Augmented Cultural Heritage

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Abstract
This paper aims at enhancing Cultural Heritage in several ways. Using augmented reality and virtual reality technologies, we seek to highlight the advantages of understanding and applying hybrid worlds in socio-cultural and educational fields. For this purpose, we suggest the inclusion of social serious games and mimetic interface games as the perfect nexus to a more productive and innovative experience as well as a more accurate analysis of simulated cultural environments.

Introduction: Hypercultural Environments
This article briefly presents a contribution to Augmented Culture made by the ongoing research project HyperUrban1, developed by the CiTu-Paragraphe research team. Our work includes the analysis and design of real and fictional simulated environments. In some words, HyperUrban's approach considers the concept of "city" as a complex and hybrid urban space that produces, maintains, exchanges, transfers and transacts information related to services and products. Nowadays, every city contains and belongs to many different "cities", such as tele-cities, virtual cities or augmented cities. HyperUrban presents a fundamental difference in the way it perceives and manages the design process. It considers, on the one hand, information and communication practicing as the kernel of any information management system and, on the other hand, the future city as an integrated media system.

Augmented Culture
The Augmented Culture2 (AC) observes the accelerated and nonstop developments of new technological concepts and their effects upon evolving social cultures. AC suggests various ways - independent of space, time and many other obstacles (such as handicap or language) - to access, process and deal with interconnected culture information. It is important to point out that cultural information has always been interconnected through traditional information supports (books, documents and movies, for example). "With the advent of digital networks, all existing information and communication supports [would dissolve their

1 "HyperUrban" presents also reflections about the concept of "social city", where the ways of communication, socialization, learning, sharing, work, etc. pass through different states of self-regulation, and where a large number is based on information and communication technologies (ICT).
2 Some examples that has been the inspiration’s source of this project:
- Worldwide: Google Art Project (http://www.googleartproject.com)
- In France: Culture Clic (http://culture clic.fr/fr)
frontiers almost completely in favor of the traffic, the metamorphosis and the miscegenation of interfaces on a same cosmopolitan territory].""
Though, with AC, the interconnection level and protocol have been profoundly changed. Beforehand, this process was mostly limited to a semantic level, but today, the interconnection is explicit from the lower level of data representation or coding. This is the case of most "interactive online multimedia products" (the Web 2.0 and Smartphone applications, for example). Indeed, it is in the standardization of information cultural interconnection protocols, where most cultural supports are using international multi-device standards.
Finally, one of the main shifts in interconnected cultural information is related to its design process. The interconnection design usually comes in advance, leading information designers to think at the same time on the information and its potential interconnection. Hence, in traditional cultural information, the interconnection comes afterwards.
AC is a logical result of a long development in the sphere of knowledge, caused by a combination between innovations in information and communication technology and a whole new perspective from the way in which society understands the world and the relationship with its inhabitants.
From a technical point of view, the term Augmented Culture could be considered as a shortcut for using augmented reality technology into some cultural representation paradigms.

New social experience
This remarkable interpretation of the space provides a new social experience, mostly exempted from the space-time barriers. It likewise shows the materialization and visualization of mixed culture phenomena in real time. As we think about this concept, we can however consider the society itself. We can visualize a society that is becoming as augmented as the culture that it spreads: a society that is interconnected with a huge number of social networks and digital worlds (which are also involved and have consequences in physical spaces). That leads us to think of an augmented individual represented with his own digital character (its avatar) in several digital communities; an avatar (or many) that could influence his individual's personality. Last but not least, we can think of a personality that grows and develops both in the physical and non-physical worlds. Before going into detail, we must clarify our research field and the purpose of this contribution.

Enhancing Cultural Heritage
Our research project aims to enhance Cultural Heritage by considering augmented reality and virtual reality concepts and technologies. We are interested in understanding and considering hybrid worlds evolving in socio-cultural and educational fields. For this reason, we have suggested social serious games and mimetic interface games as the perfect nexus to a more productive and innovative experience as well as a more accurate analysis of simulated cultural environments.

