

Media art creation process using digitized archetype of Korean traditional dance movement



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Abstract

Cultural heritage is a product of history and culture that contains traces and memories of humanity. Therefore, various kinds of effort are needed to care and spread its value. However, young people's interest in cultural heritage remains shallow due to the strong perception or bias that it cannot be reconciled with modern culture. Intangible cultural properties are thus held and passed down by a relatively small population, which often carries the risk of losing or damaging its original form. Thus, establishing measures to pass down intangible cultural heritage (ICH) is a crucial challenge. In addition to the safeguarding of ICH, there is also a need to increase the younger generation's interest in traditional Korean cultural heritage and encourage them to participate in various activities in order to slowly expose them to the various dimensions of cultural heritage.

The purpose of this study is to propose and demonstrate a new media art creation process through the case of the 'Dongnae Crane Dance', one of the most prominent aspects within the local cultural heritage of Busan. This study was conducted in using the following process: 1) The archetype data of the 'Dongnae Crane Dance' was extracted using motion recognition technology to recognize the dancer's body movements. 2) The displacement difference (difference in the changing position) of the 3D data was calculated, and the trajectory distance of the motion was derived from the accumulative data calculated above. 3) Based on the data acquired, this study proposes a media art creation process applying various practical contents, focusing on the detailed elements included in digitalized archetype data.

Through this process, this study aims to enhance the interest of young people in ICH and contributes to the cultural transmission and safeguarding of its original form. Furthermore, it is expected that the creative activity of modern artworks based on archetype data, not on reinterpretation from the artist's point of view, can provide an opportunity to recognize and convey the value of Korean cultural heritage once again and to have this cultural heritage further disseminate throughout the world.

Author keywords

Korean Culture; Traditional Dance Movement; Use of Archetype; Media Art Creation Process

Introduction

Cultural uniformity has deepened as the integration of economy, politics and culture has accelerated internationally in the era of globalization. Accordingly, maintaining cultural diversity and national identity has become an important research issue. Culture is formed through the lifestyle, behavior, belief, and faith of a particular community (Yoon, Kim, & Chang, 2022), and this becomes a key foundation for shaping new values, creativity, knowledge, and traditions (Herrow & Azraai, 2021; Chang, 2020). Cultural heritage is formed, shared and handed down from generation to generation. The diversity of culture and heritage is an irreplaceable asset for the spiritual and intellectual enrichment of all mankind (UNESCO, 2021). Therefore, various efforts are needed to safeguard cultural heritage and spread its value.

Folk dance is an important part of Intangible Cultural Heritage (ICH) and one of the diverse cultural foundations that shape a particular social context (Stavrakis, Aristidou, Savva, Himona, & Chrysanthou, 2012). However, unlike tangible cultural heritage, which has a relatively clear substance, ICH has some problems involving care and succession because it is handed down mainly by a small number of heritage holders and bearers. In other words, if there is a problem with the personal safety of the bearers, the original form may be damaged or, in severe cases, may not be able to pass down. Therefore, in the transmission of ICH, it is necessary to break away with traditional methods, and seek new ways that can assist or replace them (Kim, 2018). In this respect, the rapid development of 3D technology has become a great turning point in the safeguarding of cultural heritage. Through this, various means and options have been obtained for recording, restoring, and harnessing the elements of ICH, escaping from the limited means of recording such as video recordings and images (Skublewska-Paszowska, Milosz, Powrozniak, & Lukasik, 2022).

Korea has a long history and rich tangible and ICH. However, it was found that 50.9% or merely half of Korean people have interest in traditional culture, and the lower the age, the lower the interest. Notably, the proportion of the population with no experience of enjoying traditional culture was higher in the younger age group (Ministry of Culture, Sports and Tourism, Republic of Korea, 2019). Although multifaceted efforts are being made to care cultural heritage in various fields, the de-

parture of young generation's cultural interest has become a new challenge. As such, there is a need to respond to the problems with ICH transmission and at the same time seek ways to enhance interest of the younger generation in the Korean traditional cultural heritage. This research project started from such context and problems.

