Realization of Virtual Animation Design of Ancient Architecture Based on Unity 3D

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Abstract. This paper proposes the realization of virtual animation design of ancient architecture based on Unity 3D. China’s ancient architecture is the art system with the longest duration, the most extensive geographical distribution and the most obvious architectural style in the history of world architecture. In modern architecture, there are also a large number of the buildings using the ancient architectural art style, for example, we can use the natural landscape to improve the internal microclimate, creating a cozy place to rest. Unity 3D integrates a wealth of the development resources, including: terrain creation tools, physics engines, particle systems, commonly used scripts, lighting rendering components, collision detection components, post-processing methods to set the image screen, and Unity 3D provides a huge class Library: Mono Behavior, in this library has been developed for developers to define a variety of ways, we can easily call these methods for functional development. Therefore, we integrate the technology into the realization of virtual animation design of ancient that will help to promote the Chinese culture.

Keywords: Unity 3D, Virtual Animation, Ancient Architecture, VR, Computer Graphics

1. Introduction
Highly flexible multi-role interactive animation needs to meet the following requirements: 1) the number of the opponents a character faces is uncertain; 2) the type of attacking action of the interactive object is indeterminate. At present, many researchers have put forward their own solutions to the interactive animation synthesis, but the traditional methods are not well-suited to the highly flexible interactive character animation synthesis [1].
Another advantage of the single-player capture is the ability to provide a basis for the subsequent chaotic sequence of multi-motion fragments. If the capture records when people movement information at the same time, then the motion data can be simply repeat playback, and if the movement in the multiple roles simulation data are frequently used, the users will find scenario exists repetitive animation that reduces the sense of reality. People have paid more and more attention to the research of the modeling and simulation in virtual environment. In order to realize real reproduction of human in the three-dimensional virtual environment, it is not only to simulate the appearance of the human body but also to improve the intelligence of the virtual human [2].

Unity 3D integrates a wealth of the development resources, including: terrain creation tools, physics engines, particle systems, commonly used scripts, lighting rendering components, collision detection components, post-processing methods to set the image screen, and Unity 3D provides a huge class Library: Mono Behavior, in this library has been developed for developers to define a variety of ways, we can easily call these methods for functional development [3]. Therefore, in our proposed model, we will focus on the 3 major aspects. (1) The exact method used to model the range is to measure and convert. In order to represent the real world more realistically, the more detailed the fine modeling shows, the better the less comprehensive the better, but this will bring a huge amount of data. (2) The firing rate and the reflectivity show their respective properties [4]. Therefore, the visual representation of the 3D scene is mainly reflected in the material endowed by the model and the material is more realistic and the model will be more realistic. (3) First open the Render Scene dialog box, set the file output size, and then select the file in the render output save path, in order to prevent Unity from reading errors, it should be noted that all the folders in the path must be English and select the output format, set to .FBX, and clicks render to export the model.

2. Virtual Design and Virtual Animation

2.1. The Virtual Design
The results show that, for most of the virtual experimental environment, they all can only transmit information between the same kinds of objects in the system implementation and cannot realize the communication among heterogeneous objects, which results in a single system structure and is only suitable for developing a certain type curriculum virtual experiment environment. Embedded part of the actual control system to achieve I/O signal transmission. The two ends of the embedded signal processing module are respectively connected with the I/O port of the PLC and the general network
port of the PC, and are mainly used for processing the signal modulation between the PLC and the controlled object and completing the UDP communication task [5].

According to the accused that the difference of the object, the user can then set up the corresponding mathematical model in MatLab/SimuLink, and then connect with the embedded signal processing module through the Ethernet interface [6]. During the simulation process, the controlled object can obtain the I/O data of the PLC in real time and return the simulated result of the controlled object to the PLC in real time. In the figure 2, we show the sample.

\[ J = \sum_{j \in C_j} \sum_{x \in C_j} \left\| x - m_j \right\|^2 \]

\[ \begin{bmatrix} x' \\ y' \end{bmatrix} = \begin{bmatrix} a_{11} & a_{12} & a_{13} \\ a_{21} & a_{22} & a_{23} \end{bmatrix} \begin{bmatrix} x \\ y' \end{bmatrix} \]

The formula 2 and 3 present the countermeasures for the optimization steps. The scheduling center uses different objective functions to determine the advantages and disadvantages of resource scheduling. At present, the optimized objective function is to meet the maximization of user request, maximum resource utilization, maximum profit and minimum cost.
3. Consider a performance even animated live. The segmentation consistent with the objective reality of the action and of course, it is totally unnecessary.

