Chapter 6

The Use of Digital Characters in Interactive Applications for Cultural Heritage

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ABSTRACT

Digital characters are software entities that look and act like real or imaginary creatures in a computer-generated environment. They are considered an important element of interactive digital heritage applications that can add significant value and increase user motivation and engagement. This chapter presents a review of the use of digital characters for communicating and disseminating cultural heritage. It explores the wide range of applications that make use of digital characters and attempts to identify how the characters are used, what are their main features, and how are they contributing to the overall cultural experience. The chapter includes an overview of current state of the art in digital character design and implementation approaches, a taxonomy about the usage of characters in cultural heritage applications, and a discussion about prospects and pitfalls of digital character technology for heritage dissemination.

INTRODUCTION

Interactive applications built with novel technologies such as virtual worlds, augmented reality and serious games have the capacity to serve as dissemination and learning platforms for history, culture and archaeology (Anderson et al., 2010; Gaitatzes et al., 2001). They may offer affordances such as high-quality visualization of digital content, real-time simulation of realistic or imaginary environments, natural and intuitive user interactions, seamless blending of physical and virtual content, and single- or multi-user embodiment. These characteristics allow applications to represent existing or reconstructed cultural artifacts and places in high detail for local or remote visitors, enhanced by features such as the superimposition of associated descriptions and media. Added interactivity allows users to freely navigate

and explore the content, and provides engaging features such as interactive digital stories or mini-games related to the historical and cultural context of the subject. Applications of this kind not only let people closely observe reconstructed buildings or artifacts, but can also serve as a motivating means to supplement people's knowledge and increase their interest in culture.

Digital characters are an important element of this type of applications that can add significant cultural value and increase user motivation and engagement in various ways. Reconstructed buildings or cities feel empty, inanimate spaces without the presence of "living" digital humans moving and acting inside them. Furthermore, digital characters can recreate an appropriate context for cultural artifacts and monuments. They may demonstrate how a work of art or a building was constructed, how an object of the past was used for specific activities, they may wear proper clothes and accessories, perform a ritual inside a temple, etc. Even more important is the use of characters for presenting intangible aspects of cultural heritage. They could simulate the daily life and activities of ancient or lost cultures, and also re-enact theatrical plays, dances and other types of cultural performance. Finally, digital characters are also an engaging and natural form of user interface for this type of applications. A virtual human could assist users in navigating inside a large museum and probably present further information, it could discuss with users and answer their questions about the content they are experiencing, and it could also act as a tutor to test their knowledge in an engaging way through quizzes and mini-games.

There is a wide usage of digital characters in cultural heritage applications, but their functional characteristics have significant differences. Depending on the type and goals of each application, the characters have different design elements regarding their interface with humans, their interaction capabilities, their believability and their autonomy. Up to now these different manifestations have not been collected and documented in a systematic review. There are a number of older reviews about virtual humans and animated agents that offer a broad overview of design and implementation issues and research potentials, but they are not focused on the specific needs of cultural heritage applications (Luck & Aylett, 2000; Gratch et al., 2002; Kasap & Magnetat-Thalmann, 2008; Swartout et al., 2006). On the other hand, more recent reviews on virtual environments and serious games in cultural heritage are available in the bibliography. These, however, consider broader design aspects, such as the game genre and gameplay (Anderson et al., 2010; Mortara et al., 2014; Paliokas & Sylaiou, 2016; Bontchev, 2015), virtual museums and exhibitions (Sylaiou et al., 2009, Carmo & Claudio, 2013), or virtual and augmented reality technologies (Noh et al., 2009; Bekele et al., 2108), and do not specifically focus in digital characters. Finally, there is a recent review on virtual humans in cultural heritage ICT applications (Machidon et al., 2018), which categorizes the types of applications that use virtual humans and discusses their strengths and weaknesses. The current study aims to shed more light on the subject by reviewing and studying a number of design dimensions related to the use of digital characters and their affordances.

This paper explores the wide range of cultural heritage applications that make use of digital characters in order to identify how the characters are used, what are their main features, and how are they contributing to the overall cultural experience. The aim of the paper is twofold. First to inform designers of future digital heritage applications about the range of possible features and use cases to consider, if they decide to include digital characters in their prototypes. Second, to identify the positive aspects, drawbacks and critical issues of using digital characters in cultural heritage applications based on the existing works, in order to influence future research studies and prototypes. This review has been based on a thorough systematic study of recent scientific papers describing applications related to tangible or intangible cultural heritage, in which one or more digital characters of any type contribute significantly to the resulting application environment.

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