words: *cultural heritage, immersive experiences, preservation, virtual gallery, virtual reality, VR.*

Снігур Володимир. ІМЕРСИВНЕ ЗБЕРЕЖЕННЯ: ВИКОРИСТАННЯ ВІРТУАЛЬНОЇ РЕАЛЬНОСТІ ДЛЯ ЗАХИСТУ КУЛЬТУРНОЇ СПАДЩИНИ

Віртуальна реальність є доволі мало використовуваною технологією, коли йдеться про збереження культурної спадщини. Це пов'язано з тим, що використання віртуальної реальності як інструменту важче виправдати порівняно з традиційними методами архівування, поширеність яких, однак, є надзвичайно корисною у випадках, коли йдеться про створення цифрового архіву. Імерсивний формат може слугувати ще одним способом, за допомогою якого ми можемо захистити і зберегти нашу спільну культуру чи історію у багатьох її проявах, починаючи від одягу, архітектури, творів декоративного та образотворчого мистецтва і до ландшафтів. Це надзвичайно корисно, оскільки дає нам можливість популяризувати свої культурні досягнення і розповісти про них світові у спосіб, який є другим найкращим після безпосереднього відвідування музеїв і галерей. Це також вимагає абсолютно нових методів дослідження, категоризації та презентації, але це справедливо для будь-яких нових технологій, а крім того, опосередковано приносить користь і суміжним галузям знань. Наприклад, для демонстрації архітектурних комплексів їх необхідно відсканувати, змоделювати в цифровому форматі та надати їм відповідну текстуру, що надасть нам не лише 3D-модель для VR-середовища, але й модель, придатну для неінвазивних досліджень. У випадку, якщо будівля перестане існувати, ми матимемо достатньо даних, щоб відновити її до оригінального стану, якщо буде вирішено, що це є оптимальним варіантом дій. За допомогою віртуальної реальності можна повернути до життя саму історію через відтворення реальних подій у їхньому оточенні, що може бути використано для зацікавлення людей у минулому їхньої країни та опосередкованого збереження його для наступних поколінь у майже такий самий спосіб, як це робилося раніше. Оскільки сам процес потребує подальшого дослідження і, як очікується, буде максимально адаптованим до кожного конкретного випадку, ми залишимо його обговорення поза увагою цієї статті. Натомість ми розглянемо сучасні, здебільшого вільнодоступні, проекти, які успішно виконали це завдання і можуть бути використані як приклади для майбутньої роботи в цьому напрямку.

Ключові слова: *культурна спадщина, імерсивний досвід, збереження, віртуальна галерея, віртуальна реальність, VR.*

Introduction. Humanity has many achievements in fields so varied and different that it would be almost pointless to even attempt to categorize them. One of them however could very well rival the rest, a choice that almost everyone will agree on – hubris. Our civilizations are always so sure that our own works will outlive the time they were made in (which is admittedly and thankfully mostly true and has to stay so), yet sometimes even as much as it standing for a hundred years is not certain. Recognising this as one of the issues that are of utmost importance and becoming more pressing with each year and decade, we need to look beyond traditional preservation methods and find what could be of help where other efforts fail.

Problem statement. Regardless of the political, cultural, ethnic or other differences, our global cultural heritage should be preserved as much as possible if only to let future generations know what was before them. We may not see the immediate benefit in doing so, yet if Romans left us their ways of making concrete, it would not have been such a mythical substance thought by common man to be almost better than its modern equivalents. In fact, some of its properties are formally found out only now. [9] Traditional archives are not as much a safeguard from natural or man-made disasters (and it is debatable which are harder to defend against) as they are beholden to the same whims of fate that original works would be and concentrated collections are far easier to destroy or lose in a nick of time than distributed network of copies. Ideally, we would have each museum, archive and gallery have their own copy of the world's history and works of art, software and hardware to safeguard it and promote studies of cultures own and foreign. However, this is hardly possible, yet probable, harder is to save architectural works, interior and exterior installations and environments as they were during certain events. More challenging than that is to make the copies last, since even digital archives are not permanent as much as we would like them to be. We will not speak of that matter now and turn our attention to the ways of preserving scenery, places, buildings and events as close to what they are/were in real life. In other words, we will try finding an answer to a question of how to save that which is intangible and has no physical form as well as that which does.

