Audiovisual Hypermedia in the Semantic Web

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INTRODUCTION

The rapid evolution of digital technology, among others, has revolutionized multimodal content production and distribution processes, propelling novel mediated communication services. Interactive media authoring and sharing technologies are currently being launched, bringing forward new ways of audiovisual (AV) content exchange. Web documentaries (web-docs) and hypermedia have appeared as a natural extension of filmed documentaries and digital TV, inheriting also some of their advantages. Narrative documentaries adopt AV mediated communication mechanisms that humans have been accustomed to be informed and communicate with each other, so that they are more informative and vivid compared to other documents (books, web-pages, multimedia, etc.). Thus, AV-documentaries and especially web-docs can be more easily distributed and attended from most ages and social groups (Dimoulas, Kalliris, Chatzara, Tsipas, & Papanikolaou, 2014a; Kotsakis, Kalliris & Dimoulas, 2012; Veglis, Dimoulas & Kalliris, 2014). Moreover, the continuous evolution of the computing power and the digital storage media, favor digital video production and distribution. This is also fuelled by the increased network speed, the efficiency of the contemporary compression algorithms and the continuous decrease of the corresponding costs (Kotsakis et al., 2012; Dimoulas, Kalliris & Veglis, 2014). High quality AV capturing equipment is currently available at low cost and size as part of smart phones and other mobile computing terminals with inherent networking capabilities, allowing easy AV-content production, contribution and sharing (Atzori, Delgado & Giusto, 2012; Dimoulas et al., 2014a; 2014b; Veglis et al. 2014). In this context, more and more users are involved in the AV production and consumption chain, so that creative experience and AV media culture are cultivated. Nevertheless, AV media related achievements are still far from the progress that has been made in textual information management during the outspread of social media and Web 2.0 services.

Interactive services have also been introduced into the AV production industry, aiming at augmenting human-machine interaction (HMI). AV content is enhanced in functional and informative level, further stimulating users to actively participate in arousing interactive scenarios. While the transition from Web 2.0 to Web 3.0 is ongoing, intelligent AV-content processing and management services are pursued, facilitating users' participation on semantically enhanced hypermedia authoring and collaborative multichannel media publishing. Although hypermedia technologies are rapidly evolving, there are still open challenges regarding upcoming semantic web services (De Bra, Freyne, & Berkovsky, 2013; Dimoulas et al., 2014a; 2014b; Kanellopoulos, 2012; Monaghan, Handschuh, & O'Sullivan, 2011; Veglis et al. 2014). The current chapter examines current trends and future perspectives of AV hypermedia (AVH), considering all the forms of non-linear storytelling (web-docs, multichannel media publishing, etc.) and the associated hypermedia authoring counterparts. Background is presented providing basic definitions, involved technology, achieved progress and limitations. Recommendations and future research direction are then stated, aiming at serving a

two-folded target. Firstly, to present new, user-friendly forms of collaborative creativity, hypermedia authoring and storytelling that current technology allows to be successfully deployed. Secondly, to suggest innovative adaptation mechanisms that can be utilized in both the AVH production and consumption ends, allowing for intelligent media management and augmented semantic interaction services to be launched. In this context, the importance of AVH toward the transition to the Web 3.0 era is revealed.

BACKGROUND

There are various definitions that classify media in different models. Two major categories are the Page-Based Model (PBM) and the Time-Based Model (TBM) (Chapman & Chapman, 2009; Veglis et al., 2014). In the PBM case, textual information and images are usually combined and spatially arranged, resembling the way that a page in a book or a magazine looks like. TBM refers to content that is assembled in time-spaced bins, as in the case of audio clips, linear graphic animations and videos. While PBM imitates the book information lookup and retrieval paradigm, TBM attempts to provide archetypal and vivid presentation of information that is closer to the natural AV communication (Veglis et al., 2014). Hybrid models of mixed PBM and TBM content types are also frequently implemented nowadays. These Multimodal Media Assets (MMA) (Veglis et al., 2014) may include multichannel audio and video, non-linear animations and photos, titles and more elongated textual descriptions that offer versatile presentation of information, enabling different views and audio-tracks selection, multilingual narration and subtitling. MMA schemes have many similarities to the early digital versatile disc (DVD-video) and are closer to the content entities and structures that contemporary web-docs and hypermedia utilize.

The term hypermedia appeared in the early 90's, along with the use of hypertext. While hypertext refers to the grouping of relevant information in the form of hyperlinked PBM nodes, and multimedia is about multimodal presentation of information using together many different media, hypermedia can be viewed as the combination of hypertext and multimedia (Bornman & Von Solms, 1993). In the years that followed, the term hypermedia was put aside, and the multimedia

definition received a broader meaning, incorporating both TBM and MMA compositions with linear but also non-linear navigation and even more sophisticated interactions (Bornman & Von Solms, 1993; Chapman & Chapman, 2009; Veglis et al. 2014). During the last years, the term hypermedia resurfaced, focusing on new forms of creativity, digital storytelling and interaction. However, there are still many technical issues and limitations associated with the involved diversities (i.e. different content types, formats and publishing channels, encoding and reproduction compatibilities, HMI and authoring technologies, etc.), so that hypermedia is more than simple combinations of MMA entities.

One of the key terms of hypermedia is interactivity, which has been advanced along with the hypertext technology. There are four main sub–concepts of interactivity: transmitional (users have the ability to choose information from a continuous stream in a one way communication), consultational (choose by request using a return channel), conversational (produce and contribute new content) and registrational (register users' request and action needs and adapt) (Jensen 1998; Spyridou & Veglis, 2008). Hence, content contribution and sharing models (Web 2.0), but also the currently deployed social tagging and semantic interaction services (Web 3.0), can be considered as interaction forms that are related to the last two concepts of the above categorization. Today, every Internet user acts both as a receiver and transmitter of information by generating and disseminating textual content, along with audio, video and generally multimedia components (Dimoulas et al., 2014b; Veglis & et al., 2014). This is also the case for the user generated content (UGC) in hypermedia platforms that utilize return channels.

As previously implied, not all of the features that have been already achieved and adopted in textual information and PBM media can be easily applied and accommodated to the cases of TBM and MMA. Indeed, there are still many open issues regarding efficient AV content description and management automation, but also interoperability with transparent multimedia access. Hence, content-based searching and retrieval techniques are currently being implemented, using multimodal content detection, segmentation and summarization-highlighting algorithms along with intelligent processing and hybrid expert systems for pattern recognition and semantic analysis purposes (Cordara, Bober & Reznik, 2013; Dimoulas, Avdelidis, Kalliris & Papanikolaou, 2008; Dimoulas, Papaniko-

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