Therefore, this study aims to propose the incorporation of cutting-edge technology through various means and options as a measure for ICH transmission, and increases the interest of the younger generation in ICH through the development of a creation process that uses media technology. In this vein, this study selects Dongnae Crane Dance, a local ICH in Korea, as a research subject, and records and cares the archetype data of the dance movements by using the sophisticated motion recognition technology to try out a new transmission method. In addition, as a way to raise the interest in local ICH and the production of content that incorporates the recorded archetype data, this study will develop and propose a media art creation process with a communication method of participation and experience of the audience.

This study largely consists of prior research review, the extraction and conversion of dance movement data, and the development and proposal of a media art creation process using data. (1) In the stage of prior research review, the study looked into related prior researches, and described the overall outline of this project. By doing so, the necessity and direction of the study was explored. (2) Data extraction on dance movements was conducted using motion capture technology, and movements were recorded for each body part, such as the torso, hands, and legs, centered on the body of the performer of Dongnae Crane Dance. Moreover, this study constructed the archetype data of the dance movements in Dongnae Crane Dance through the moving distance according to the movement after calculating the displacement difference in the recorded 3D coordinates. (3) In the proposal of media art creation process, this study attempted to identify the flow of media art, which has recently drawn a high interest, and propose a process for media art creators to realize creations by harnessing the archetype data of local ICH that they secured earlier. This study corresponds to the basic research part of the entire project, and includes the details of the prior research review stage.

Related Studies

This section briefly reviewed recent research related to the safeguarding of ICH and folk dance.

Tangible cultural heritage with a physical substance has the characteristic that its original form is relatively well maintained for a longer period of time than ICH. Accordingly, it can be said that the majority of studies related to the safeguarding and utilization of cultural heritage in the past were focused on tangible cultural heritage (Pistola, et al, 2021). With the development of 3D and digital media technology, it has become possible to study the care of the archetype of ICH in more effective and diversified ways, breaking with the limitations of relying on traditional recording methods (illustrations, photos, videos, Labanotation, etc.) and observation and recording of heritage (Skublewska-Paszkowska, et al, 2022). Accordingly, research related to the ICH safeguarding has recently become a major topic of cultural heritage research internationally (Jing, Tan, & Zhang, 2021), and various technologies such as 3D modeling, motion capture, 3D visualization, VR, and AR have been

used in related studies. Furthermore, there have been various attempts to safeguard heritage and add new value, such as building an Internet public database using digitized ICH, experiencing museum AR, and developing a platform that promotes ICH-based creative activities (Hou, Kenderdine, Picca, Egloff, & Adamou, 2021; Pistola, et al, 2021; Kim, Im, Lee, & Choi, 2019; Xue, Li, & Meng, 2019; Kim, 2018).

Most of the studies related to the safeguarding of traditional dance movements show awareness of the problem involving effective safeguarding and recording, and raising interest of the younger generation or the general public (Stavrakis, et al, 2012; Zhanna, 2020). Discussions are also underway to develop games, interaction programs, learning games and animations using digitized data, including care through digital technology (Herrow, et al, 2021). In this regard, the study by Hajdin, et al (2018) developed and presented a visualized interaction application that can learn through the digitized traditional dance of Slovakia. This showed the potential that 3D and media technologies could be useful options for learning traditional dance movements.

It was found that related recent studies have a tendency to build digitized data by using advanced technology and based on this, seek a direction to create new value, while evolving from the perspective of mere recording and safeguarding. This seems to have been an important global issue.

To create such new value, this study attempted to design a media art creation process based on the archetype data of digitized ICH. The expected contributions to the media art creation process are as follows. (1) It proposes various methods by providing a reference based on the archetype data extracted through advanced technology, and thus expanding the archetype record of Dongnae Crane Dance, an ICH. Through this, it is expected to contribute to the transmission of local ICH and safeguarding of its original form. (2) It promotes interaction, participation, and cultural experience with visitors by presenting a media art creation process using ICH. In this process, the familiarity and interest in cultural heritage are expected to grow.









