

Digital Heritage: Bringing New Life to the Montreux Jazz Festival's Audio-Visual Archives with Immersive Installations

Nicolas Henchoz and Allison Crank

ABSTRACT

To revive the Montreux Jazz Festival's archival live-concert footage, three immersive installations were designed using three different principles of augmentation, physicality and interaction. The primary aim was to engage the user in a new relationship with digitized heritage. Audience observations indicated a strong emotional connection to the content, the artist and the crowd, as well as the development of new social interactions. Experimentation showed close interaction between the three principles, while the three installations suggested methodologies for reviving audio-visual archives.

Nicolas Henchoz
EPFL+ECAL Lab
Ecole Polytechnique Fédérale
de Lausanne, Switzerland
<nicolas.henchoz@epfl.ch>

Allison Crank
EPFL+ECAL Lab
Ecole Polytechnique Fédérale
de Lausanne, Switzerland
<allison.crank@epfl.ch>

See <mitpressjournals.org/toc/leon/51/4> for supplemental files associated with this issue.

The Montreux Jazz Festival was founded in 1967 by Claude Nobs, who recorded most of the concerts with the latest available technologies. With over 5,000 concerts, it became one of the world's largest audio-visual archives of live blues, jazz and rock concerts. In 2013, UNESCO deemed the festival's archive a pivotal part of human heritage, "something that is, or should be, passed from generation to generation because it is valued" [1], and entered it into the UNESCO's Memory of the World Register.

Heritage digitization occurs in most cultural institutions around the world. The Montreux Jazz Digital Project involved researchers, computer scientists, engineers, designers and architects. They faced the challenge of digitizing 14,000 tapes with 18 different recording formats introducing a huge diversity among the content, from low resolution, black and white, 4:3, 16:9 to 4K multitrack uncompressed tapeless formats. Another issue was the lack of metadata on the oldest content. Lastly, copyright practices have changed dramatically over the past five decades. Open access to this content is not possible; therefore, public accessibility can only take place in approved installations.

Our project builds upon the Montreux Jazz Digital Project by exploring how to revive this digitized heritage. If digitized archives can provide better access to heritage content, then the corresponding increase in maintenance costs must be balanced with generating valuable user experiences. If we fail to create engaging interactions with the digitized content that add value to this heritage, we risk losing part of our history.

Audio-Visual Heritage

Digital archives are not only an issue of storage architecture or maintenance, but also one of accessibility [2]. Issues of how to access the content or how to represent large pools of heterogeneous materials raise new questions. For example, Petras et al. [3] designed a large-scale search engine for digitized cultural material involving 53 million objects in 50 languages, where the team combined technologies, associated metadata and user inputs to improve the engine's overall navigation. User interactions and the medium (i.e. the physical device to view the content) emerges as a core issue. This question of how to access audio-visual heritage in an engaging manner has been explored by Bugalia et al. [4], who found that through hand gestures and projection mapping, users could physically interact with multimedia data in order to generate new interactive and semantic relationships to the digitized heritage. Here, immersion and physicality combine with interaction principles to enrich the overall impact of the installation, while the installation still primarily focuses on information dissemination. Sanders and Salgado [5] built a tool that allowed users to create their own digital narratives with audio-visual archives; the existing archive was improved by adding user-generated metadata, hence enriching the interaction. Murphy et al. [6] researched methods of



how to create new user experiences of past environments, in particular that of acoustic heritage and how to recontextualize audio data in order for the user to feel new relationships with intangible cultural heritage.

Reviving a cultural event, such as a concert, sets other dimensions that are impossible to recreate; the impact of a crowd of 3,000 people, the presence of the real artist and the unexpected events in a live performance. Additionally, the Montreux recordings provide tailored views of the original event which differ from the public viewpoint. Therefore, these observations and references set the need to revive audio-visual cultural archives through new experiences—experiences that are specific to digital content. Through redefining the use and combination of the three principles: augmentation, physicality and interaction, as identified by previous works in various fields between 2012 and 2017, we set out to build three installations to investigate these principles.

Montreux Jazz Heritage Lab I

The first installation (Fig. 1) explores creating specific experiences for digitized heritage. Immersion principles are based on screen size and perception of depth. The screen installation takes its inspiration from the trompe l'oeil perspectives of baroque churches [7]. The surrounding enclosure serves to reflect the screen luminosity and creates an overall ambiance for the viewing experience.

The interface design promoted dialogue exchange between users. By using a large multi-touch screen, two people can simultaneously explore the database and exchange their search results. Physical interaction with the content (from an “active” selection position to a “passive” viewing position) involves natural body movement, improving one’s sense of presence.



