Analysis on the Application of Computer Animation Technology--Focus on Creating Special Effects in the Movies

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Abstract:- Computer animation uses graphics and image processing technology with the help of programming or animation software to generate a series of scenes. An important application of computer animation is the production of special effects for movies. Computer animation plays an important role in creating virtual scenes, dynamic simulation and post-compositing special effects. It brought the creative level of the film industry to a new height and greatly affected the film market. The combination of computer animation and film has also become an inevitable trend in the development of interactive computer media. This article mainly discusses the development of computer animation technology in film special effects, practical application, significance and other aspects, hoping to provide a good reference for those who want to understand the later stage of the film through my thesis.

Keywords- Computer Animation Technology; Special Visual Effects in the Movie; Movie Art; Application.

I. COMPUTER ANIMATION TECHNOLOGY

Computer animation, also known as computer graphics, is the technique of making animation through computers. It is a subfield of computer graphics and animation[1]. In recent years, animators have increasingly resorted to three-dimensional computer graphics, even though two-dimensional computer graphics are still widely used. The computer-animated film of the period is made by programming language. With the continuous development of technology, the system operating platform has become complete. Without the participation of computer experts, artists can make films alone. Computer animation software saves a lot of human resources, material resources and financial resources. At present, movie special effects are mainly realized by computer animation technology, and the methods are mainly realized by software and secondary development through high-level language[2]-[3].

Software

According to the characteristics of movie special effects, it can be divided into three-dimensional special effects and late special effects. In the field of special effects, the two are indispensable. At present, the commonly used 3D special effects software is MAYA, launched by Autodesk. It is the most popular 3D modelling, animation and rendering software in the world today. With the internal use of button design, all commands can be realized through buttons. At the same time, the finished objects have a strong texture, and the effects of light reflection, refraction, shadow, mirroring, and color are ideal. Many animations at home are made with MAYA, and animations produced by this software are known as the software masters in the animation industry.Side Effects Software's flagship product is the ultimate tool for creating advanced visual effects. It is a very powerful software for special effects. After Effects is a professional non-linear editing software(AE) produced by Adobe for high-end video editing systems, it draws on the successes of many software. It takes video editing and synthesis to a new level. The software is compatible with many special effect plug-ins, which enhances the production function. In post-animation synthesis, you can create complex effects, such as misty effects, explosion effects, using unparalleled tight integration with other Adobe software and highly flexible 2D and 3D synthesis, as well as hundreds of preset effects and animations. Add refreshing effects to movie works. Movie special effects use more than so many software mentioned above, so whether these digital technologies can be fully and rationally used is the key to success[4].

Secondary development through high-level language

At present, digital film special effects belong to a cross-discipline, which is a fusion of film art and computer technology. Many movie special effects can be realized by the secondary development of high-level language on the software platform. Furthermore, Maya is widely accepted by the film special effects production community, in large part because it encourages a wide range of customization through the development of plug-ins and the writing of Maya Embedded Language (MEL) scripts. Maya and its Maya embedded language (MEL) help some studios, and film directors, including Disney, DreamWorks, ILM and Song Picture Image, create many excellent works. In addition, based on virtual reality software VRML, GeoVRML or open graphics library OpenGL, Direct3D and other high-quality 3D graphics development platforms, programming in high-level languages C++, VB, C# to achieve three-dimensional modeling, geometric transformation, color, texture, Three-dimensional terrain and roaming in the scene[5]-[6]. The plug-in developed based on Maya is mostly used for the processing of detailed steps. A small plug-in can double the result with half the effort.

II. APPLICATION OF COMPUTER ANIMATION IN MOVIE SPECIAL EFFECTS

Creation of virtual scene

In filming, some cameras have high-risk factors and require too much shooting technology and cost, and it is even difficult to shoot in real life. Especially for sci-fi action movies, realistic disaster scenes need to be completed with computer technology. So creating a virtual scene model is the first step[7]. In the actual modeling process, they were usually based on the real world. According to the plot characteristics and role modeling, various ways are combined to form the model data. With the development of technology, audiences have higher and higher requirements for the simulation design of scene models. For example, In the figure1, *Transformers* first adds an extensive background of a seaside city to the camera screen to create an urban scene effect. In this way, you can see the effect of each scene before you start shooting[8]-[9].

The application of virtual movie scene design and virtual preview shooting can greatly improve film shooting and production efficiency, reduce the cost of setting and transition, and save resources[10]. It can also improve the on-the-spot control ability of directors and photographers so that actors' performances can be more intuitively integrated with virtual scenes; at the same time, it can create image miracles and continuously improve the viewing experience.

