

“Information engineering methodologies for managing and preserving audio (speech and music) archives.”

Abstract

The lack of a standard preservation methodology is an important issue that digital archives have to face nowadays. In fact, the huge amount of information that needs to be stored, data and metadata, requires the implementation of a methodological framework, in order to prevent significant cultural losses. Active preservation and restoration of audio documents is one of the main research topics at Centro di Sonologia Computazionale (CSC) of the Università di Padova, Department of Information Engineering (DEI). The laboratory, during its years of activity, cooperated with many local and international archives, dealing in particular with audio documents, more often magnetic tapes, containing speech recordings, electro/acoustic music and linguistic and ethnographical studies. In this scenario, a multidisciplinary approach is fundamental, due to the complex nature of audio documents. As a matter of fact, even if the stored audio information is the main center of importance, also the carrier has to be preserved and restored, with procedures that require skills in the field of information engineering, material science, chemistry and musicology. This is particularly important, for example, dealing with electronic music, where the carrier is a part of the artwork itself, due to signs and annotations that the composers usually took onto the tape. The research activity led to the development of a scientific methodology that aims to answer the requirements of audio archives in the modern scenario, that in many cases still do not dispose of adequate instruments for managing a complex situation as a digitized audio corpus is. In fact, it's evident that common issues, like chemico-physical and digital degradation, obsolescence of technologies (carriers and playback systems) and digital formats can't be faced with a classic “librarian” approach by the archivist, but require specific protocols. In addition, regarding the data access, it is important to remind that stored data have to be reached by the user in every moment and from everywhere. New technologies, like the web-based ones, may be helpful for achieving the abovementioned purpose and have to be considered by modern archives. Nevertheless, due to the incremental progress in the field of artificial intelligence, like machine learning techniques, the framework is still a work in progress at the CSC and the methodology is always improved with new additions, both in the preservation and in the access procedures. Major improvements derived from machine learning-based techniques, like automatic systems for detecting the right equalization curve to apply to a tape during the signal transfer and systems for the automatic recognition of discontinuities on the tape (splices, lacks of magnetic paste, presence of signature etc.) are just some of the last results of the research activity of the laboratory that may be really helpful in the modern scenario. In fact, the precious information extracted thanks to the use of these techniques may be helpful to prevent common human mistakes and data loss, leading to a huge savings in time and expense for the archive. In the paper the authors will introduce the developed methodology, explaining it in all its steps, focusing both on the preservation and the access procedures, with a particular emphasis on the concept of metadata and its primary importance in the storing procedure, the philological accuracy of the process, some machine learning-based techniques applied for the recognition of equalization curves and discontinuity on the tape and the benefits that audio restoration algorithms can bring to digitized oral archives, in particular for improving the intelligibility of speech recordings, even providing some examples.