4 Digital computer-based products that respond to the user's actions. They usually present a set of contents such as text, graphics, animation, video, audio, and games.
5 The individual's representation can take several forms at the same moment: in social networks as Facebook, Twitter or Google+, in a digital world as Second Life and in a massive multiplayer online role playing game as World of Warcraft. In all of these cases, digital communities are formed by avatars or digital representations of the self.
6 A social serious game have the particularity of being designed for different purposes other than pure amusement. Always recreating a social environment, this type of games aims at, for example, developing educational, political, cultural and social tools.
7 Mimetic interface games use the physical body of the user to act as an extension of the interface in the digital world. They reproduce, by mimesis, the actions of the player in the game world.

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In fact, we deal clearly with the concept of Augmented Culture and we look forward to consider cloud computing\(^8\) architecture on many levels of our cultural games design. As we have observed, most augmented reality or virtual reality projects have a common aim:

» To enhance and enrich the development of "culture" (by integrating online multimedia interconnected information).

» To liberate cultural comprehension from a very local and linguistic interpretation of cultural information (this means, to allow new ways of exploring and understanding cultural information).

In addition and through its three-layered architecture (infrastructure as a service, platform as a service, software as a service), cloud computing has enabled the scope of hypermedia application domains to be enlarged, especially in games design. We observe that, due to cloud computing, using games as an integrated part of AC has become an appropriate challenge. Finally, we are eager to present in the following pages an *in design project* that will provide an original experience in a simulated museum.

Our main objectives are:

» Simulate an online reactive environment that can be integrated, in real time, into physical spaces (museum).

  - Develop and integrate a platform that allows their visitors to:
    - create their own avatar (their digital representation).
    - interact with the hybrid environment.
    - meet new people (other visitors).
    - create digital communities and social networks.
    - interact with physical space and objects through the simulated environment and mimetic interface games.
    - participate in the cultural content through social serious games.

» Optimize / Extend Cultural Heritage’s environments.

» Provide an alternative experience towards the expression, contemplation and consumption of artworks.

» Improve and increase the audio guide devices with augmented reality features.

» Experience the museum otherwise (in-situ) by integrating the fourth dimension.

» Provide new ways of analysis concerning the effects of new technologies of information and communication in our society.

**Play Studies**

Culture could be seen as both the means to and end of a process: to acquire new knowledge, validate knowledge, exchange knowledge, question knowledge and transfer knowledge. Culture (and knowledge) involves exploring, learning, playing, teaching, making transactions and developing new relationships, very often without any space or time constraints. Our goal is to emphasize the moment when culture involves playing, and vice versa.

At present, AC is mainly focused on the possibility of exploring Ultra Cultural Spaces (UCS) (for instance, to facilitate immediate access to otherness information). However, AC also allows us to explore Intra Cultural Spaces (ICS). Our concern is to study ICS as well as UCS, and this is why play takes on an important role in our work. The following schema shows the most important elements in this research. They should be considered as a whole and in a constant relationship between each other.

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\(^8\) Cloud computing is the use of computing resources (hardware and software) that are delivered as a service over a network (typically the Internet).
Play

Our research is centered on the concept of play and on the social function of games. Johan Huizinga\(^9\) believed that culture was created in the form of games and that it was originally played. The idea suggested by the Dutch sociologist is that culture develops as a game in its primitive forms, and that it is through the game that society questions itself and interprets life. The act of play was, is and will always be an essential part of all societies and cultures: it is in the human nature to play. Nowadays, thanks to computer network technology, several forms of game give users (or players) the possibility to mix fictional and real worlds in a fun, pleasant and relaxed activity. Although not always free from social pressures, this kind of situation usually generates more creative environments. Games open the door to creativity and interaction, and also to relationships. In fact, we believe that playing is the most suitable and useful activity to combine many cultures in real time, reuniting men from all over the world in an active and persistent digital community.

