

Skill of Improving Quality and Loading Speed of Virtual Reality Software

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Abstract

The present situation, which has the danger of destroying and damaging the ruins and cultural assets by mistake or trial and error in maintaining them, has become a serious problem in preserving the ruins and cultural assets. Therefore, we can resolve these problems, by means of the technology of 3D virtual reality digital restoration. This technology provides a very effective method in preserving cultural asset data semi-permanently as well as utilizing them. Besides, when excellent quality is required in loading virtual reality software, execution speed gets slower due to excessive traffic, and even the normal operation is not done. Thus, this paper presents the skill, which can improve quality and loading speed in order to resolve those problems.

Keywords: *Virtual Reality, Digital Restoration, Preserving Cultural Asset, 3D Modeling, Virtual Experience*

1. Introduction

Recently Virtual Reality Technology gets developed, which helps the real life very much and is utilized in many places. Virtual reality has been widely used in various fields, such as experiment for investing much money, dangerous training for helicopter pilot, design of automobile or plane, health care and restoration of cultural assets. Among them, the fields utilizing virtual reality technology have been studied enthusiastically and developed rapidly. In addition, many advanced countries have used virtual reality technology in restoring cultural assets, and obtained great results while they introduce their own culture and history to the world.

Accordingly, this paper has a goal of realizing appearance of Hanyang in old Chosun Dynasty around Gyeongbok Palace by virtual reality, and a goal of enhancing virtual reality execution speed and graphic effect quality, by using unit division & Resource Manager Discard Bytes channel, in order to improve speed problem. Also, if we restore the ruins and cultural assets by 3D virtual reality digital restoration, we can provide a convenient view to the ruins and easy access to the information on cultural assets anytime, anywhere, through multi-media like Internet.

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2. Related Works

2.1. Method of Realizing Cyber Folk Theme Park by Virtual Experience Skill

It is about the method that realizes a cyber folk theme park by virtual experience skill. And it has a goal of telling Korean traditional technology, art and plays, and providing the method that realizes a cyber folk theme park by virtual experience skill, and offers various vivid virtual experiences in accordance with user's demand within web images, and recording media that can read the program with computer.

In addition, regarding the method that realizes business contents on the Internet, it is about the method that tells Korean traditional technology, art and plays and realizes the cyber folk theme park by virtual experience skill, and provides various vivid virtual experiences in accordance with the user's demand within the web images. A difference from this research has been realized so as to introduce our traditional play culture and experience by web images. This research expressed the appearance of Hanyang in Chosun Dynasty realistically, according to the literature. It makes users experience residential environment and natural environment of those days in virtual reality, and compare and experience past and present environment, through animation that gives comparison between the old times and present times.

2.2. Environment Avatar Operating System by Avatar Item Linked with Environmental Index

It is the research about the method that makes an environment avatar by environment avatar operating system, which utilizes DB of environment information and the above operating system. And environment avatar operating system on the internet is made up of: user server which manages the information of environment avatar user who makes user registration and gets access to the program through web browser, environment avatar user server which manages the environment avatar made by each avatar user, environment avatar item server which provides environment avatar items used to decorate environment avatar, environment index server which is linked with environment avatar item and calculate each item's environment index and store it, and environment avatar operating system which has a characteristic of environment information DB, which is linked with environment index server for calculating environment index. It differs from this research in the following aspect; It is a programming technology for environment education, and it does not use a simple DB of environmental information, but expects an effect that realizes those appearances as they are with background of Chosun Dynasty as a virtual reality, makes users experience natural environment and residential environment of those days and recognize clean environment, impresses why the environment gets polluted, through comparison with present cities, and, even implants a mind of trying to reduce environmental pollution.

3. Process of Restoring Appearance of Hanyang in Chosun Dynasty

The process of restoring appearance of Hanyang in Chosun Dynasty was carried out as follows: Planning and Decision of work's environment -> Collection of relevant materials -> Writing scenario -> Writing storyboard -> Modeling -> Mapping -> Virtual Reality Program. It is the recurrence restoration among the types of digital restoration for cultural assets, and it is restored, based on the complete historical research and materials by thoroughly tracing the original shapes of old appearance, one by one.

3.1. Process of 3D Modeling

Figure 1 is an appearance that models Yangban Street and the Hyangwonjeong in Chosun Dynasty and Figure 2 is an appearance that models the characters in Chosun Dynasty.

