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Original article

Audiovisual production, restoration-archiving and content management methods to preserve local tradition and folkloric heritage

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ABSTRACT

The current work focuses on the implementation of audiovisual production technologies for preservation and demonstration of local tradition and Cultural Heritage (CH). A methodological framework is proposed for the production, digitization, authoring and presentation of audiovisual (AV) content, related to traditional music and dances. The production chain involves content restoration, description and management of archived material, direction of documentary biographies, demonstration of folk customs and filming of chore-theatrical acts, aiming at creating historical, informative and educational video entities. User-friendly interactive environments are employed by means of media browsing menus and multilingual narration, utilizing new AV authoring. The proposed methodology has been implemented on the occasion of a folk-heritage multilingual DVD video production and its enhanced Web-TV edition[1]. The paper brings forward novel theoretical, technical and mostly methodological guidelines in preserving and disseminating CH, using state of the art AV production technologies.

1. Introduction

Nowadays, Information and Communication Technologies (ICT) are broadly used in CH projects. As examples, we may refer to web sites, virtual/e-museums and generally CH portals where archived documents are published, offering content management and dissemination services [1–5]. Among these, 3D-modeling is combined with virtual reality, 3D-interaction and navigation, augmenting user experience [6–12]. Besides web services, related ICT services are deployed for experiencing immersive virtual reality interaction while visiting real museums and other natural sites of CH [13].

Among the challenges and difficulties that have to be faced is the diversity of the CH expressions, along with the large-scale heterogeneity of the involved content, organizations and end-users[2]. A variety of different CH artifacts, documents and content types are involved (i.e. manuscripts, paintings, photos, films, tapes, vinyl records, sculptures, monuments, etc.) [1–5]. Content digitization and documentation is a common target of these quite dissimilar CH approaches, empowering digital replicas to express CH at a different level, and not as an inferior substitute of the original cultural expression-creation [2,6–8]. A very challenging task that state of the art technology is able to cope with is the preservation and exploitation of important audiovisual (AV) collections[3,4,5] [14,15].

In contrast to classical web elements (i.e. text and images), narrative AV documentaries are more easily attended, while being more informative and vivid at the same time. While 3D virtual reality and augmented interaction interfaces [6–13,16] enhance the provided information and functionality, they also create higher demands in computational load, bandwidth, powerful terminals and skilled users. In contrast to classical AV mass media, a somewhat drawback of these approaches is their lack to deliver massively the involved CH services to all possible social groups,

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[1] *"The clarinet in the Greek tradition: Vaios Maliaras, his life and work"*, online: http://arutv.ee.auth.gr/archiver/.

[2] http://ec.europa.eu/information_society/activities/digital_libraries/doc/refgroup/annexes/digiti_report.pdf (Report for the Comité des Sages of the European Commission, The Cost of Digitising Europe's *Cultural* Heritage, Nov. 2010).

[3] http://www.tape-online.net/docs/audiovisual_research_collections.pdf (Project report in the framework of the TAPE project on "Audiovisual research collections and their preservation", March 2008).

[4] http://tech.ebu.ch/docs/techreports/tr006.pdf (EBU technical report 006, June 2010).

[5] http://www.europeana.eu/portal (the largest European digital multimedia library, providing open access to several properly digitized and documented distributed collections).

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including technologically illiterate users and elderly people. AV production techniques tend to overcome the above difficulties, incorporating multimodal documentaries and contemporary Interactive TV (ITV) services, using less complicated front-ends. Easier distribution of high quality AV content is also feasible, taking advantage of new media (Web-TV, mobile-TV, etc.) that have great infiltration to most social groups, while intellectual property management and content protection issues can be settled [15,17–22].

2. Research aims

Naturally, AV-CH projects are more conveniently deployed in cases that inherently belong to the AV industry, like the folk music and dances' heritage. In such cases, it is helpful to utilize historical AV documents related to artists, folkloric legends, cultural customs and local tradition, which can be combined with newly produced media assets, aiming at offering rich-media experience. This creates further necessities compared to standard AV production, requiring special treatment that the current paper focuses on, presenting an integrated methodology on *Cultural Heritage Audiovisual Documentation-Dissemination* (CH-ADD). The proposed methodology includes:

- implementation of AV digitization and processing for the needs of content restoration and documentation;
- direction and shooting of new AV production entities (e.g. logographic interviews, journalism essays, choreographies, chore-theatrical drama, etc.);
- implementation of applicable description schemes for efficient management of both archived and newly produced content;
- AV authoring and release of rich-media CH services, taking advantage of novel broadcasting technologies, featuring high quality, easy operation and enhanced user interaction.

