Application Research of Engine Technology in 3D Animation Production

Tang Linye

School of Digital Creativity and Animation, Shenzhen Polytechnic, Shenzhen, Guangdong, China

Keywords: 3D animation, engine technology, applied research

Abstract: With the rapid development of computer technology, animation production technology is gradually being updated. Traditional 3D animation is gradually limited more and more in the production process, so in order to maximize the 3D animation process. The improvement of work efficiency, reduction of cost investment, improvement of animation rendering effect and overall quality, the introduction of new technology is very necessary. Engine technology has been widely used as an indispensable technical method in the modern 3D animation production process. Therefore, this paper studies the application of engine technology in the 3D animation production process to further optimize the 3D animation production industry.

1. The drawbacks of traditional 3D animation

With the rapid development of computer technology in various industries, the application and promotion of computer graphics in many fields has also been rapidly improved, especially in animation production. Up to now, the production of animation has been going on for many years. With the entry of computer graphics into the three-dimensional era, three-dimensional animation has appeared in people's lives one after another, and it has been less than twenty years old. For example, many domestically produced animated blockbusters, “The Big Miscellaneous Heaven”, “Where is the Sea”, have witnessed the Chinese-made 3D animation production technology. However, due to the many professional knowledge and computer language algorithms involved in the production of 3D graphics, traditional animation techniques and techniques also have significant limitations. For example, the production and development costs caused by repeated operations are too large, the development equipment configuration requirements are too high, the production efficiency is low, the development cycle time is too long, etc., which is significantly backward compared with foreign advanced technology [1]. The production process is shown in Figure 1.

According to the survey, in the traditional 3D animation production process, the production of 10 minutes of animation usually requires 200,000 RMB, of which labor costs and time costs account for 80-90% [2]. Image rendering takes a lot of manpower and time costs. If the number of large-scale computers is adjusted, the capital input cost will be greatly increased. If the general platform is used for drawing, the time cost is too large to realize the real-time drawing requirement. Therefore, traditional 3D animation needs to be revolutionized, using a way that is simple to operate, easy to use, feature-rich, and can greatly improve work efficiency, namely engine technology. The use of engine technology to intervene in the production of 3D animation can upgrade and reform the traditional 3D animation production process, thus greatly improving the defects of traditional 3D animation.

