Research on the Application of Computer Rendering Technology in Two-Dimensional Animation Design

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Abstract. With the application and development trend of computer rendering technology in two-dimensional animation, this paper expounds the process of computer rendering technology in two-dimensional animation production, analyzes the operation and application of the software, and discusses the key technical points of After Effects in two-dimensional animation rendering. By taking the application of computer rendering technology in two-dimensional animation as the research content, and combining with the practical operation of After Effects in two-dimensional animation, we can improve people's understanding of computer rendering technology.

Keywords: computer rendering technology · two-dimensional animation · computer technology

1 Introduction

Under the background of rapid development of network new media, the artistic value of two-dimensional animation cannot be shaken. In order to keep pace with the times, 2D animation should not only learn from the production ideas and techniques of traditional manual animation, but also integrate relevant computer technologies such as modeling, rendering, etc. into 2D animation production. Computer rendering technology is crucial to the production of animation. A good animation work needs early scheme design, midterm software production and post rendering. The most important thing is that we need to combine the rendering software to make correct settings in the rendering process to achieve realistic effects. If we use computer rendering, it will be more efficient than traditional animation production, and can effectively save rendering time and costs, Improve the actual operation efficiency, so as to present a good animation work. Therefore, we should strengthen the research of computer rendering technology in 2D animation to improve the level of animation production.

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2 Application Status and Development Trend of Computer Rendering Technology in 2D Animation Design

2.1 Application Status of Rendering Technology in 2D Animation

In the early days of China, the computer processing capability was poor, and the processing capability of graphics processing hardware could not meet the requirements of high-speed rendering of two-dimensional animation. Screen rendering is mainly on the CPU. Due to the low efficiency of screen rendering that only relies on CPU in early rendering, it is easy to cause computer failure. Therefore, in order to avoid this problem, the early two-dimensional animation production tried to reduce the diversified use of screen materials, such as "Monkey King", "Little Sloppy", etc., otherwise it is easy to cause screen stagnation and frame loss. With the development of computer technology and graphics display processing technology in contemporary society, most computers have installed high-performance graphics cards with image processing functions. This graphics card does not use CPU technology, but GPU is responsible for all painting rendering work inside the computer. The processing ability of the computer is enhanced, and the video card is no longer a simple image information storage device. Moreover, at this stage, the diversity of Internet elements makes people have higher and higher requirements for computer rendering technology [1].

2.2 Innovative Development of Two-Dimensional Animation in the New Media Environment

Animation works annotate the national cultural characteristics and value orientation in the form of animation. Animation works with national cultural and artistic characteristics often have unique appeal to people of other nationalities or countries. Therefore, the innovation of anime animation works focuses on the innovation of content itself, that is, to improve the compatibility of content design and creation with traditional Chinese culture and art forms, and to attract audiences from the perspective of anime animation content innovation. The case that the excellent domestic animated film "Big Fish and Begonia" won international awards fully proves that the excellent culture is easy to resonate. It is a wise move in line with the international development trend to understand each other and eliminate disputes through cultural and artistic exchanges. The main body of the story "Big Fish and Begonia" comes from the story "There are fish in the North Sea, named Kun" in "Chuang Tzu · Leisure Tour". For China's two-dimensional animation, there are many excellent story themes. As long as the content of two-dimensional animation is further improved and innovated, excellent cultural and artistic forms are presented in the form of animation, and computer software and hardware technology is used to improve the production level of works, we will be able to produce well-known two-dimensional animation works.

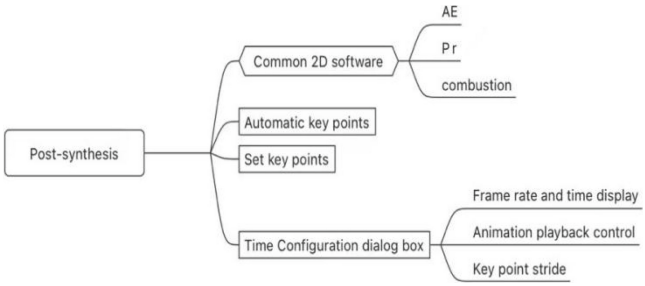

Fig. 1. 2D Animation Production Process

3 Application Process of Computer Rendering Technology in Two-Dimensional Animation Production

In the animation industry, we are making a two-dimensional animation short film. In the early stage, we usually use the hand painting method. The regular steps of the work are divided into three processes: early creation, mid production and post synthesis (1) early creation. The early stage creation is divided into three steps: ① original script; ② Character and scene settings; ③ Storyboards, which turn the text narration of the script into pictures. (2) Mid term production: the mid term production is divided into two steps: ① design draft drawing, which is the basis for the original painting design and background drawing. It is necessary to enlarge each lens in the screen sub lens book to the specified drawing specification, and adjust and layer the entire lens screen in detail and accurately according to the modeling design and scene design; ② In animation production, the animation designer turns the words in the script and the pictures in the sub lens into a vivid performance to make the characters come alive. (3) Post synthesis. In post synthesis, the most important is the law of motion. We should create all kinds of reasonable, accurate and attractive movements, and pay attention to maintaining the aesthetic feeling of the picture composition as much as possible during the movement, as well as the continuity of lens processing and use. As shown in Fig. 1, I will detail the production process of two-dimensional animation as follows.