Fig 1:-The use of virtual scene models in movies

Dynamic simulation

Film production usually uses special effects when it is impossible to shoot in a natural state or high shooting cost. Particles are part of dynamic effects, and dynamics is a branch of physics used to describe the movement of objects in the physical world. Maya has a very powerful particle system with quite complete parameter settings. She can define the shape of particles according to different modeling shapes, and at the same time, enhance the flexibility and artistry of the particle system. The particle system is mainly used to express dynamic effects and closely relates to time and speed. It is generally used for animation production. The particle system is mainly used to create abstract visual effects such as fire, explosion, smoke, dust, foam, water flow, sparks, fallen leaves, or luminous trails. It can also use any shape as a particle to express animation effects such as swarms of birds, ants, and blown dandelions. The dynamics system can produce real effects that are difficult to accomplish using traditional keyframing techniques, such as an object falling on the ground and numerous fragments falling and colliding with each other. The object fragment model can be converted into a rigid body to participate in a series of dynamic calculations, and the

simulated motion can be obtained through the calculations[11]. For example, In the figure2, magnificent, unparalleled visual effects are used in *The Day AfterTomorrow*, with inspirational images such as huge snowstorms and destructive tsunamis. For example, scenes such as the Los Angeles tornado, the Manhattan tsunami, and the wind observed from outer space. These process special effects artists use MAYA software to make animations, and the ThinkingParticles particle plug-in makes buildings collapse.

Fig 2:-Movie dynamic simulation scene

Special Visual Effects in movie

With the emergence of digital media platforms, the post-editing of film and television works has changed from the traditional single linear editing to the current processing method that combines linear editing and nonlinear editing.AE plays an important role in the visual effect of works and the success or failure of film and television works. Post-synthesis generally refers to the reprocessing of the finished film material to achieve special effects. In some special-effects scenes, actors cannot be photographed realistically. Therefore, post-synthesis processing can only be performed by a computer. The actor stands in front of the blue or green cloth as the background to shoot. In the figure3, The production staff cut out the blue or green shooting area and then used computer graphics processing technology to combine the special effects scene with the shot characters to get the real effect. The flying action of Superman in "Superman" is the best example of the application potential of synthetic special effects technology[12].

Fig 3:-Special effects film post-production technology

In film creation, the picture's color completed in the early stage of shooting will not perfectly meet the needs of film creation. At this time, the color correction in the later stage of the film is particularly important. The color correction of the film is the secondary artistic creation of the film and television works. The re-creation of color in film and television works, that is, secondary school color makes the film and television work not only a movie but also a work of art with more artistic value[13]-[14].

Color correction refers to the external technology and subjective internal art color adjustment of the original video material of a movie or micro-film to get the best effect after color correction. The subjective adjustment of the film's color is to correct the color according to the film's style, tone, and emotional content[15]-[16]. In the figure4-5, Several commonly used commands for color correction using animation software are Brightness and Contrast, Sharpening, Hue, Saturation, Specific color selection, SA Color Finesse 3, color curve (Curves), Etc[17].

Fig 4:-Modify the image by modifying the Hue/Saturation

Fig 5:-By modifying the Curves for regional toning

In addition to the picture, the sound is an important part of the film form. Furthermore, film music or film scoring is one of these forms. Under the current trend of rapid development of science and technology, it is very common for electronic synthesis to participate in creating film music. It is almost impossible for the audience to judge whether the music they hear is a real band performance or electronically synthesized music processed by a computer[18]-[19].

III. CONCLUSION

At the history of film development, it is not difficult to find that computer animation technology has brought the creative level of the film industry to a new height. Movie special effects have become more lifelike, especially the three-dimensional effects that have stimulated the imagination of screenwriters and directors in recent years. Nowadays, movies, TV series, and other film and television works use an unprecedented way of expression to enhance the audience's visual enjoyment, thereby creating a new feast that stirs the audience's soul. The film and television post-production special effects are shooting tasks that are impossible to complete in the real life of film shooting. The shooting purpose is difficult to complete or requires many human resources, material resources, and funds to outweigh the gain. Finally, use a computer or graphics image processing workstation to control the content of the screen. Perform digital processing to achieve the expected visual effect finally. It frees the new generation of filmmakers from the shackles of creative thinking and film technology and enhances the creative space. Computer animation provides a novel creative way for most film and television workers and adds a unique artistic form to cultural life. The development of film special

effects and computer animation promote each other. The combination of computer animation and film has also become an inevitable trend in the development of interactive computer media.

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