Our analysis is based on games commonly known as MMORPG (Massive Multiplayer Online Role Playing Games)\(^11\). These games are only playable online and generally have the particularity to encourage teamwork to achieve in-game objectives. Players create and integrate in-game digital communities, but they usually bring their social circles and activities out of these games (into the physical world). This happens because MMORPGs are heavily charged with multicultural environments and they hosted communities with their own social pressures, occasionally bearing a great influence on users’ digital and real lives.

Furthermore, it is essential for us to emphasize the role that video games is taking in our society nowadays. We can find video games in cell phones, in e-pads, in personal computers, in social networks, etc. In fact, video games are spreading in such several forms that they are aiming at everyone, and not only at a specialized community of gamers. As Jesper Juul affirms: “This is the

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\(^9\) That is to say, the activity of play as a human connector. We believe that the action of play functions as a generator and developer of social relationships.


\(^11\) Being the most popular and best example: "World of Warcraft" http://eu.battle.net/wow/
moment in which the simplicity of early video games is being rediscovered, while new flexible designs are letting video games fit into the lives of players. Video games are being reinvented, and so is our image of those who play the games. This is the moment when we realize that everybody can be a video game player. The popular video game consoles as Nintendo Wii or Microsoft Xbox 360 Kinect are really good examples of this simplicity, as their mimetic interface philosophy ("you are the controller") can evoke a huge connection between the users and the interface, and with the activity of playing as well. In conclusion, we are living the moment in which videogames are becoming a normal and dynamic practice of our culture. That is why combining culture and games is vastly important to us. We propose setting up a simple social serious game controlled by a mimetic interface device in an Augmented Cultural Heritage space. Our goal is to observe and study the interrelationships between users and avatars and the whole environment that is generated around them. We consider this as a valuable method to make progress in UCS and ICS experimentations. Our main challenge, however, is to design an immersive environment with a high level of influence on its users. In fact, we find necessary to define what immersion means to us when designing an Augmented Cultural Heritage environment.

Immersion
When we read a book, watch a film or play a video game, we are transported into a fictional (or real) world with its own rules, spaces, characteristics and situations: a world in which we are immersed for a period of time. This process obviously requires a voluntary act from readers, spectators or players, and it does not guarantee an optimal level of immersion. Marie Laure Ryan considers that "the degree of precision and the nature of the immersed reader's mental representations depend in part on his individual disposition, in part on whether the focus of attention is character, plot, or setting". According to the author, the level of immersion not only depends on personal disposition, but also on spatial immersion (the response to the setting), temporal immersion (the response to the plot) and emotional immersion (the response to the character).

In a traditional museum, we can see several time periods and different spaces in a single, unique environment. The background and given information are extremely rich and usually captivate the interests of different kinds of people. But in this case, we barely have the possibility to experiment with the emotional field. In an online digital museum, however, users would be able to create their own personal character, which serves as the digital connection face to other visitors/users. Additionally, users would have the opportunity to interact with all the objects and artworks from the simulated museum.

Social Games
The inclusion of social serious games in an online digital museum will enhance the possibilities. Just to briefly mention some of them:
Games that involve an interaction with the space, artworks and users could serve for artistic design and cultural development. This interaction is useful to analyze users' space appropriation in an environment without boundaries. Indeed, this "liberty" will make a positive effect turning on users' creativity.
Games that include rich arguments or plots could be useful for educational purposes, as they are an efficient tool to learn (by playing). Museums are provided, obviously, with a huge amount of history. They have the informational potential to produce plenty of appealing games. Moreover, the creation of a personalized avatar will give researchers the possibility to ask every user for their

