

Chapter 34

The Application of Intelligent Algorithms in the Animation Design of 3D Graphics Engines

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ABSTRACT

With the rapid improvement of computer hardware capabilities and the reduction of cost, the quality of game pictures has made a qualitative breakthrough, which has reached or exceeded the picture effect of many dedicated virtual reality engines. On the basis of the design and implementation of the virtual reality 3D engine, the rendering queue management method is proposed to improve the frame rate. Based on the object-oriented design method, emitter regulator particle rendering mode, and traditional bone skin animation technology, the key structure technology in skeletal animation is analyzed, and the animation controller used to control animation playback and key structure interpolation operation is designed, which achieves the ideal animation effect. Finally, a prototype system based on engine is implemented.

1. INTRODUCTION

Virtual reality is an integrated technology, which integrates the latest development of computer graphics, computer simulation, sensor technology and AI technology. It can also be said to be an analog system generated by computer technology (Sun F et al.2015). The 3D engine is the foundation of the virtual reality technology. Virtual reality contains a lot of technology of image processing, including light and shadow computing, animation processing, physical system, collision detection system and rendering system (Baken L et al.2015). At present, the three dimensional game technology maintains a good momentum of development in these aspects (Lau K W.2015). With the growing graphics function of the game engine and the ability of computer hardware, especially the rapid improvement of display capacity, the scene of the 3D game is rapidly developing toward a high sense of reality. So the game engine has been able to fully meet the requirements of the virtual reality in the picture quality (Qin Z et al.2016). Due to the rapid development of the game industry and the maturity of the game engine, the development speed of

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virtual reality can be greatly shortened and the development cost can be reduced better with the help of game engine (Liu K et al.2017). However, our country's current research on the game engine is relatively backward. If our country don't have a self-developed high-performance game engine, we can't catch up with the international level and resist the impact of a large number of foreign games fundamentally, nor can we drive the development of other industries (Park K B et al.2016). Therefore, independent research and development of solid and high-performance 3D game engine will be of great practical value for the development of our game and virtual reality application platform (Dorta T et al.2016).

2. RELATED WORK

In the 90s of last century, NASA and the United States Department of defense organized a series of research on virtual reality technology and achieved remarkable results. NASA's lab engineered data gloves to made it a high availability product and simulated the operation of Johnson space station in real time, and simulated the test plan of virtual space exploration by Harbert space telescope (Mejía R I et al.2017). At present, NASA has established the aeronautical and satellite maintenance training system, the space station training system and the VR education system for the national use (Konrad R et al.2017). Fujitsu Laboratory Limited is studying the interaction of virtual organisms and the VR environment. They are still studying gesture recognition in virtual reality and have developed a set of neural network posture recognition systems that can identify postures (Diao J et al.2017). Virtual reality technology is a science and technology field with large investment and high difficulty. The research of virtual reality technology in China started relatively late, so there is a certain gap compared with some developed countries. With the rapid development of computer graphics and computer system engineering, virtual reality technology has aroused extensive interest and attention from our government departments and scientists. The 11th Five-Year plan, the National 863 plan, the 973 Plan, the National Natural Science Foundation and the national high technology research and development plan and so on have included the research of virtual reality technology in the scope of funding. China is keeping pace with the new international technology. At the same time, some domestic research institutions and key institutions have carried out virtual reality technology in military, engineering, sports, culture and education.

3. METHODOLOGY

3.1 Grid Model of xVR Engine Renderer

The rendering system designed in this paper consists of three parts and five modules. The first part is the rendering of the primitives management module. The rendering primitives management module is mainly used to manage the rendering primitives, which allows the programmer to use the rendering system efficiently. This part includes two modules: the management of the vertex and the shader, and index management module. These two modules are independent and complementary to each other, but they need to work together. The second part is the part of realizing the rendering function. This section consists of two modules: the material and texture modules and the rendering queue. The material and texture modules are used to manage material and texture, and prevent the renderer from reading the same material and texture repeatedly. The rendering queue mainly plays two roles: one is to ensure the correct

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