Research on the Experiential Communication of Digital Humanities and Information Visualization: A Case Study of Iconography Measurement

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Abstract. The purpose of digital humanities and information visualization in culture heritage preservation is the inheritance of values and dissemination of culture. The introduction of digital technologies strengthened the importance of transmitting the value of heritage. This dissertation proposes applied theoretical framework for the digitization, preservation and communication of cultural heritage, from the perspective of design thinking and based on experiential communication prototyping methodology. It proposes an "Information-Value-Experience" heritage communication framework. By examining "experience as a medium" and "experience as communication," the author presents an experiential communication concept and a prototyping methodology for experiential communication of digitized cultural heritage.

This paper defines experiential communication in the context of digitization and preservation of cultural heritage as a set of communication design methods and guiding principles. Based on the analyzing the evolution of cultural heritage and of heritage preservation philosophy. It proposes the concept of a cultural heritage experience and analyzes its attributes and the process of the experiential communication of heritage. The analysis of "digital heritage" and "digitization of cultural heritage" clarified for digital humanities; the scope of technology application, the main form, and the basic process. There are four basic principles that are proposed for the process of the digitization of cultural heritage. By comparison of the communications transmission model and the rituals model clarified basic characteristics of the communication of digitized of cultural heritage. Visualization used the book Iconography Measurement to validate the application of the experiential communication prototype and visualization method. The digital and visualization of this book illustrated the value and meaning of experiential communication prototype for digital humanities.

Keywords: Digital humanities · Information visualization · Experiential communication

C. Stephanidis (Ed.): HCII Posters 2017, Part II, CCIS 714, pp. 534–542, 2017.
DOI: 10.1007/978-3-319-58753-0_75

1 Introduction: Cultural Heritage and Context

Cultural Heritage, also named as cultural capital, cultural property or cultural wealth, is the traditional culture that equipped by architectures, historical relic, historical sites and various non-materials with prominent humanity history, arts and scientific values. It can be divided into "material cultural heritage" and "non-material cultural heritage" in concept. The "material cultural heritage" is the traditional "cultural heritage". In accordance with the definition in "Convention Concerning the Protection of the World Cultural and Natural Heritage", historical relics, historical buildings, human cultural sites are included. The "non-material cultural heritage" refers to various practices, performances, presentation forms, knowledge, skills and related tools, objects, artworks and cultural places etc., which are regarded as cultural heritage by various groups, teams and sometimes individuals.

With the rapid development of society and economy, the survival and development environment of cultural heritage is increasingly severe. A large amount of cultural heritages are ruined or over explored, have vanished or close to vanishment; besides that, the social humanity environment which cultural heritage lives by also disappears and vanishes. Therefore, under the background of post-industrial era, Barbara Kirshenblatt-Gimblett (1995), American anthropologist, proposes that as a past culture production mode exists in modern time and a kind of "added-value" industry is formed through the presentation of differences between the past and the present and some local value supplementary elements of heritage. Therefore, the protection of heritage should return to the actual social environmental requirements and modern elements can be added conditionally with the insistence of tradition and the balance between different related-benefits. Originated from the concept of language discipline, context was divided into context of situation and cultural context by an anthropologist named Malinowski for the first time and consisted of three elements: cultural background, emotional scenes and time and space environment. Extending into cultural heritage area, especially the gradual process in digital technology, In the environment culture heritage is in and the crossing of human society from industrial time to information time, the connection function should be adjusted in accordance with the development of culture background, emotions and space environment etc. Therefore, with the combination of digital technology, the putting forward of the context cultural heritage is an important topic from the post industry society to information society.

2 Context Interpretation of Digital Dilemma and Construction Strategy

The development of digital technology not only provides technical means for the protection and presentation of cultural heritage, but also changes the traditional way of protecting cultural heritage, it has made indelible contributions to the conservation and inheritance of cultural heritage. However, its effectiveness is still not fully developed; it shows some shortcomings in the protection and presentation of material and non-material cultural heritage, and the dissemination of cultural information. Meanwhile, it may bring adverse effects to cultural diversity and ecological balance.

