

Chapter 65

Enhanced Virtual Reality Experience in Personalised Virtual Museums

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ABSTRACT

This article focuses on important factors in the creation of enhanced personalised experiences in virtual environments for cultural heritage applications, especially those targeting virtual museums and exhibitions. Some of the most important factors relating to personalised virtual museums that relate to intelligent content and user modelling in virtual environments are being highlighted and discussed. After an extensive review of the current trends in the domain, the article presents a generalised framework for the development of the next generation enhanced VR experiences in personalised virtual museums. This framework, which naturally surfaces from the domain, was put to the test in the development of the DynaMus platform and two case studies based on this platform are referenced and commented to support such an approach. This concept can serve as the general framework for developing enhanced personalised virtual environments for cultural heritage applications.

INTRODUCTION

The advent of the web, was an initial motivation for museums, to start creating information-rich web sites to promote their services. Personalised content was considered a good strategy to support users, with different capabilities and requirements, in finding information in unfamiliar collections (Ardissono, et

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al., 2015). As soon as mobile technology appeared, it was adopted for delivering context-aware cultural heritage information both indoors and outdoors. Generally speaking, indoors there is a limited space, which is extremely rich in content but offers few services over and above information delivery. In contrast, outdoor mobile apps cover relatively large areas – a city or part of it – offering a wide range of integrated services, such as those providing location-based, cultural, hotel and travel information. The infusion of new technologies in cultural institutions, such as mobile technologies (Asif & Krogstie, 2012), Virtual Reality (VR) (Kiourt, Pavlidis, Koutsoudis, & Kalles, 2017a), Augmented Reality (AR) (White, et al., 2004; Katifori, et al., 2014; Pujol, et al., 2012) etc. have resulted in new experiences (spatial awareness) and have helped in reaching a larger audience – not only children but also adult visitors (Kuflik, Kay, & Kummerfeld, 2010) – focusing on several different goals such as education, lifelong learning etc. (Ardissono, Kuflik, & Petrelli, 2012; Ardissono, et al., 2015; Kiourt, Pavlidis, Koutsoudis, & Kalles, 2017a).

Personalised content in cultural heritage aims at adjusting and transforming the cultural experience so as to meet the experiences, interests and knowledge at the level of the individual visitor or the group (Ardissono, Kuflik, & Petrelli, 2012; Yiannoutsou & Avouris, 2014). Personalised content is considered by many researchers (Ardissono, Kuflik, & Petrelli, 2012; Asif & Krogstie, 2012; Bohnert, 2010; Kuflik, Kay, & Kummerfeld, 2010; Not & Petrelli, 2014; Vayanou, et al., 2012) as a key factor in the success of such objectives. Content personalisation techniques can be employed to steer the information selection based on the user / group profile (interests and context), thus protecting them from data overload (Ardissono, Kuflik, & Petrelli, 2012). Moreover, personalisation can be used to adapt the presentation of information to the user's device, thus facilitating exploration. Personalised content delivery to users is more acceptable through gamified applications, such as serious games, because they are more realistic, user-friendly, pleasant and attractive systems (Anderson, et al., 2010).

There is a growing trend for the development of serious games in diverse fields, including entertainment, cultural heritage, education, artificial intelligence, sociology, military and health systems (Abt, 1987; Breuer & Bente, 2010). Serious games are highlighted as innovative and important tools for the development of applications broadly accepted by all ages, children, adults and seniors (David & Sandra, 2005). Serious games have been widely adopted in cultural heritage, for applications such as virtual exhibitions and museums and have been the subject of applied research and development for several years (Mortara, et al., 2014; Kiourt, Pavlidis, Koutsoudis, & Kalles, 2017a; Doulamis, Liarokapis, Petridis, & Miaoulis, 2012; Froschauer, Arends, Goldfarb, & Merkl, 2012). Nevertheless, there are still challenges for further research, targeting the enhanced interactive realistic simulations of ancient worlds or cultural sites and exhibitions. In a sense, serious games can be considered an efficient approach for blending domain specific activities, like those in cultural heritage and education, with gaming.

Gamification (Deterding, Dixon, Khaled, & L., 2011) is the result of applying game mechanics into diverse domains, in order to engage users and enhance their knowledge and performance. The importance of playing has been emphasised in many studies from various domains. According to Brown & Vaughan (Brown & Vaughan, 2010), playing is an archetypical activity that arises from primordial biological structures existing even before the conscience or the capacity for speech; as Brown & Vaughan emphatically stated, playing is not something a person decides to do. According to Nicholson (Nicholson, 2011), gamification is nothing more than the use of specific game design approaches and techniques in various environments, in order to attract people in problem solving and to enhance their contribution.

This paper focuses on serious games-based cultural heritage applications (mainly as virtual museums) with personalised content for more accurately targeted information and knowledge delivery to users. Of special interest is to derive a framework of rules, theory and best practices for the development of the

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