Fig. 1. Users viewing archive content in the Montreux Jazz Heritage Lab 1, 2012. (© EPFL+ECAL Lab. Photo: Daniela Droz and Tonatiuh Ambrosetti.)

Montreux Jazz Heritage Lab II

In late 2016, a second installation (Fig. 2) which accommodates up to 20 people opened as a permanent fixture at a Montreux Jazz Café. It investigates several aspects of augmentation.

The main architectural research focused on the augmentation and materiality of the screen. Inspired by Carsten Nicolai's Unicolor installations [8], the screen is designed like a small portion of a torus. The surface is faceted to create screen physicality. Lateral two-way mirrored walls on either side of the main screen induce the perception of an endless image (or when showcasing the concerts, of a continuous stage). Behind the mirrors, two LED screens display metadata: information about the song and iconic visuals from the festival. User testing demonstrated the preference for a low resolution metadata screen in order to keep a clear differentiation between the central "concert" screen and the lateral "information" walls.

Sound is augmented by a 3D sound reconstruction of the original concert halls and different up-mix from original stereo recordings. The audio hardware is a 32.2 audio system. Storytelling contributes to the augmentation with short emotional anecdotes about the festival's history projected between songs.



Fig. 2. Montreux Jazz Heritage Lab II installation, 2016. (© EPFL+ECAL Lab. Photo: Joël Tettamanti.)

The Montreux Jazz Heritage Lab Nomad

The nomad prototype (Fig. 3) aims to bring the heritage experience to the greater public around the world. To play with this nomadic notion we also took concepts of flexibility, portability, user inputs and storytelling into account as foreign users may know less about the festival and its cultural impact on music history.

Visual investigation led the architectural team to build the screen installation on a hacked Smart car. The final screen geometry is a deformed sphere. This introduced a new challenge: overcoming the poor image resolution incurred by spreading the image over a 180° field. The solution involves two projectors. One directly projects a full picture at the screen center. The second, placed at the front of the car, illuminates by bouncing off a curved mirror and, through masking techniques, provides an ambient image, extracted from the main footage in real time. Sound is integrated with a new up-mix algorithm on a 10.1 system.

External virtual reality devices point to the car and provide a new form of augmentation through immersive and interactive storytelling about the festival. The installation's theatrical aspect is that users

can become a protagonist. A video camera captures user memories by recording their thoughts after they experience a performance and integrates their inputs into the database.

User Experiences

We performed qualitative observations with musicians, music producers, festival audiences as well as the greater public, which led to several observations about the three principles.

For augmentation, we observed that using 3D sound reconstruction and up-mix, reflections in the architectural space (so that the image expands beyond the screen), metadata displays and storytelling heightened the users' sense of presence and enhanced the immediacy of the concert experience, e.g. ambiance, artist–crowd interactions, historical setting, venue, stage and concert progression. Sound, in particular, seems to be a critical parameter for global credibility.



Fig. 3. Prototype for the Montreux Jazz Heritage Lab Nomad. (© EPFL+ECAL Lab. Photo: Daniela Droz and Tonatiuh Ambrosetti.)

To increase physicality, we designed curved and structured screens and took advantage of interactions that play with the users' body postures, which increased exploration behavior and stimulated social interactions.

To increase interaction, we introduced new interface typologies for browsing the archive that were structured on the festival's program. We also empowered users through virtual reality to explore the festival's history and to leave a trace of their experience through the recorded user testimonials.

We noted a significant positive emotional impact in most participants. Our installations engaged users across generations and promoted social dialogue and empathy. Sound in audio-visual archive material plays

a strong role; if there was poor sound (for example, audio glitches), users also perceived “poor image resolution” (even if the picture image had not altered). However, our installations may not enhance all audio-visual archive content. For example, our designs had little effect on content that is inherently devoid of context and emotion (i.e. charts, graphs and text). Likewise, our installations did not work when showing GoPro sports footage where shaky cameras and distorted lenses induced motion sickness when viewed in hyper-scale. Participant responses may have been biased, for example, by ascertainment bias, rhetoric bias and/or observer bias.

Redefining a physicality enhances the immediacy of the experience. Screen physicality (the screen as a three-dimensional object with tangible qualities) can enhance immersion, but it also makes it sensitive, especially in the case of low-resolution visuals where screen material qualities may overpower the picture image. Physicality must, therefore, always support immersion in the service of the original content. Interaction has been defined, here, as specific to the archive experience with a focus on linking users to the content; it revolves around how the user accesses and views the content rather than serving as a kind of universal search tool.