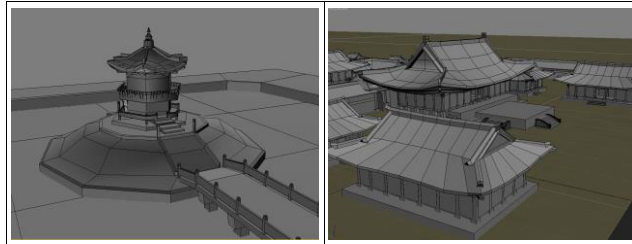


Figure 1. Process of Modeling Buildings

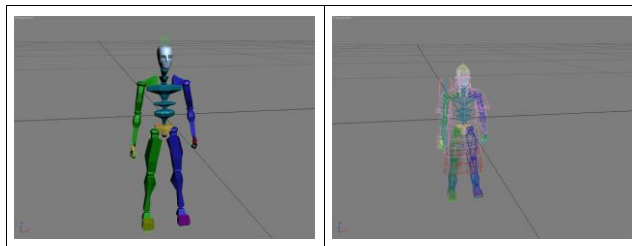


Figure 2. Process of Modeling Characters

3.2. Process of 3D Mapping

Figure 3 and Figure 4 are appearances where the mapping work is done after modeling is finished.

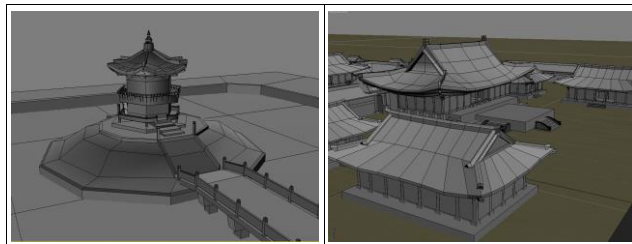


Figure 3. Mapping of Buildings

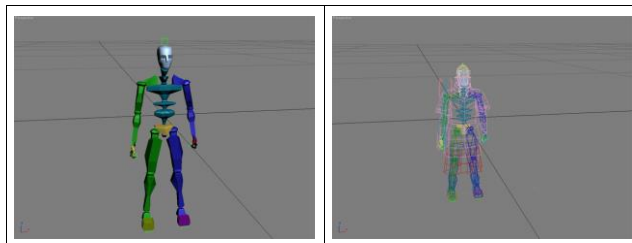


Figure 4. Mapping of Characters

4. Method of Improving Quality and Loading Speed

Figure 5 and Figure 6 show the method that reduces the rate occupied by Process Memory and Video Memory, on the process of virtual reality programming. Figure 5 shows dividing a wide scene into tiny units. When a virtual camera reaches a certain unit, it shows an image of it, but, if the dividing is not done like this, it increases the occupancy rate by Process Memory, since even the part, which does not reach camera angle, is loaded. Like this, when dividing is done, the unit deviating from camera angle is deleted, and thus, it can give an effect that lowers occupancy rate by Process Memory.

Figure 6 will use much video memory while the virtual reality is carried out, which lowers execution speed due to Video Memory's occupancy rate. As a solution for this kind of problem, Figure 6 shows the screen of virtual reality program, which uses Resource Manager Discard Bytes channel, initializes Video memory when moving between units, thereby reduces Video Memory's occupancy rate.

Figure 7 is the display that shows the restored appearance of Hanyang in Chosun Dynasty, using virtual reality.

A test route starts from Gwanghwamun in virtual reality, passes Geunjeongjeon, Gyeonghoeru, Geunjeongjeon, Gwanghwamun and house of Yangban, and arrives at folk houses. The test results are as Figure 8. A in Figure 8 is the data on memory test before adopting the method. B is the data on memory test after adopting the method. Before adopting the method, Memory: 1.83G - 648MB (system memory) = 1.18G. After adopting the method, Memory: 845MB - 648MB (system memory) = 197MB. Comparing the before and after, it is reduced almost to a sixth.