The proposed models encompass interdisciplinary collaboration between experts of various fields for efficiently conducting CH projects.

3. Cultural Heritage Audiovisual Documentation-Dissemination

As already mentioned, the proposed methodology has been implemented on the occasion of the DVD video production *The clarinet in the Greek tradition: Vaios Maliaras, his life and work*[1], demonstrating various folkloric aspects of the wider region of Thessaly, Greece. In such a project, proper AV content processing and archiving are essential, requiring sophisticated documentation and management [17]. To address the challenges involved in the process, a modular desktop application was implemented in LabVIEW[6], taking advantage of its Graphical User Interfacing (GUI) and the already implemented AV processing and content management tools [23–26]. The application was positively evaluated for its usefulness at the production site, despite its integration and distribution limitations (i.e. not fully integrated with the remaining AV production environments, related meta-data had to be manually inserted). Methodology updates were drawn for the release of an enhanced Web-TV edition, seeking for online distribution and AV-CH dissemination enhancement. ARUTV[7] was selected as deployment platform, due to the advanced content description, browsing and retrieval capabilities supported. Gradual refactoring of web-based management and AV authoring was decided, aiming at augmenting automation, networked collaboration, end-users' contribution and interaction. Based on this experience, technical information and methodological aspects are presented, without providing technical details over software engineering and AV processing algorithms.

4. Material and methods

Besides the basic requirements that are common in most film-TV productions [15,17,21], the current work has certain specificities that are related to the very distinct nature of CH tasks. Hence, for historical, aesthetic and creative reasons, archived material should be as much as possible employed, since it inherently exhibits originality. This has a great influence on production scripting and organization, which have to be accommodated on the availability of archived AV material. Besides, a main task of CH is the preservation and documentation of this historical-cultural material. While processing is necessary for the restoration and adaptation of the Digitally Archived (DA) AV material, new Digitally Created (DC) content is engaged aiming at providing new digital story-telling contexts. A block diagram representing the relationships between material, methods and services is provided in Fig. 1.

4.1. Digitization, restoration and documentation of archived audiovisual material

The first task in AV-CH is content digitization and documentation. Hardware equipment is necessary for Analog to Digital Conversion (ADC) of the archived AV material, whereas availability of proper well-operating playback devices is crucial (e.g. u-matic and filmed video, vinyl records pick-up playback devices, etc.). Analog signal processing or even storage-medium based treatment might be applied for content restoration-enhancement, prior to the digitization process [27,28]. Format selection and digitization parameters need to be decided from the early beginning of the project, determining content-quality along with the applicable publishing-broadcasting formats. The adopted-strategy suggests attainment of maximum available and affordable quality during ADC, even if lower quality is used in the project, whereas lossless compression can be also utilized. While this settlement favors enhanced future releases and re-publishing, much care should be taken for avoiding unreasonable digitization-compression and wasting storage capacity, with the risk to create additional artifacts.

Referring to Figs. 1 and 2, DA High Quality Reference Content (HQRC) is used as master reference that allows the creation and extraction of lower quality content profiles. Hence, needless transcoding/up-scaling that would lead to unwanted loss of information and quality degradation are avoided. In case that the project's quality specifications are lower than the HQRC profile, transcoding might be needed for the extraction of the Initial Project Oriented Content (IPOC). For safety reasons, both HQRC and IPOC reference content should be properly preserved-duplicated. Based on the preceding analysis, it is quite difficult to encode archived AV material in acceptable quality in the new digital high definition (HD) formats. This deteriorates the possibility of taking full advantage of contemporary high quality HD production technologies. Fortunately, filmed AV material inherently offers higher resolution than standard TV, while reasonable up-scaling is also feasible [21]. Another useful technique is the use of lower resolution pictures and video-frames, in combination with picture-in-picture views and other motion effects, resulting in animated photo-stories (APS) [17]. In this context, low-resolution material can be used in higher definition CH productions, whereas text-over, graphical layers, and animations can be inserted to fill out the scene area gaps.

[6] www.ni.com.
[7] http://arutv.ee.auth.gr (*ARUTV: "are you TV"* - Aristotle University Web-TV platform).