  DOI: 10.25236/aisct.2019.033

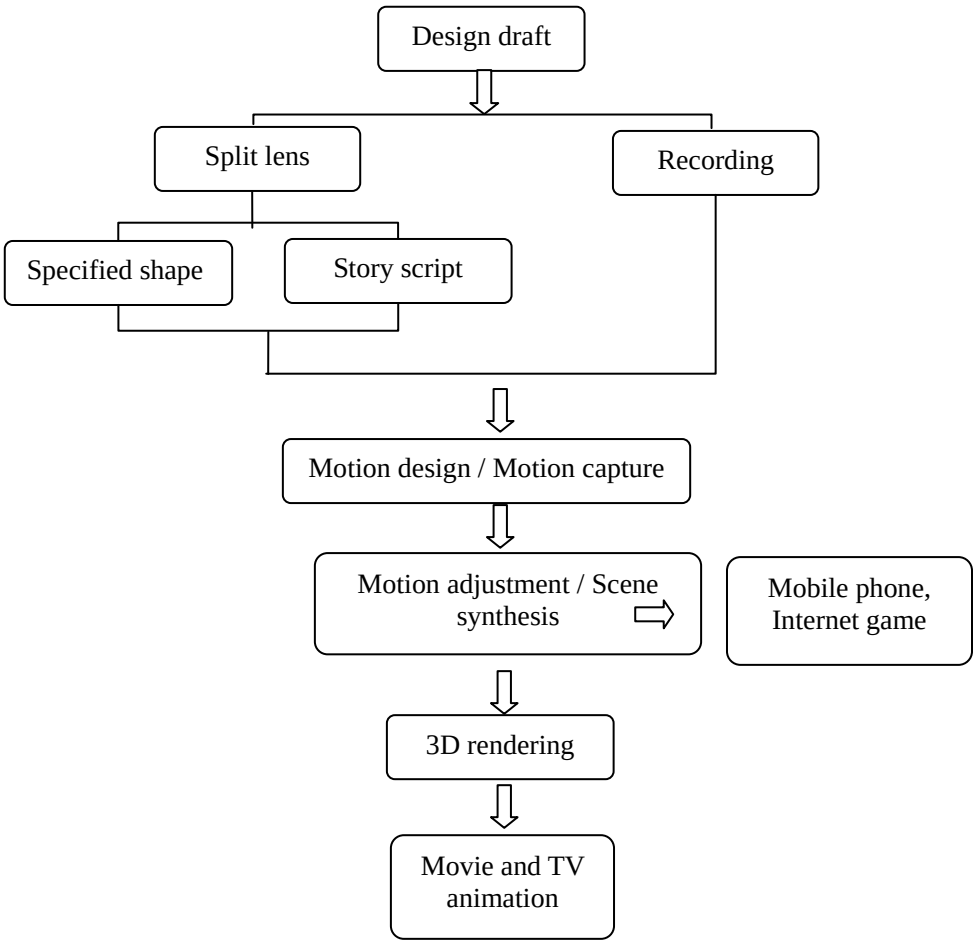

Figure 1 Traditional 3D animation flow chart

2. Application of engine technology

2.1 Introduction to engine technology

Usually the engine refers to a set of low-level functions that can be independent of external resources and have certain functions. If you take the car as a metaphor, the engine is the core power of the car, regardless of the car's outer casing, an important consideration for determining the car's power, speed, stability and handling. For the game, in the animation process of the game page, the player's experience, the game's plot, music, interface color changes, level settings, art and other operations are directly controlled by the engine. He is able to combine all the elements of the game step by step, and in the background to control their streamlining work. Therefore, the engine plays an important role in leading and controlling the operation of various functions of the game, such as data calculation, receiving signals, and signaling. Therefore, the quality of 3D animation depends mainly on the processing power of the engine. If the engine structure design is unreasonable and the processing ability is poor, even if the overall animation design and the art design are perfect, the whole animation planning idea is very creative. Can not be fully reflected in the actual application process, can not achieve the optimization of visual, auditory, sensory and operational 3D animation. Therefore, in the overall engineering requirements of 3D animation production, the engine structure is designed to fully realize the various functions of the operation, reduce the manual programming workload, improve the engine development efficiency, save time cost, and reduce the cost of the overall project. Therefore, the design structure of the engine plays an important role in the production of 3D animation. Generally, the system structure of the game engine is shown in Figure 2.