2.1 Digital Dilemma

Compared with the digital technology represented by computer and the Internet, the constitution of Cultural heritage has fundamental differences. Cultural heritage mainly comes into being, develops and spread in the form of "atom", while the digital technology is mainly based on "bits"; the conventional protection of cultural heritage does not involve the transform of "mode to state", but data collection and conversion is the first step of digital protection. The integrity and fidelity of stored information will be influenced by different storage patterns, which are mainly reflected in the following aspects:

Digital Preservation Outweighing the Intrinsic Value Heritage Protection. Digital protection came into existence to transform the material and non-material cultural heritages into digital forms that can be widely used and easily spread on computers and the Internet with the aid of technical means, so as to achieve the permanent preservation and wide dissemination of cultural heritages. However, currently the domestic digital data of cultural heritage mainly include picture, audio, video, three-dimensional data, texture data, etc. The process of digitization focuses on the recording, collection and preservation of data, and the so-called "heritage protection" is to store the data collected by computer into the hard disk, just like "specimens" to be stored in the museum. Therefore, most of the digital protection work still stuck in the data "save" stage, data are used for relevant research on heritage, but the "protection" of heritage is not yet in full swing.

Media Outweighing Content Mining. The major difference between "bit" and "atom" is that bit cannot be touched, smelled, seen or heard, it can only demonstrate its feature and function with the aid of other carriers, so digitized cultural heritage also face such problem, the characteristics of media can directly affect people's cognition on the characteristics of cultural heritage. Therefore, the ultimate goal of cultural heritage digitization is to choose the right media and restore the original cultural heritage truthfully, including the natural environment, social environment and humanistic environment.

Digital Content Becoming "Heritage". Digital technology is a multidimensional media performance means, which integrates sound, image, text, virtual reality, video animation and other performance methods. However, the replacement cycle of computer technology is very short, as described by Moore's Law that computer power would be doubled every 18 months. Therefore, with the improvement of information technology, the data derived from the digitization of present stage need be "migrated" continuously, converting into new format and replacing new storage media. In this process, the digitized cultural heritage becomes "heritage" again, sucking in the circle of ceaseless iterative update.

The "Homogenization" of Digitalized Heritages Interpretation. The protection of cultural heritage is based on the universal consensus of preserving "cultural diversity", diversity and difference precisely reflect the value of cultural heritage, its traditionality, artistry and scientificity also demonstrate that it is based on quests of originality of various nations and ethnics under the trend of globalization. However, the biggest

advantage of digital technology is that it can break the constraints of time and space, and all the data are saved into different combinations of 0 and 1. The storage formats of different heritages are exactly the same, its display and transmission methods are much the same, too. Thus, "homogenization" is a serious phenomenon in the display and dissemination process of contemporary digital preservation of cultural heritage, which fails to meet the original goal of protecting cultural diversity, and is currently the plight of the digital heritage protection.

2.2 Context Interpretation and Construction Methods

Digital technology is a computer "language" of the information age. With the development of modern technology and the improvement of social and humanistic environment, it will inevitably encounter the above-mentioned "digital dilemma" when describing "cultural heritage", which represents the traditional history and culture. The discussion on the dilemma existed in the digital protection of cultural heritage is not to stop the "digitization" progress, but to avoid the bad effects rising from the technical defects of digital technology, restore the original appearance of cultural heritage more truthfully, and create a more natural experience of digital heritage. Currently, context construction is a new approach in the digital protection of heritages, using digital technology as the computer "language" of "information age", and regarding the "cultural heritage" as the target "sentence". In order to fully express the "meaning" of mass digital survival condition, and experience the cultural values behind the cultural heritage more naturally, I think we should take measures from the following aspects:

Combining Synchronic Context with Diachronic Context. Heritage is the art of time. Therefore, the historical context and realistic context of cultural heritage cannot be ignored in the process of digital expression of cultural heritage. The historical context of cultural heritage provides answers to its formation, development and decline. By restoring history, the essential connotation of cultural heritage can be found and interpreted as the focused value of art performance at later stage, reflecting the implied meaning of those "heritages" under the given historical backgrounds, rather than simply presenting the artistic level of heritages from the perspective of visual arts. Synchronic context can enable cultural heritage to find an expression method that is in line with the cognition of modern people in the realistic context, and interpret the realistic context without violating the original intention of protecting cultural heritage. This process always exists, because modern people cannot judge things if they give no consideration to their economic, social and cultural environments, and they will inevitably ignore elements beyond their perceived values in the process of interpretation. Therefore, in the process of digitization of cultural heritage, we should interpret the Synchronic context of the heritage under the premise that we have fully understood its historical context.

Combining the Virtual World with the Real World. With the development of information technology, the digitization of modern society has been gradually strengthened. Negro Ponty, a Professor from MIT, said that: We are digitized at a rapid pace; all the things that can be digitized will be digitized by us. However, at the

junction of the virtual world and real world, people have not changed their favor for "materials", they still needs carriers that can be felt, touched, smelled and seen to provide basic sense of existence. The two features of cultural heritage are very similar, which are tangible and intangible. Both of the material cultural heritage and intangible cultural heritage have tangible and intangible characteristics, which are not isolated from each other. In the digitization process, especially in the interpretation, dissemination and presentation processes, we should give even consideration to the tangible and intangible elements of heritages, making the intangible Social and cultural customs and rituals go along with the tangible cultural heritage; making intangible cultural heritages have "tangible" subjects that can be felt, touched, smelled, heard and seen.