Semantic segmentation steps in the exercise data using semi-automated methods to then complete. First, the original motion segments are automatically segmented, which can greatly reduce the cumbersome work required by the manual segmentation of the original motion data. Because of the variety of human motion, the initial automatic motion data segmentation certainly cannot get a good segmentation result for all types of motion data, so some unsatisfactory segmentation results are still manually adjusted after the automatic motion segmentation. Animated films are different from live-action films [9]. The basic premise is common. The art is different. Cartoons have both the artistic characteristics of art and the film, and do not exist independently of their respective characteristics. A live action doesn't have to be about fluency, just think about how to express a director's intent, and an animated performance not only needs to achieve a similar degree of fluency. Also highlight the character. So, the animation doesn't need a lot of psychological performance to promote the plot. Many of cartoons just symbolized the performance of animated characters. Sometimes this method even destroys the continuity of roles, and uses facial features to express emotions.

But animations also need more exciting and energetic performances. The symbolic and graphic performance not only cannot attract the audience, but also limits the development of animation art. In a word, the animation must be developed with its unique artistic way to explore. Therefore, we should consider the following aspects.

3. The Virtual Animation Design of Ancient Architecture Based on Unity 3D

3.1. The Unity 3D

Unity's development technology system mainly includes 3D modeling technology, the UI technology, multimedia technology, database development technology, web development technology and system interaction technology.
Based on the development of technology system, Unity's development process includes content import that content editing and content release three stages. The content import phase includes the import of 3D models, images, sound effects and videos, etc. The content editing phase includes the steps of the VR development engine, the plug-in, and the third-party server. The content publishing can be performed by a single application, online publishing, and mobile device publishing and many other forms. Once developed, the support for VR peripherals allows for immersive experiences. Resource files and the scene files are different in the Unity engine. The resource files are mainly stored on the hard disk as program dependencies. The scene files are loaded into the memory when the current program is running. Presets are an important concept to connect the two and it is a collection of game objects and their components, inherited, overloaded and other attributes, which greatly facilitates the reuse of resources. There are many ways to build topography in Unity, which can be obtained directly by using the native terrain tool or modeling software, or by using a satellite map to get the satellite map based on terrain composer plug-in tool in the designated area of Terrain data and texture feature, and cutting, Terrain blocks into Unity can directly generate Terrain blocks and Terrain texture resources [10].

In addition, the Unity terrain component supports LOD (Levels of Detail), which greatly reduces the workload of building LOD from DEM data and dividing the landform block, and constructing the terrain is convenient and efficient. The mentioned model can be therefore summarized as the following aspects.

- When the program is initialized, nine terrain blocks around it are loaded according to the initial position of the camera, and the name of the loading terrain block is stored in the current terrain block list CurrentTerrainList.

- The program enters the frame update gets the location of the current camera and calculates its mapping terrain block. If it does not change, it will not be processed or otherwise the dynamic scheduling of the terrain block will be entered.

- Based on the terrain block row and the column value mapped by the changed camera, the name of the surrounding terrain block of the current camera is calculated and stored in the string list RefreshTerrainList.

Black and white terrain height map refers to the use of black and the white ash pixels to locate the relief height of relief map, by importing the hypsography can create large terrain, from a macro grasp
the overall regional structure, location and direction of terrain, rendering terrain details to lay the foundation for the next step, relative to the direct rendering terrain production can save much time. Therefore, the light information should also be considered from the following aspects.

- The light by the picture element illumination may alter to by the apex illumination. The apex light may let all objects exaggerate in each one time, the picture element light only can let each the object which is shone by the light exaggerate in each one time, through goes against in the roaming scene lights a lamp the exaggeration entire picture, thus even if is disposes the low computer also similarly to be possible to move smoothly this system.

- In addition to model optimization, in addition to the map, we should pay attention to the fact that the map files should not be too large to avoid the speed of the system.