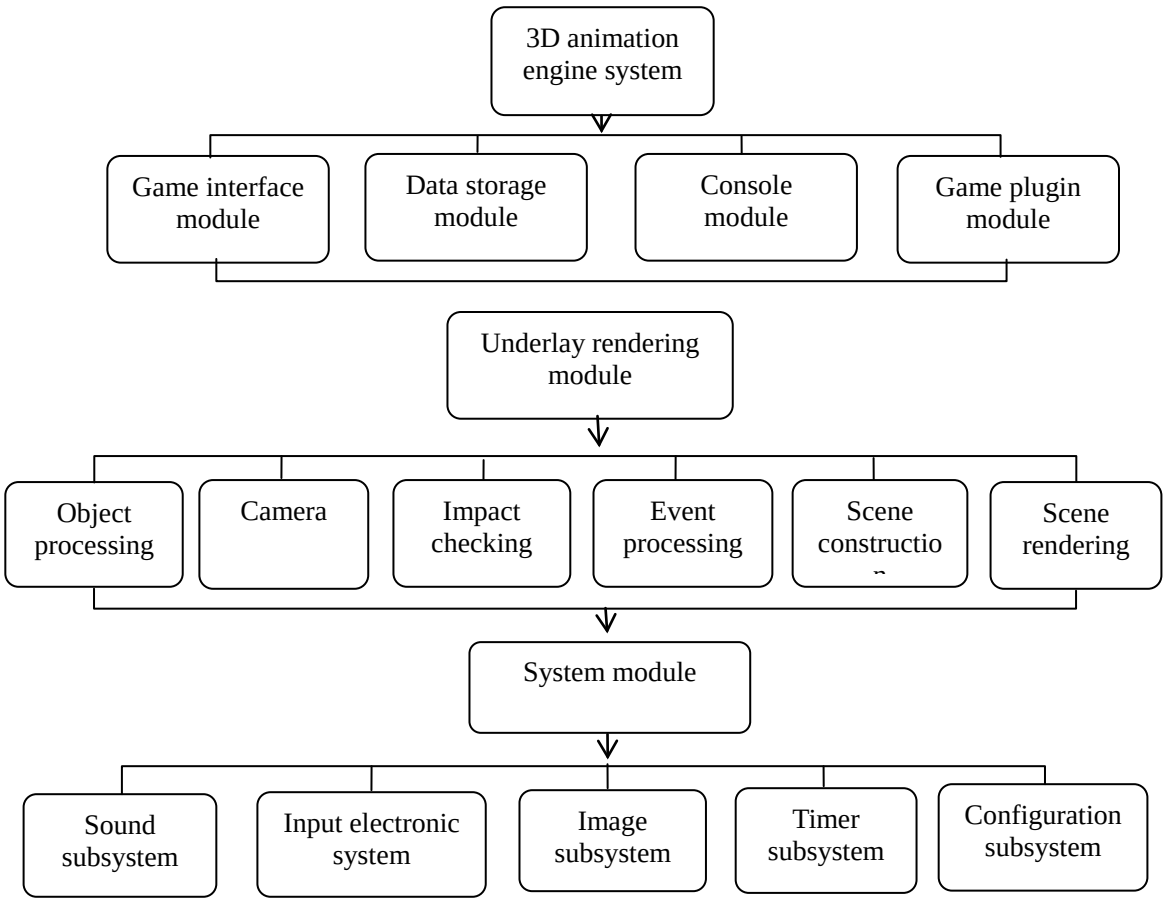

Figure 2 3D animation engine architecture diagram

The underlying rendering module is one of the most important components of the engine. Usually its function is mainly completed by Direct3D and Open GL. It can be implemented through the interface of each module when configuring settings [3]. The interaction between the engine and the system and the computer hardware is mainly realized by the system module. When the engine system needs to be properly debugged, it is mainly implemented through the console module. The function of the data storage module in the figure is mainly used to define its data format and how the data is organized between animations or games. The game interface module is mainly an excuse between the development staff and the engine. The developer needs to use the interface to fully utilize the corresponding functions provided by the engine. At the same time, the developer can also use the logic script language to write the corresponding according to the animation requirements. Programs to define game events, scenarios, etc. However, in the process of using the engine, there are some functions that cannot be completed by itself. Then, a third-party editor is needed to assist the implementation, that is, using a third-party editor to convert the file into a format usable by the engine, so that it can be implemented. Function, this third-party editor is the game plug-in module shown in the figure.

2.2 Application of engine technology in 3D animation production process

At present, the application of engine technology in the production process of 3D animation has been very extensive, and all the conditions required for constructing the animation design process are already available. Engine technology can control the form of object application, can adjust the reaction of the task character in a specific environment, can define gravity, and even more, the engine technology can achieve all the operation methods if the technical conditions permit. During the production process, the creator can adjust the storyline, lighting, sound effects, special effects, and perspective of the animation at will. You can make all kinds of bold attempts, and even reflect the unrealistic content in real life. So where is the application of engine technology in the

production of 3D animation? Next, the three aspects of the three-dimensional animation production process are explained in the early, middle and late stages.