In the production process of two-dimensional animation, post synthesis is very important. Whether an animation can be presented completely and smoothly before our eyes focuses on the application of computer rendering technology in two-dimensional animation. I take After Effects, a commonly used rendering software for two-dimensional animation [2], for example, as shown in Fig. 2, to detail the application process of computer rendering technology AE software in two-dimensional animation.

4 Key Technical Points of After Effects in 2D Animation Rendering

4.1 Application of AE Rendering Technology in Post Animation Synthesis

After Effects particle system shows the main features and motion details of the scenery in the nature in a vivid and vivid form. It mainly controls the whole process with the help of random processes, producing a vivid performance effect. Randomness is the core

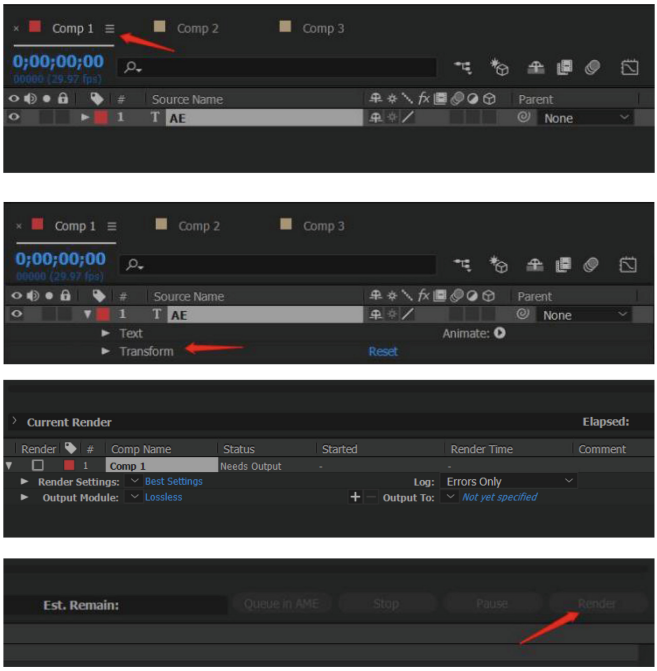

Fig. 2. AE Rendering Flow Chart

part of After Effects application. After Effects is used to set the number of particles at will, which shows strong dynamic characteristics. Taking the scene of downpour as an example, in the AE software, the late composite group created is named downpour, the new solid layer is named rain, and the background is set to white. Select the realistic simulation option in the effect template, and then drag the timeline, so that people can directly see the animation effect of particle motion in the synthesis window. Use the effects control panel to expand the particle motion rollout. The effect of rain is improved again. The particle parameters are adjusted in time first, and the time module is dragged in time to see the movement of particles and show the initial effect of downpour. However, it is not very similar to the rain form in the natural environment, so it is necessary to use the advanced fuzziness in After Effects software to set the fuzzy value. Use the 0 key on the keyboard to preview the heavy rain effect. At the same time, drag the relevant video materials and pictures with rain into the timeline window, and finally the system outputs the rendering results. Table 1 shows the setting standards of natural scene parameter [3].

Secondly, in the post synthesis of two-dimensional animation, the speed and rhythm of the video should also be well controlled. When we open the After Effects software, we double click the control panel to import the corresponding video file, add the video file to the synthesis, select the video file, right click to select the time scaling in the time option, and adjust the original video to 200%. However, after slowing down the video, we found that the video was too laggy, which directly affected the audience's visual enjoyment, In order to change this situation, we need to use frame fusion technology to make reasonable adjustments in time. Set the time key frame at the link where you want

Table 1. Setting Standards of Natural Scene Parameters

Number of particles	Partical velocity	Particle life/gravity	Emitter type	Visual effects
1000	30	100/2	Lamplight	Sand color word
0 ~ 100	400	2/70	Dot	Fireworks effect
600	0	10/0	Box	Clouds
200	100	1/0	Sphere	Smog
2700	5000	3/0	Box	The rain scene

to slow down. By adjusting the key frame position, you can effectively adjust the video playback speed. The smaller the space between the first key frame and the key frame, the faster the video playback speed. Finally, we can also install plug-ins when making animation, such as lens transition plug-ins and natural landscape plug-ins, to make the animation look more perfect and smooth.