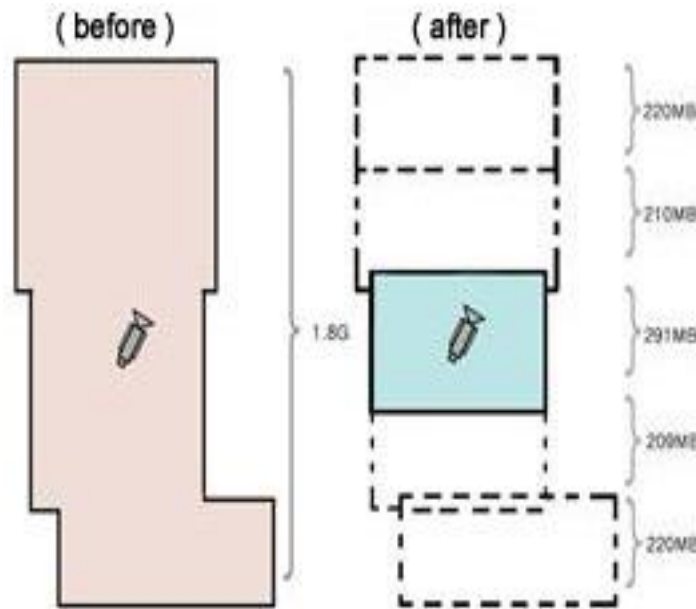


Figure 5. Method of Dividing Units

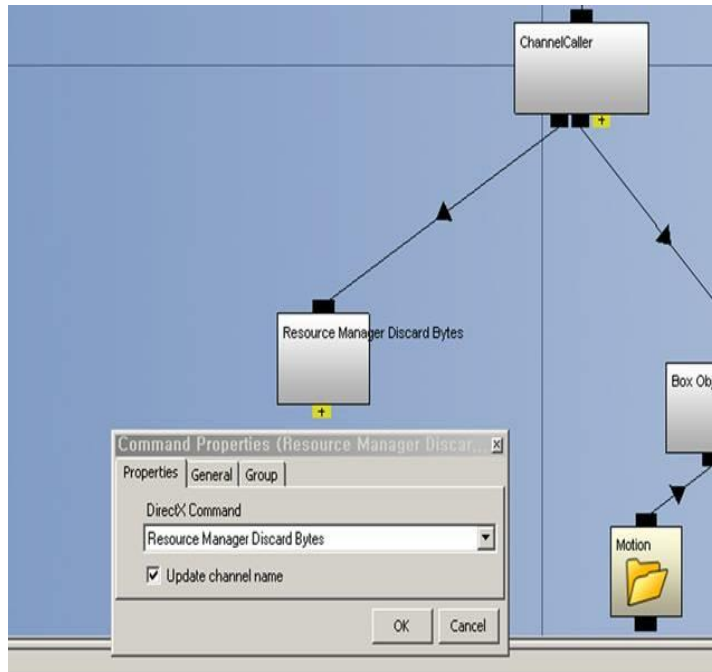


Figure 6. Resource Manager Discard Bytes channel



Figure 7. Work of Virtual Reality Program

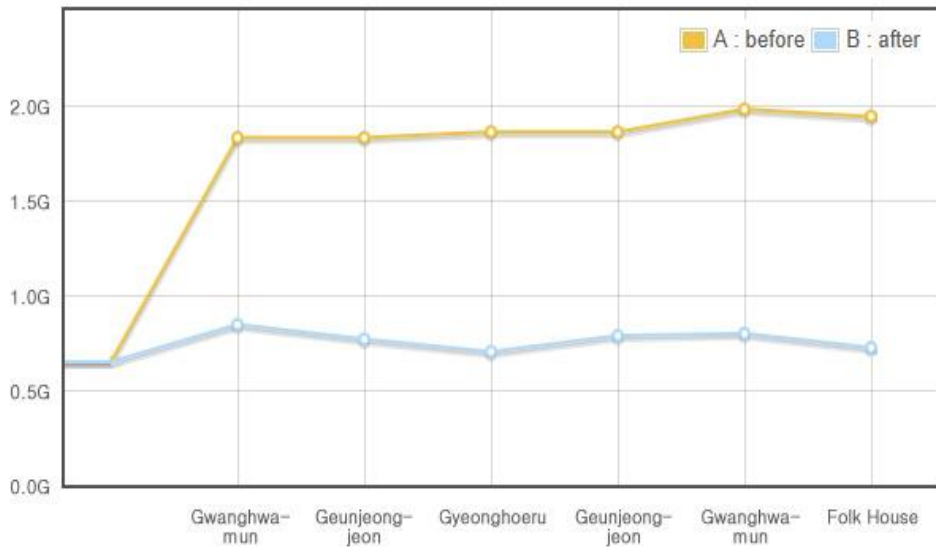


Figure 8. Test and Comparison Before and After Adopting Solution (Memory)