2.2.1 Application of 3D animation pre-production stage

The preliminary preparation of 3D animation plays an important role in the animation effect of the later presentation. Usually, the overall structure of the story structure, script content, character image, art design, music type, etc. is repeatedly studied in the preliminary preparation, and preliminary determination is made. Then the traditional 3D animation design will have obvious deficiencies in this respect. Therefore, the application of engine technology can express the idea of the producer well in the preparation process of 3D animation pre-production. This implementation is mainly achieved by real-time rendering and real-time modification technology, which allows the producer to see the overall atmosphere of the movie without spending a lot of time. On the other hand, the producer can modify the unsatisfactory part of the script only by adjusting the engine parameters, and can see the adjusted appearance in real time while modifying, so as to better adjust the details of the animation and optimization.

2.2.2 Application of the mid-production stage of 3D animation

The production of 3D animation in the mid-term is mainly the atmosphere of the animation and the adjustment of the movement. The use of the engine in this process can greatly improve the efficiency of production, and it can be controlled and improved by adjusting a few codes compared with the adjustment of the action and atmosphere in the traditional 3D animation process. For example, in the adjustment of group 3D animation, if the traditional production method is used, each character in the group animation needs to be modified separately, which is time-consuming and labor-intensive, and greatly increases the labor cost. The use of engine technology to create a group animation can be manipulated for the script, so that only a single character can adjust the group animation in terms of the direction of the character's movement, the frequency of the movement, the sensitivity of the movement, etc. , greatly improving work efficiency and saving production time.

Not only that, the traditional 3D animation in the mid-production process first through the rendering technology to copy the animation onto the film before it can be projected, and the use of engine technology after production and rendering can be achieved simultaneously, that is, the production staff on the animation It is basically done in real time before and after rendering. Greatly saves rendering time and improves work efficiency.

2.2.3 Application of 3D animation post-production stage

The special effects production and post-editing work of the animation is the key part of the final animation effect. The exquisite animation effect is often through repeated revisions, adjustment of ideas, sorting of various story materials, optimization of pictures and music. Fully presented. Therefore, this process requires a lot of repetitive work by the producer, not only killing the producer's time but also consuming a lot of creativity. Therefore, the intervention of engine technology can control different substances and phenomena, such as lighting, fireworks, water flow, etc. by controlling the particle system [4]. At the same time, the engine technology can also provide more special effects for the animation, which makes the atmosphere of the film more diverse.

Therefore, the application of engine technology in the 3D animation process is integrated into the overall production process of the animation, the middle and the end of the animation, that is, from the design of the original animated script, the rendering of the animated film, the post-production effects of the animation, and the adjustment of the created atmosphere. , can provide the producer with convenient and efficient auxiliary functions.

3. Conclusion

With the rapid development of the animation industry, the traditional 3D animation production method can not meet the needs of the animation industry in the existing animation industry.

Therefore, the application of engine technology plays an important role in promoting the development of three-dimensional animation work. This paper first expounds the shortcomings of traditional 3D animation production, such as long time, high cost and poor effect. Secondly, the application of engine technology separately explains the role and significance of engine technology in the process of 3D animation from the early, middle and late stages of animation production, so that the development of engine technology in the animation production industry will be further improved.

References

[1] Wang Long, Li Weiwei, Yang Zhenfa. Game Engine Research and Analysis [J]. Software Guide, 2018, 17 (02): 5-7.

[2] Zhang Sai. Analysis of 3D Animation Based on Game Engine Technology[J]. Computer and Telecommunications, 2018(Z1): 61-63.

[3] Yuan Qiong, Liu Li. 3D game engine under DX 11 advanced rendering technology [J]. Computer System Application, 2016, 25(04): 73-79.

[4] Song Hui, Jiang Zhongding. Design and Implementation of Graphic User Interface Cluster Rendering System Based on Game Engine[J]. Microcomputer Applications, 2016, 32(10): 5-9.