- After the dynamic loading and unloading of the terrain block is completed, the UnloadUnusedAssets() core function is executed to release memory, such as the texture and material of the terrain block, and update the current terrain block list, thereby completing the scheduling of the entire terrain block. The program enters the next frame cycle during the whole frame cycle and the number of terrain blocks in memory remains the same, so as to realize the management of memory usage of terrain blocks in memory.

- Model building including terrain, buildings and environment, terrain and buildings in a specific terrain data and data, can be in 3D software like 3DS Max according to the scenic spot to build information data

3.2. The Animation Design of Ancient Architecture

After thousands of years of development, ancient Chinese architectural form has evolved from primitive burial to ground construction. From the wood-bone mud walls in the Xia and Shang dynasties to the Terrace buildings in the Spring and Autumn Period and the Warring States Period, the Buddhism in Eastern Han Dynasty was further enriched. The forms of architecture and the types and construction forms of ancient buildings in the Ming and the Qing Dynasties have varied. The architectural forms in different regions are of different styles and poses. Bearing structure in traditional Chinese architecture and space to surround close to have a clear division of responsibilities, with column, beam, fang, purlin, the Gong big wood, such as through the connection of mortise and tenon joint structure, constitute a whole framework, purlin rafters, hit the shelves above laying tile surface, reoccupy wall or partition board to surround close around shelter. Due to the weight of the roof truss by column grid layer to the foundation, walls and doors and Windows Settings so became free and flexible, some buildings in the southern states and even all around the partition board, in order to improve the indoor ventilated with daylighting [11].

The structure of the frame is not completely fixed, so it can greatly reduce the damage of earthquake force. Lifting beam is a beam and column support system, by the layers of pillars to force the transmission, beams are flexural members, long beams can reach four-step frame or six-step length, we can get a larger space span, the ammunition to pay a large section beam of the price. This wooden frame is to follow the direction of the house, the column on the stone, column beams, and then overlap the columns and beams on the beam, the top of the beam on the ridge column, constitute a wooden frame. In the adjacent two roof truss, with the beam of the outer end of the frame wipe, the final roof was formed that concave arc two slopes of the roof skeleton. In ancient times, a wooden building house usually consists of several rooms as the layout of the structure is mostly rectangular form. The artistic features reflected in ancient buildings can be summarized as the table 1.
Table 1. The Artistic Features Reflected in Ancient Buildings

| Artistic Features | Details                                                                                                                                                                                                                                                                 |
|------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Humanistic beauty of ancient buildings | The ancient architecture is not simply used, but is closely associated with the traditional culture of culture. To be precise, the ancient buildings are built on the basis of the school of health and architecture and are the soul of the city. Ancient buildings are all very important, and have a lot of creative and ingenious design. Combine the local characteristics with the cultural and artistic features, and create their own unique mainstream architecture and artistic elements. |
| Beauty of ancient buildings | The overall applied color can also enhance the beauty of the entire ancient buildings. This is also an ancient method of expression often used in mass architectural layouts. Our country ancient times garden construction and its layout then generally all uses the construction peripheral natural condition, or moves in the natural landscape directly in the construction, maintains the building taking advantage of this ventilating with the natural lighting. |
| The beauty of ancient buildings | The strict division of form and pattern is also an important part of ancient culture and ancient art. The walls, the structure of the eaves and the symmetrical architectural structure have all displayed the beauty of the ancient architecture and endowed the connotation of the culture. |

The roof of Chinese traditional architecture also has its unique artistic characteristics, its form is rich and colorful and its form is the direct external reflection of the wooden roof frame. Unlike the western church's emphasis on the art of the house, Chinese ancient buildings pay more attention to the performance of the roof. The plants in the ancient buildings should be distinct, and scientific and reasonable combinations of the flowers, plants, shrubs and trees should be made to create a sense of nature so as to prevent the appearance of artificial state. The figure 4 shows the sample simulations.

Fig. 4. The Sample Animation Design of Ancient Architecture
4. Conclusion
China is one of the ancient civilizations in the world with a splendid culture. The ancient Chinese architecture and ancient Egyptian architecture, the ancient West Asia architecture, the ancient Indian architecture, the ancient Aegean Sea architecture and the ancient American architecture are tied together as the six major components of the world's ancient architecture. Chinese architecture and culture have a long history and form a unique structure with graceful structure and strict structure. Under this basis, the paper proposes the realization of virtual animation design of ancient architecture based on Unity 3D.

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