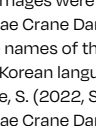
Digital data recording of traditional dance movements

Introduction to the dance movement of Dongnae Crane Dance

Dongnae Crane Dance, designated as Intangible Cultural Property No. 3 by Busan City, is said to have been expressed based on the Deotbaegi Dance that started extemporaneously in Nori Madang, the areas for traditional outdoor performances. This is an unstructured dance that is improvised to the Gutgeory jangdan (rhythm) or Deotbaegi jangdan (rhythm) through Nori Madang, including Dongnae Yaryu or tug-of-war that have been passed down in the Dongnae area of Busan. It developed from the Deotbaegi Dance performed in a fixed frame but unfixed freedom. In particular, Dongnae Crane Dance has larger movements than the Deotbaegi Dance, and the dance moves, such as connecting between motions through abundant breathing or moving forward, are expressed in a dynamic yet round manner. The name of the Crane Dance originated from dance movements that resemble those of a crane when a man donning a white robe and a black hat, the daily style at the time, danced merrily. Dongnae Crane Dance was created by adding the movements

of the crane according to the flow of time, and is currently taught with arbitrary names based on the form of 16 dances. Among them, the nine movements presented in Table 1 represent the shape of a crane (Busan, 2012).

Table 1. Movement Description and Symbolism of Dongnae Crane Dance

#	Image of Dance Movements*	Name** (the original language) and Description**	***Symbolism
1		Hwalkaetjit Ttwim (할갯짓 됴) Running around the dance floor while fluttering the left and right arms in turn	The image of a crane flying merrily
2		Jwawoo Hwalkae (좌우할개) Opening both arms and raising and lowering them on the shoulders in turn	The image of a crane flapping its wings in place
3		Dolim (돌림) A slow, spinning movement with both arms open to the side and stepping out once in a while	The image of meandering as if looking for food with wings wide open
4		Somae Keoteum (소매견음) Rolling up the sleeve of the other arm with one arm	The image of opening and folding the wings one by one
5		Baegim (배김) Jumping big	The image of a crane spreading its wings wide to jump and sit down
6		Jwawoo Puri (좌우풀이) Folding and releasing both arms in turn to keep balance	The image of slowly opening the wings and turning the body gradually from side to side
7		Moi Eorum (모이어름) Finding or picking up food	The image of picking up food
8		Sokuri (소쿠리) Raising both arms over the shoulders and supporting the basket that is being held over the head	The image of walking gently with both wings slightly raised
9		Dodum Ttwiki (도둣뛰기) Taking a basket motion with both arms and turning around, while jumping both feet at the same time	The image of standing and jumping in place with both wings slightly raised

* The images were created by our research team based on the pictures of the Dongnae Crane Dance performance.
 ** The names of the dance movements are written according to the pronunciation of the Korean language.
 *** Lee, S. (2022, September/October). In-depth interviews with the bearer of Dongnae Crane Dance by J. Kim, H. Kim [Personal interview].

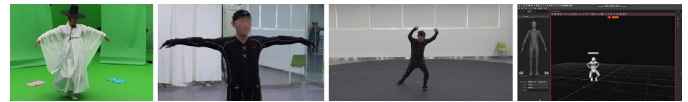


Figure 1. Preparation for the motion capture of the crane dance movements (first and second from left). Input (second from right) and output (first from right) of the motion capture

He is a person who can acquire, safeguard, and reproduce the art of Dongnae Crane Dance designated by the country in its original form. Lee is capable of succession activities and has a succession system. Moreover, he plans and conducts Dongnae Crane Dance performances every year, and operates classes and training at training centers. Centering on him as a subject, the following techniques were used to record the dance movements of Dongnae Crane Dance, and extract data accordingly (Kim, 2006).

First, the Primex camera of the motion capture system OptiTrack was used to measure the movements of the dance. To accurately measure body movements, 24 cameras were installed around the subject, and 180 frames of data were acquired per second. Motive software was used for the editing of the acquired data. The dance movements were extracted through the moving distance of 26 markers attached to each joint, and the movements were recorded for each body part, such as head, torso, hands, and legs of the subject. In addition, archetype data of the movement trajectory of the Dongnae Crane Dance was constructed by calculating the displacement difference of the recorded 3D coordinates.