Artistic Interpretation and Scientific Presentation. The purpose of cultural heritage protection is to protect the artistic value, heritage protection starts from the protection of its artistic value. Therefore, how should we describe, restore and present the artistic value of cultural heritage in the process of digitization? Digitalized heritages are different from those original heritages, original heritages have powerful "self-explanatory feature", in no needs of other media-assisted self-presentation. Digital heritages have changed the "format" of their existences, their status in space and time dimensions are analogs of heritages. Therefore, we should give full play to the characteristics of the artistic value of the cultural heritage in such "context", make reasonable interpretation of art on this basis, set appropriate guidance and expansion of art, bring the audience into the atmosphere created by artistic interpretation, and present and disseminate them in a scientific, rational and natural way.

Online Demonstration and Offline Validation. The virtual environment created by computers and the Internet is the main arena of digital cultural heritage, and digital interactive experience can attract the audiences' curiosity about the real collections. Amit Sood, who is born in India, holds a similar view: "The more images of collection you see, the stronger desire for face-to-face contacts with them you will have". Amit Sood had no chance to go to museums for many years, and such regret became the driving force for him to start the Google Art Project. "Digitization cannot replace the physical museums. Conversely, when people acquire a certain understanding and knowledge of the museum and its collections, they will be more interested to visit the museum." Therefore, the online culture heritage shaped by digital technology has demonstration effects, promoting its publicity and encouraging more people to have personal experience in reality.

3 Case Study of Experiential Communication of Digital Humanities and Information Visualization

It is involved to present the information of the heritage itself, to design the exhibition space of the heritage and the interaction design while the expressing of the information and experience during the design of experiential communication of Digitized Cultural Heritage. Generally speaking, "Experiential Communication" is to figure out the relationships between information, interaction and experience. Two examples are shown in this article, one is the Buddha statues in the 45th and 159th cave of Mogao

Grotto at Dunhuang, while another one is the painting call Iconography Measurement drawn in the 18th century which showed roughly same as in the iconography measurement classics.

The so-called "Iconography Measurement" is the proportion of the Buddha figure and the ruler of the statue. It could be the reference standard to draw the figure of Buddha in Tibet and Nepal district in the 18th century, which contains 36 detailed drawings. Since the figures of the Buddha are not fabricated, their physical proportion, appearance, postures and decorations were rigorously stipulated. Meanwhile the figures were recorded in the books like "Iconography Measurement" in the style of line drawing. The unit of the measurement is called "one finger" (the width of the figure's middle finger).

First of all, the most important task of the design of experiential communication of Digitized Cultural Heritage is to accurately express the information of the cultural heritage itself and to transmit basic information of the artistic and scientific value of the cultural heritage. Whether the information are accurate and scientific can directly influence the deep excavation of the concealed humanity, art, history and etc Fig. 2.

Fig. 1. Information collection of the Buddha statues

Fig. 2. Million-level pixel statue display

The 45th and the 159th caves in Mogao Grotto are the representatives of the caverns digged at the same time whose types of caves, statues and murals possessed really high historical and artistic value. The preservation of them are comparatively integrated. On the processing of the Buddha statue at the left side of the shrine in the 45th cave, not only the "original appearance" is shown to the spectators, even the beyond-the-real visual angles are provided because of the advantages of digitization (Fig. 1). Million-level-pixel photograph can distinctly show the linetype, brushwork, and even the tiny dust dropped on the Buddha statues for the past thousand years. (P.2) The "beyond-the-real" details could be shown in the digitized scenes. When the statue of Sakyamuni was found missing and only left his lotus throne, the original statue was virtually reconstructed by the means of digitization, allowing spectators to transform their mobile terminals to digital display device (Figs. 3 and 4).