4.2 Operating Difficulties of Rendering Technology in 2D Animation

In 2D animation production, frame-by-frame animation is a common animation form (frame-by-frame).Because the frame sequence content of frame-by-frame animation is different, this not only increases the production burden, but also increases the final output of a large number of files. However, frame-by-frame animation has great flexibility and can display anything you want to display. It is similar to video playback mode and is very suitable for performing delicate animation. However, rendering such high-quality animation works requires very high computer configuration, and a slight carelessness will cause the computer to crash during the rendering process. Therefore, if we want to render this kind of animation, but we don't want to reduce the quality of the lens and the smoothness of the video, we can actually solve this problem in the following three ways. First of all, we can improve the personal computer configuration, which is also the simplest way. Second, you can render with low precision, and then import the sequence into Nuke and add denoising. The third method is to establish a rendering farm, which is equivalent to rendering dozens or even hundreds of servers for a task at the same time, thus reducing rendering time. In fact, when we use AE to render animation, we will encounter the problem that rendering speed is too slow. Here is a solution. We can see how many color bits are used in the project. In order to obtain high-quality or cinematic effects, some templates usually use 16-bit and 32-bit color modes, which naturally requires a lot of calculation. If you don't think you have such a high requirement, you can try to reduce the color bit to the normal 8 bits. However, sometimes there will be some obvious color scale phenomenon after lowering, as shown in Fig. 3 [4].

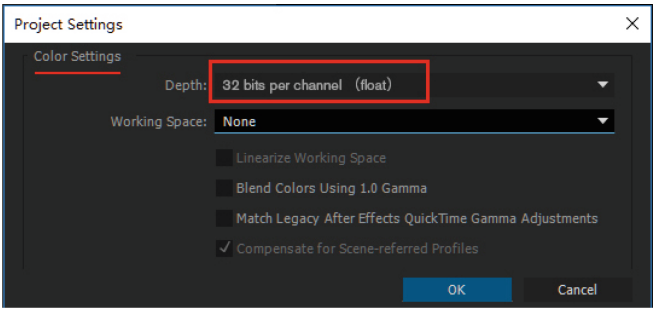

Fig. 3. Reducing the number of color bits

5 Design Practice of Computer Rendering Technology in 2D Animation

5.1 Design Principles in Two-Dimensional Computer Animation

Character modeling design is the core of two-dimensional animation. The primary criterion and standard of 2D animation design is to follow the dual requirements of character modeling design and scene design. At the same time, personalized standard is also an important requirement of two-dimensional animation design. In character modeling design, it refers to an animated film. Only those who can leave a deep impression and have sharp edges and corners can be welcomed. On the contrary, it is not warm, and such cartoons are easily forgotten [5]. For example, the Chinese-made animated film "Monkey King" won the victory with its bright and full character image and high-quality scene design. The distinctive character image of Sun Wukong not only highlights the diversified personality under the anime animation, but also shapes the incomparable classic of Guoman at that time, laying the foundation for the development of later domestic animation (Fig. 4).

Fig. 4. The Poster of "The Heavenly Palace"

5.2 Practice of Using AE Rendering Software in 2D Animation Design

Post synthesis is the key to two-dimensional animation production, so computer rendering technology is the most important. Here, I will elaborate on my original two-dimensional animation work Epidemic Times. Because the requirements and quality of the work for rendering are not very precise, it is very simple and convenient to use AE software to render animation. In the rendering process, I will add some plug-ins of natural elements to enrich the picture [6]. For the content of this knowledge, please refer to 3.1 in Chapter 3. AE, as the mainstream rendering software for rendering two-dimensional animation and simple dynamic video, its rendering process is to import video elements into the editing software, post software, and color mixing software, and then perform various operations in the software, such as editing, color mixing, special effects, text The operation of subtitles and so on can only be seen in the software at this time. If you want others to see it, you need to output the effect of the software. Output to the desired format, After output, it will become a universal format, and the effects in the software will be fixed together. Here, please look at the second chapter of this article in detail,

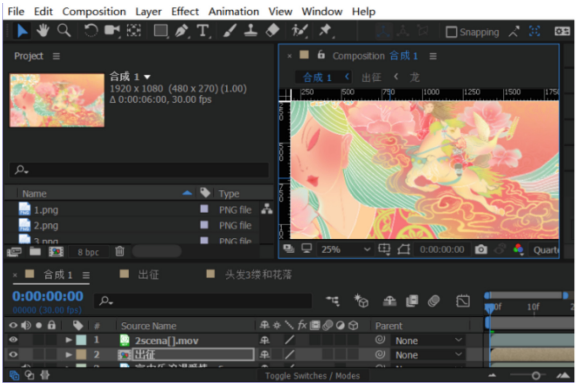

Fig. 5. Rendering process of original animation “Epidemic Times”

Fig. 6. The original animated work “The Epidemic Time”

with illustrations. As shown in Fig. 5, it is the rendering process diagram of a short film in my original work Epidemic Times, which can be used to illustrate that AE software is a commonly used software for rendering two-dimensional animation (Fig. 6).

6 Conclusions

This paper mainly studies the application and practical operation of computer rendering technology in two-dimensional animation. As the mainstream, 2D animation wants to render 2D animation with good quality and requirements. It is necessary to be proficient in the operation of computer rendering software and render effectively while improving the computer configuration. To sum up, rendering technology plays a very important role in simplifying the production process, saving production time, reducing production costs and other aspects of the animation industry. With the powerful help of cutting-edge technology, domestic animation will surely produce unique material achievements.

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