Ways of the past. Previously we would have historic records made and distributed in the hopes they will be unbiased and last long enough to be useful. First was debatable, second was not guaranteed. Any material pertaining to the events, be it a printed or handwritten account or a drawn image, is bound to be incorrect in some way. Witness' memory may be not as good, the story may be misconstrued or changed deliberately and it is the duty of histographer to present it in the most truthful way, as long as doing so will not cause them certain "extra difficulties", which could be almost guaranteed in certain cases. In much the same way, even the best drawing or painting rely on the skill of their creator and truthfulness of the source material. Then there is the issue of time it takes for the work to be finished. These ways are as good as they were for the time that did not have any other means, we however are thankfully not limited by technologies and principles of old. We can do more, better and faster, however it doesn't mean it will last longer or stay unaffected by political, technological, economic or other issues.

Modern approach. While collections like the Library of Congress, Internet Archive with their Wayback Machine project or even Wikipedia do a lot to preserve our history and culture, it is still only a minuscule part of it. Moreover, even the best photography or laser scan are as good as ways by which we can view them. Photograph will likely need a projector, screen or at least a printer of sorts, since we have given up film and slide photography, 3D scans will need the same. Sound recordings will absolutely need playback devices, again, since even vinyl records are not as widely used, even if they could be played on something made of literal cardboard. But then it would sound about as good too. [12] Disregarding these issues along with questions of safety and longevity of digital data, as much as they need a lengthy exploration on their own, we will explore how VR can help if not with preservation itself, then with presentation of our history.

Virtual reality and related efforts. Let's look at how we can display real historic interiors using

virtual reality. One example is a program called "IL DIVINO: Michelangelo's Sistine Ceiling in VR" [7, 8] that aims to show how the Sistine Chapel looks like if it was visited in real life. The copy is supposed to be a 1:1 recreation with the ability to view the frescoes as closely as possible, and even imagine yourself painting one of them. Former is achieved through a simulated cradle on a crane and latter is a recreation of a part of Michilangelo's scaffolds.

Another program aims to recreate Versailles as it is now, including inaccessible to general public interiors. "VersaillesVR | the Palace is yours" [13, 14] is this VR free to play, accessible (as long as it is on the storefront or uploaded elsewhere for download) experience. One that, judging by reviews, is also one of high-quality full-scale scans, even if they could be, quote, "more refined". In both cases, VR is merely a product, a result, a way to see the scans that, presumably, were made specifically to be showcased in VR.

However, preserving works of art is one side of the task at hand. The other, arguably more complex, is that of bringing to life real historic events. There are generally three types of such data that people would like to experience for themselves: notable historic events, lifestyles of bygone eras and recent events that have changed the course of history as it would have been.

First type, usually would involve some form of audio, photo or video recordings, maybe even first- or second-hand accounts (assuming they are correct of course) made during the events we aim to recreate. Sometimes much older but still comprehensive data can be used instead. As real and accessible for free (history should be free after all) is Vivez Versailles [15] that guides the viewer through several real events that happened at the palace grounds. Apart from the ability to walk through its halls (one that we have as a standalone program already), we can take part in welcoming Siamese ambassadors to the King's court or appear, not without prior invitation of course, at the masked ball organized by Louis XV himself. Such an approach all but ensures heightened interest among those studying this time period or France in general. After all, wouldn't seeing everything with one's own eyes be more engaging than reading dry historic accounts?

Recreating customs, clothes and broader architecture in VR is not something that has been done yet, however in the confines of ordinary computer games we have seen entire cities recreated as close to source material as possible, even if some things are apparently copyrighted even here. [6] Sadly such products are not guaranteed to live long enough to become referenced in future academic works, as any digital document or scan to be honest, but the recreated worlds are still of importance to us. The game in question [2, 3] has a purely fictional plot and so far does not have a VR component, it still captures old Paris of the French Revolution. No doubt this was helped by an abundance of mapping data spanning at least 4 centuries and possibly much more. [4, 5, 10].

Attempts to create an immersive archive or, perhaps, a "live history lesson" using VR come from Ukraine in a form of Kickstarter-backed project [1]. It was designed as an accessible VR app utilizing real footage and area scans as source materials. Included was a short Wiki-like glossary of terms and objects related to the events of Euromaidan 2014. As interesting and unique the project is/was, since there are few, if any, such apps recreating modern-day history, nothing more is known about it. All updates have stopped after December 2018 and the promised release as a free program on Steam did not happen either.

Conclusion. As we have seen, virtual reality presents unique ways for us to preserve our history in the form that is closest and easiest to experience (provided we have VR gear). Recreating architecture, clothes, art or certain events in their entirety is possible and should be done to an extent that is permissible by technologies of our time. However, we have to remember that there is no "ultimate" or "best" archival method and even VR itself is only one tool from a historian's or artist's toolbox. It can help us experience, understand, show and preserve, but as anything else, even paper records, it can disappear if not kept accessible and preserved by itself. On the other hand, if not the VR app itself, then the scans made for it will survive and they can become the basis of another immersive recreation or even help restore real artifacts themselves.

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