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13 Further information in http://www.nintendo.com/wii
14 Further information http://www.xbox.com/KINECT
interests. What this signifies is that this learning tool could be optimized and personalized in real time.
Games that must be played with an avatar could have sociological and psychological uses, not only by studying role playing situations: the possibility to develop an avatar gives their players a social status in the digital community. It integrates a hierarchy that evolves depending on users' ambitions. By studying an online simulation in real time, we can analyze the relationship (and its evolution) between the avatars and their users; also between the avatars and the different communities of avatars.
This experience can also allow us to learn more about space and time perception paradigms; space construction; own-time management; emotion management, etc. In addition, it could probably extend the analysis to individuals and communities participating simultaneously in both, the physical and the simulated world.
In theory, this simulated environment will give researchers the possibility to take control over the three forms of responses that we have mentioned (spatial, temporal and emotional) and to use them in direct association with the users' interests. We will be able to change variables for the purposes of our research and for the needs of the whole digital community. This way, the immersion process will be very different: if the choices are more personal and the options are wider, it will be easier to reach an optimal level of immersion. This is why we have chosen the Augmented Cultural Heritage environment as our ideal domain of experimentation.
In fact, Cultural Heritage has always been a kind of virtual or augmented reality, as it has always taken its visitors out of time and space. This means that visitors are prepared to experience spatial and cultural adventures: they are ready to experience different feelings and beliefs on what is written or seen during their visit. Users are nowadays accustomed to participate in different communities at once and to live without any space or time limitations.
Moreover, this research could also bring about a change in the whole structure of user's profiles. In a traditional exhibition or museum design (planning), visitors can be assimilated to a sort of determinant avatar designed by the curator. Therefore, every visitor is already predefined and predesigned. This explains why some visitors prefer certain places more than others (or some curators more than others, implicitly). The possibility of creating an avatar with no predefined characteristics will help the whole cultural heritage institution to gain valuable knowledge about its visitors.

The Augmented Museum
Our project has two phases: digitalization and augmentation.

1. Digitalization: Simulated Museum
This phase includes the following:
» Build an online, 3D virtual model in real time.
This device will be used to accommodate users worldwide for personalized tours. In comparison with other forms of digital representation, the 3D simulation provides a more realistic sense of the visit. Letting visitors walk freely and examine the artworks with more detail and a dynamic interaction is also an extraordinary experience for those visitors who are unable to attend the museum physically.
» Allow each user to create its own avatar.
The visitors' digital representation will be a new way of obtaining information about their interests. We find it a valuable feature to enhance the visitor's profile creation. Indeed, all information collected in our experiment will be used to optimize the physical/hybrid museum towards the development of better experiences in the future.
» Custom tours.
The online simulation in real time enables group visits. In addition, the interaction with the artworks enriches possibilities. To accommodate a variety of digital communities in the same
interactive space is fundamental to an evolutionary study of expression, appropriation and utilization of Cultural Heritage.

» Multimedia devices dedicated to the works of art.
The digitalization of artworks provides an opportunity to add (by tagging) multimedia information in real time. Videos, comments and extra information on each work will be available at every user's request.

» The use of social serious games (as explained before).

2. Augmentation: Augmented Museum
This phase includes the following:

» Using the 3D simulation to upgrade the physical museum.
The simulation will never be an alternative to avoid the presence of visitors in the physical environment. Instead, the simulation will be used to nourish the physical experience through augmented reality technology.

» Improved audio guides with augmented reality devices.
Combining augmented reality goggles with video game devices may increase the experience of audio guides. During the visit, the audio guides will offer an interaction with the augmented digital reproductions of some works of art. As social games, this interaction will have educational and cultural purposes.

» The use of mimetic interface games (as explained before).

Conclusion
The goal of our research project is to develop a socio-cultural experience in a simulated museum. On the one hand, we want to prove why and how social games and their immersive nature can be used to raise users' awareness regarding the issue of Cultural Heritage.

On the other hand, the games we are developing could be used, for instance, to gather data about individual and collective space appropriation (interactive games with the works of art and the environment); individual and collective reactions to unforeseen events (social games based on digital crises in closed spaces); emotion management (social games based on group’s organization); identity construction through individual and collective representations (individual games based on avatar's evolution systems and collective games based on community's hierarchy systems).

Our final objective is to show how these games can be useful to analyze digital communities and to demonstrate their socio-cultural and educational effects on our society. As we explained, our approach is especially focused on users and their relationship with their avatars, with the digital environment and with the community. Our theoretical support is based on the positive results of our most recent research on digital worlds. Indeed, we believe that our research could be used as a new approach to enrich cultural studies.

References