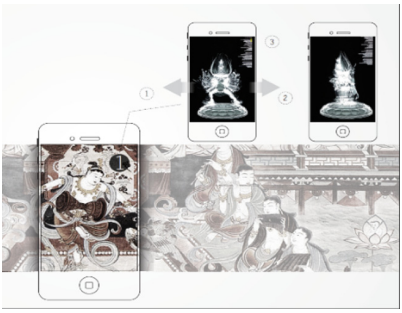

Fig. 3. Mobile terminals enhancing display

Fig. 4. Digital restored missing Buddha statue

Secondly, from the perspective of communication, the interaction design of Digitized Heritage is not merely technical considerations, but overall considerations of the textural environment and the relationship between human and digitized heritage and the installation of the interaction points. Opposite to the management of the content of the heritage, interaction techniques provide a kind of hidden existence and initiatively discover the spectator's need of the experience in the virtual space, providing a interact participation way which could be naturally responded on the processing of the design of the organization, presentation and transfer mode of the information. Such as in (Fig. 5), on the settlement of the digitization and interaction of the different pictures,

Fig. 5. The mural Iconography Measurement full of media interaction installation

the proportion, appearance, decoration are reconstructed according to the separation of the stories, forming a Multi-Sensory experience which gathers different media formats such as voice, video and pictures.

Finally, Digitized Heritage is the experience at the dimension of time and space, so the society, history and cultural foundation of the time should be considered during the intact Digitized Cultural Heritage experience. Just as Confucius wrote in The Analects of Confucius, “See what he is, find what he did, observe what he is content with”. The Cultural Heritage is similar to that. “See what he is”-know exactly what the heritage is; “Find what he did”- explore why and how it became a heritage; “Observe what he is content with”- dig out why the heritage has located that place for so many years, finding out the constant rules among the transformations, thus answer the questions occurred in the practical environment. There are three progressive levels in the designing of the whole picture - picture explanation, scripture interpretation and art deduction. (Figure 6) Level 1: reconstruct the images in the Iconography Measurement by the means of digital techniques, restoring its original environment and building the relatively real experiencing environment. Level 2: scientifically interpret the acquirement and presentation of all the elements at the back of the images, illustrating the meaning of the frames, Buddha sculpture, color, texture and contents. Level 3: deduce the art guided by the experiential communication at the foundation of the research result of the first and second level. By the means of data visualization, the spectators can drag the proportion line to judge the level of similarity of the scales and Iconography Measurement. On the one hand, it can provide the ordinary spectators a basic rule to learn Buddhist statues; on the other hand, it helps to provide the professionals a digitized auxiliary tool.

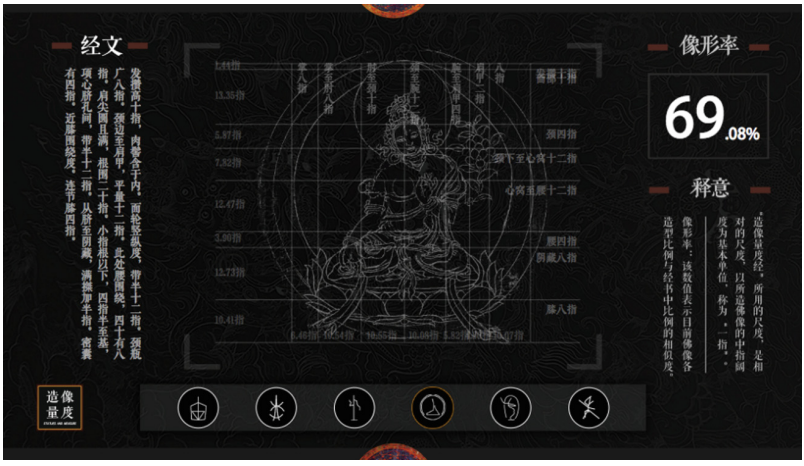

Fig. 6. Interface design of Iconography Measurement

4 Conclusion

As another existence form of heritage, Digitized Cultural Heritage is the products of technology evolution and the social and economic development. It is the construction to the existence of the Heritage Digitization. It helps to avoid the "Digitized Predicament" by bringing in the conception of experiential communication, gathering up the information presentation, interaction techniques and environmental construction involved in the field of heritage digitization design. It provides different spectators proper textual environment of heritage experiential communication, creating a new way for the communication, interaction and expression between different cultures. Digitized Cultural Heritage provides some available theories, methods and tools for the protection of the cultural heritage, exhibition, museum management, cultural creative industry and many other fields.

In summary, the cultural heritage exists naturally and can sustain for a long history, so its traditional foundation will inevitably be affected by the huge differences of humanistic and social environments between modern society and the era of heritage. Staring from the digital dilemma, the author proposes the construction strategy for the digital protection of cultural heritage from the contextual perspective of time dimension, combines the positive and negative impacts of information technology with that of interactive techniques, analyzes the multidimensional features of cultural heritage in the process of digitization, avoids attaching too much emphases on the limitations of the digital media, uses digital technology as the "language" and the modern expression of cultural heritage as its "sentence meaning", explores cultural connotation and essences behind culture heritage from experiences, and provides new methods and direction for the preservation, protection and dissemination of cultural heritage from the construction of context.

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