Table 1. Test and Comparison Before and After Adopting Solution (Memory)

Test before and after adopting	Test Item	System Memory	1	2	3	4	5	6
A(before adopting)	memory	648MB	1.83GB	1.83GB	1.86GB	1.86GB	1.98GB	1.94GB
	Video memory	7MB	156MB	165MB	165MB	167MB	175MB	186MB
B(after adopting)	memory	648MB	845MB	768MB	702MB	787MB	798MB	723MB
	Video memory	7MB	60MB	67MB	57MB	68MB	64MB	55MB

※ 1: Gwanghwamun, 2: Geunjeongjeon, 3: Gyeonghoeru, 4: Geunjeongjeon, 5: Gwanghwamun, 6: Folk House

A test route starts from Gwanghwamun in virtual reality, passes Geunjeongjeon, Gyeonghoeru, Geunjeongjeon, Gwanghwamun and house of Yangban, and arrives at folk houses. The test results are as Figure 9. A in Figure 9 is the data on video memory test before adopting the method. B is the data on video memory test after adopting the method. Comparing the before and after, it is reduced almost to a third.

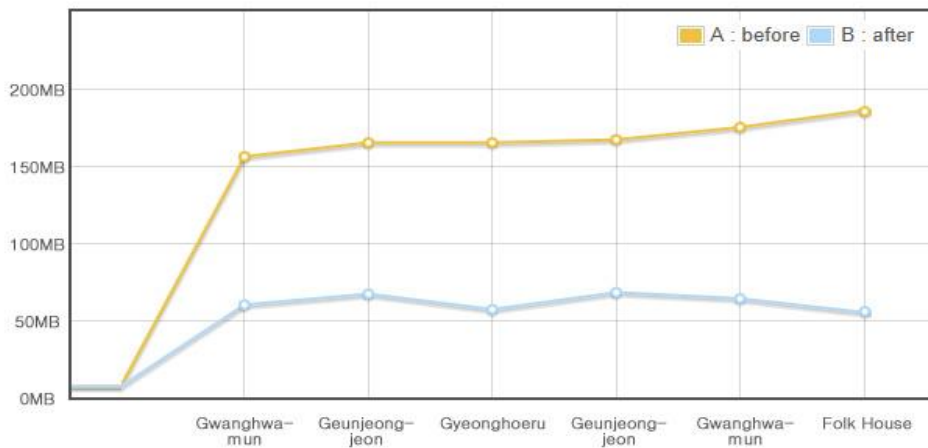


Figure 9. Test and Comparison 1 Before and After Adopting Solution (Video Memory)

5. Conclusion

Now, the digitalization of original shape from cultural assets has been developed over and over by various methods and technologies, and it is a trend that much attention is paid to realizing 3D graphic data technology and virtual reality, as a way of digitalization, thanks to its development.

This paper restored the appearance of Hanyang in Chosun Dynasty by virtual reality. It is considered that 3D virtual reality will tell the appearance of Hanyang in Chosun Dynasty widely, be effective in educational use, have various usages, and enhance its efficiency. As it has been restored by 3D virtual reality technology, it can provide convenient viewing to the ruins, and a lot of people can easily access to the information on cultural assets anytime, anywhere, through multimedia contents on the Internet. Thanks to adopting the way of dividing units and the Resource Manager Discard Bytes channel among the virtual reality program works, we can know that the occupancy rate of Process Memory and Video Memory has been lowered to a sixth respectively, as shown in Figure 8 and Figure 9.

This paper resolved the problem of virtual reality effect and processing speed. Therefore, we could process a large-scale 3D digital experience project more practically and more fast, through this research, and it is thought that we can improve and develop 3D experience project more, based on this research. This research can be used as learning material for environment education, by reproducing the original appearance of natural environment and city, which have been transformed due to human development, in the cyber space, using 3D technology, and it can be practically helpful in environmental education provided by social education institutions or Ministry of Environment, and also it can be used as education material appropriate for environment conservation.

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