Conclusion

If digitized archives can provide better access to heritage content, the corresponding increase in maintenance costs needs to be balanced with generating new valuable user experiences. If we fail to create engaging interactions, we risk losing part of our history; the content “potency” could decrease over time as newer generations lack personal relevance to the original material. The field of archaeology has tackled this issue on numerous accounts by trying to revive static environments. These projects often employ advanced concepts of immersion and interaction such as exploring reconstructed simulations of historic buildings and environments in virtual reality. Our experience for the Montreux Jazz archive shows the challenge of reviving digitized concert footage that is directly linked to the specific nature of its archival content.

The quest for recreating the “world exactly as it used to be” is nonsensical, at least in the context of cultural events. The goal for reviving concert material is not to provide a better understanding of its environment, but to revive an event, an event that is fueled by the intensity of the live audience, the uncertainty of the real performance and the presence of the real artists. Our proposition aims to define new experiences for reviving audio-visual cultural archives—experiences that are specific to digital content. Combining new media, technologies and content (including metadata and user recordings) creates a new kind of “Gesamtkunstwerk”—Wagner’s vision for a total work of art.

Our work emphasizes the three principles: augmentation, physicality and interaction in the revival of digital archives, but also underlines the sensitive link that connects them. Like the 1958 Philips Pavilion by Le Corbusier, Xenakis and Varèse [9], the search for a multiplicity of physical relations unite the space, content and interactions, leading to a contemporary Gesamtkunstwerk, where the audience is no longer passive, but becomes the protagonist in the space. However, this ambition is threatened by the danger of the user running away with the story. Therefore, we assess the importance to work with these principles within specific criteria.

The principles can be applied to many other audio-visual archives. However, archival content must be first categorized to define whether it will benefit from being viewed in an immersive and physical experience. For example, footage with flat perspectives and cognitive content (i.e. text and charts) could be poorly perceived in an immersive environment. Specific criteria for this categorization of archival material must be developed to predict suitable content.

Future work will assess how to combine the principles to complementary archives and enrich their content through real-time information.

Acknowledgments

The experimental works result from a collaboration between the EPFL+ECAL team (Tommaso Colombo, Cédric Duchêne, Delphine Ribes, Yves Kalberer and the authors), ALICE-EPFL, for architecture (Pr. Dieter Dietz, Rudi Nieveen) and the EPFL Metamedia Center (Alain Dufaux) in partnership with the Montreux Jazz Festival and the Claude Nobs Foundation.

References and Notes

1. “Background | United Nations Educational, Scientific and Cultural Organization,” available at: <www.unesco.org/new/en/communication-and-information/access-to-knowledge/preservation-of-documentary-heritage/digital-heritage/background/> (accessed 12 January 2017).
2. G. Magyar, I. Szakadát and G. Knapp, “Information System Development in the ‘E-Age,’” *New Perspectives on Information Systems Development* (Boston, MA: Springer, 2002) pp. 113–123.
3. V. Petras et al., “Europeana—A Search Engine for Digitised Cultural Heritage Material,” *Datenbank-Spektrum* **17**, No. 1, 41–46 (2017).
4. N. Bugalia et al., “Mixed Reality Based Interaction System for Digital Heritage,” in *Proceedings of the 15th ACM SIGGRAPH Conference on Virtual-Reality Continuum and Its Applications in Industry—Volume 1* (New York: 2016) pp. 31–37.
5. W. Sanders and M. Salgado, “Re-using the Archive in Video Posters: A Win–Win for Users and Archives,” *Interactions: Studies in Communication & Culture* **8**, No. 1, 63–78 (2017).
6. D. Murphy et al., “Acoustic Heritage and Audio Creativity: The Creative Application of Sound in the Representation, Understanding and Experience of Past Environments,” *Internet Archaeology* (June 2017).
7. N.J. Wade and P. Hughes, “Fooling the Eyes: Trompe L’Oeil and Reverse Perspective,” *Perception* **28**, No. 9, 1115–1119 (1999).
8. E. Rosenthal, “Warp Your Perception of Color in Carsten Nicolai’s Infinite Installation,” *Creators* (5 January 2015). Available at: <https://creators.vice.com/en_us/article/78exxy/warp-your-perception-of-color-in-carsten-nicolais-infinite-installation> (accessed 28 January 2018).
9. P. Boudon, “L’architecture comme cosmos,” *Actes Sémiotiques* (March 2009).