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Editorial: Preservation and exploitation of audio recordings: from archives to industries

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Editorial on the Research Topic
Preservation and exploitation of audio recordings: from archives to industries

Creative industry is a prominent and dynamic sector in global trade. It is constituted of a range of knowledge-based activities promoting innovation as well as contributing to society's wellbeing. As reported in the United Nations Conference on Trade and Development (UNCTAD)[1], Creative industries constantly increase their worldwide exports. Since 2007, Asia has been the largest exporter of creative goods ($308 billion in 2020), followed by Europe ($169 billion) and North America ($37 billion). These data indicate the strategic importance of creative industries. Continuing growth in this sector is supported by intersector collaborations among knowledge workers, scientists, and artists. At the same time, an important effort has to be made to preserve the most important parts of these creative goods that will be part of our heritage and constitute the basis for creating new ones.

The preservation of this heritage is itself a big challenge which requires consideration of continued technological evolution. In the last century, for example, the medium used to record audio evolved from mechanical and magnetic, to digital. Over the same period, the number of recordings drastically increased, capturing significant private and public history and culture (oral sources, concerts, radio broadcasting, etc.). Nowadays, audio and video recordings are ubiquitous (e.g., through social media, instant messaging, etc.) and will also become part of our heritage. Digital Signal Processing (DSP) and Artificial Intelligence (AI), in general, open new possibilities for preserving, analyzing, assessing, re-using, and therefore valorizing audio recordings and multimedia heritage in general Fantozzi et al. (2017);

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1 https://unctad.org/system/files/official-document/ditctsce2024d1_en.pdf (Last access Wednesday 5th June 2024).

Pretto et al. (2021). Furthermore, the availability of these Research Topic can facilitate the advancement of the DSP and AI fields by addressing real, complex problems and challenges as well as datasets for training new algorithms. But this requires the definition of new fields and the creation of standards. Some recent advancements have been made with the MPAI/IEEE 3302–2022 standard[2] for the preservation of audio archives (Bosi et al., 2021; 2023), but the field requires further development, particularly in preserving and enhancing multimodal and multi-platform content.

This Research Topic presents three original research articles and a methods article. They delineate the state of the art of four different fields, provide further perspective, and draw together new opportunities for creative industries and academia.

Fiordelmondo et al. propose the Multilevel Dynamic Preservation (MDP) model which aims to preserve, document, and reactivate artistic multimedia installations. Moreover, the paper reports a complex "hybrid reactivation" of the "Il caos delle sfere," an interactive installation by Italian composer Carlo De Pirro. This work dates back to 1999 and is a significant case study that demonstrates the entire reactivation process. The model aims to preserve the identity of the multimedia installation, rather than simply replicating the original installation. It consists of both the replacement of old and non-functioning components ("adaptive/update approach") and the reactivation of original parts ("purist approach") - hence the name "hybrid reactivation." This encourages a rethink of the concept of authenticity in interactive multimedia art, shifting the focus from materiality to the experience and function that artworks activate.

On the other hand, Lazzarini et al. unveil the dynamics of distributed knowledge underlying some of the breakthroughs that took place during the complex transition between analog-based and digitally oriented forms of artistic practice of the 1961-9. For the "New Music" of the 20th century this decade was very important, the beginning of the transition that would later culminate in the 1980s and 1990s; in some fields and in some respects the transition has yet to end. The authors reconstructed tools and artworks belonging to the origins of music computing. In particular, they document the implementation of two musical replicas: the "Computer Suite for Little Boy" and "For Ann (Rising)," applying archaeological ubiquitous music methods. Through new renditions of historically significant artefacts, enabled by the recovery of artistic first-hand sources and one of the early computer music environments, MUSIC V, they explore the emergence of simulations in new musical worlds.

Marták et al. tackle a different research field showing the impact of cutting-edge AI algorithms in the task of piano transcription systems. The authors propose a variant of the method

"Differentiable Dictionary Search" (DDS) to reduce the computational demands and memory requirements of this method which is usually too inefficient for utilizing computational resources applied to piano music transcription. The results generally show the fundamental promise of the model, and in particular, demonstrate improvement in situations where a corpus bias incurred by learning from musical material of a specific genre would be problematic.

The last contribution of this Research Topic is a methods article presenting a Musical Instrument Performance Capture and Analysis Toolbox (MIPCAT) that can be used to capture and process the physical control variables used by a musician while performing music. Almeida et al. applied this toolbox for studying clarinet performances. Numerous sensors record blowing pressure, reed position, tongue contact, sound pressures in the mouth, etc. along with radiated sound and multiple videos. The case study shows how to compare the performances of different musicians. But in general, this work shows how the study of fine-grained physical interaction between the human player and the musical instrument can significantly improve our understanding of music performance.

In conclusion, we believe this Research Topic provides the readers with valuable new models, as well as innovative tools, perspectives and challenges for the preservation, analysis, and enhancement of musical and multimedia heritage.

Author contributions

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Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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2 More information about the Moving Picture, Audio and Data Coding by Artificial Intelligence (MPAI) standard adopted by the Institute of Electrical and Electronics Engineers (IEEE) can be found at this link: https://standards.ieee.org/ieee/3302/11006/ (Last access Wednesday 5th June 2024).

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