Media art using local intangible cultural heritage

ICH is a cultural art in a special field of folk culture, and it is possible to naturally approach the perception of existence of people living in the present through folk culture. Unlike other traditional dances, the dance movements of Dongnae Crane Dance have the characteristics of the regional specificity and uniqueness of Busan, which makes the safeguarding and utilization all the more valuable. Despite its value, however, local ICH is often latent only within the region, and interest is low, especially among the younger generation. Therefore, to increase interest in local ICH, content creators in various fields should try an approach to media art creation using new technologies (Choi, 2016). In this section, this study proposes a process through which creators can realize various creative works related to media art by harnessing digital data and technology of Dongnae Crane Dance, a local ICH.

Cultural heritage and media art

Recently, smart interactive media art that stimulates the emotions of the younger generation is gaining popularity (Gong, 2021). Using advanced technologies such as virtual reality (VR), augmented reality (AR), mixed reality (MR), high-resolution video images, holograms, and projection mapping, the work is expressed through a communication method called user participation and experience. Notably, immersive content that has recently attracted attention, is a type of media art that stimulates the five senses to enhances immersion. It is used as exhibition content at the National Research Institute of Cultural Heritage or National Museum of Korea to create new values for the safeguarding and utilization of cultural heritage.

Methods and results of recording traditional dance movements

The subject of the dance movements recorded in this study is Mr. Lee Seonghune, the bearer of Dongnae Crane Dance.

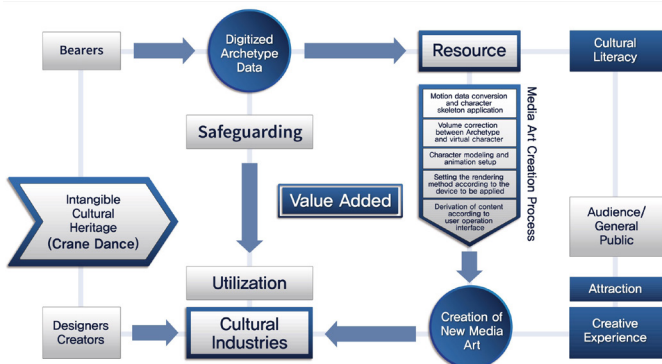


Figure 2. The Concept map of the Media Art Creation Process

Proposal of media art creation process

In this study, the process by which creators attempt to create media art using the archetype data of local ICH will be designed as follows.

1. Apply skeleton properties to 3D characters through motion data conversion by using the archetype dance movement data extracted from the motion capture system.
2. Correct the part where the actual volume of the bearer and the volume of the virtual character do not match by using a layer in the next step of creating an animation key and designing a character.
3. Select a high-poly or low-poly rendering method according to the device to implement the content, and perform modeling in the 3D design process,
4. After setting the modeled character, save the file in the format of the set device environment, and derive the final content by setting the user manipulation interface.

Using the final content derived from the above process, construct a spatial structure of the environment in which the

audience can immerse. In addition, create media art in which the audience plays a main role and an important medium by forming the environment that induces interaction with the audience through harmony and experience between the video and the audience.

Conclusion

This study examined the contents corresponding to the basic research among the entire research projects that digitize Dongnae Crane Dance, an ICH in Korea, and develop a media art creation process based on it. Literature on the safeguarding and utilization of ICH and traditional dance movements was briefly reviewed, and the general context of this research field and the position of this study were explored. Moreover, this study introduced Dongnae Crane Dance, the main subject of the study, and presented an outline for future research projects.

Based on this, this study conducted digital data recording of Dongnae Crane Dance in the next stage, and attempted to convert the invisible content called intangible cultural heritage into visible content through digital data recording and extraction. This study also proposed a process of media art creation by harnessing extracted digital data to derive visualized content.

By attempting to develop a new creation process using the digitized archetype data of ICH, this study is expected to have a positive effect on the perception of the younger generation about the value of ICH. Last but not least, this study is expected to make a significant contribution in terms of a modern re-interpretation and utilization of cultural heritage through the creation process based on the archetype data.

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