Research on Animation and Motion Capture Technology

Xianwei Zhang, Yang Liu

School of Arts Xuzhou University of Technology, Xuzhou, Jiangsu, 221018

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Abstract: Motion capture technology can measure, track and record the trajectory of an object in three-dimensional space and has been widely used in many research fields. The development process of motion capture technology is introduced, and the composition, advantages and disadvantages of the currently used five motion capture systems are summarized, and the relevant results of applied research using motion capture technology are collected, classified and collated from intangible cultural heritage. Digital protection, simulation training and teaching, film and video animation and game production, human posture research, ergonomics research and other aspects of these achievements are systematically reviewed. After analyzing and summarizing the existing research results, it is proposed that the technology can be applied to some new research projects.

1. Introduction

In recent years, with the rapid development of computer graphics and hardware technology, people can already use computers to generate high-quality images. Virtual reality is no longer a strange word. It has penetrated into every corner of people's lives. The application of computer special effects has become an indispensable means in modern film and television special effects production. Various kinds of plane and three-dimensional computer special effects production technology have brought new feelings to the audience. Performance animation technology can be said to be the most current. One of the most advanced and popular computer animation techniques. In the traditional animation production, according to the requirements of the plot, the producer must draw the animation frame by frame, and the workload is very huge. After the computer animation technology is introduced, the computer can be used to design the shape first. Then determine the keyframe according to the plot, and then the animator adjusts the pose of the keyframe. The animation software generates the animated image sequence based on the keyframe. However, for a long animation work, determining keyframes one by one is still a very heavy work. Comprehensive use of computer graphics, electronics, machinery, optics, computer vision, the creation of performance animation techniques such as computer animation and motion capture has completely changed this situation. Motion capture mainly captures performers' movements and even expressions, and uses these motion or expression data to directly drive models such as animation and virtual objects to create Image realistic animation.

2. Overview of Motion Capture Technology

In order to reduce the workload of animation makers in computer animation production, performance animation has been further studied and applied, and the most critical and indispensable performance animation is the motion capture technology. In the production process, first use real people or Other images similar to the animated model are “played” in a three-dimensional space, and the computer captures the “image” motion data and processes the data, restoring the acquired planar points to spatial three-dimensional points. The motion sequence generated by the motion sequence generates a motion trajectory; on the other hand, a three-dimensional model is created by using three-dimensional production software (which can be a model produced by various three-dimensional software, and the system studies a model produced by 3D Simulation Digital), and studies the three-dimensional model file. The structure, the system generates three-dimensional

animation model, and finally use the generated spatial motion trajectory to drive the model to generate computer animation sequences [2 ~ 4]. Mography capture technology can be used for robot remote control. The robot transmits dangerous environment information to the controller. The controller makes various actions based on the information, and the motion capture system takes actions Captured, delivered to the robot in real time and controlled to perform the same actions. Compared with the traditional remote control method, this system can realize more detailed, complicated, flexible and rapid action control, which can greatly improve the robot to cope with complex situations. Ability. In the current situation where the robot autonomous control technology is far from mature, it is of special significance. Modern advanced three-dimensional, simulation games emphasize the player's "participation" and "immersion", emphasizing the player and the game environment. Interactive. Now we can also use the 3D scanning technology to get the player's digital model, place it in the game environment, and then use the motion capture technology to capture the player's various actions to drive the digital model, which can give the player New feelings, Develop a highly realistic game system. M otion capture is not only the key link in performance animation, but also has a wide range of application prospects in other fields. Comprehensive use of new technologies such as performance animation, virtual studio, 3D scanning, etc. , Expect magical special effects. You can even use animal performers to drive animal models. Type, shooting a real animal kingdom story.

3. 3D Animation Production

The production of three-dimensional animation is mainly for animation workers to create animated characters, scenes, and movements in the computer virtual world. Then, materials and lights are added to the characters and scenes. At the same time, the camera is recorded by means of a virtual camera. Finally, the computer automatically performs calculations. Output animation screen. Specifically, the professional three-dimensional animation production process is divided into three major levels, they are pre-production, mid-production and post-production. The early period belongs to the script, original painting and sub-camera part of the animation. It has no obvious difference from the traditional two-dimensional animation. In the medium term, it mainly uses the computer to complete the establishment of the virtual world. The production of the animation is mainly to add and integrate relevant elements in the later period, and perfect the animation effect. In the production of three-dimensional animation software, there are generally modeling, materials and textures, lighting, animation and rendering, such as 3ds Max, Maya and other popular three-dimensional animation software, this process is the middle of three-dimensional animation production.

From a technical point of view, the key steps in 3D animation production include geometric modeling techniques, material adjustment studies, motion trajectory setting, and color rendering. It can be understood as modeling techniques, material technologies, motion techniques, rendering of 3D animation. technology. At present, the computer modeling technology mainly solves the model reappearance of the virtual world object; the motion technology mainly solves the problem of the character movement in the animation, especially the movement of people or animals; the material technology mainly solves how to use the computer to simulate the colorful real world in the nature The texture of the material; the rendering technique involves outputting the computer's set of effects into a high-quality static image. In the key steps of 3D animation production, motion technology has always been a difficult point in 3D animation production, especially the role of the action adjustment problem. The action design and adjustment of a character is a core issue in sports technology. Although in all kinds of animation works, we can see magnificent scenes, but a good work pays more attention to the movement of animated characters. This is like an excellent film and television work. The actor's wonderful performance is always the first One, even if it is a gorgeous scene, beautiful music, if the lack of real and natural performance, such a movie will certainly not be welcomed. In the three-dimensional animation process, the character's movement design and adjustment is actually equivalent to the performance of the actors. For an animated feature, if it is to rely on the animator to manually adjust the motion parameters, even for a very experienced

animator, it will be a very huge workload. Therefore, the action design and adjustment of the character become one of the bottlenecks restricting the development of three-dimensional animation. Three-dimensional motion capture technology is developed to solve the above problems. The three-dimensional motion capture technology refers to the setting of trackers in key parts of real moving objects (such as humans and animals). The computer tracks and processes the positions of these trackers, records motion data of moving objects to form three-dimensional motion data, and finally Motion data is re-assigned to the animation model to create a realistic and natural movement of the animation model. At present, the commonly used motion capture technologies include mechanical, acoustic, electromagnetic, and optical. Among them, optical motion capture is the most common due to its high sampling rate, large range of performers' movements, and limitations of cables and mechanical devices. Therefore, the long-disturbed animator's role-adjustment problem has been solved.

4. Application and Development of Motion Capture Technology

Motion capture system is used in the production of animation from the beginning of its birth, so the main application of three-dimensional motion capture technology is film and television animation, games, multimedia and other related professional teaching and creation. In the field of film and television animation, the motion data captured by motion capture technology can generate natural animations and reduce the manual editing of the animation. It can play a great role in the special effects of animation and the production of movie titles. The application of motion capture technology in foreign countries has produced a lot of stunning large-scale, China has also applied the technology to complete the three-dimensional animation "Qin Shi Mingyue" with the essence of the essence of Chinese martial arts. The use of motion capture technology abroad to make the game is also too numerous to list, such as smooth and realistic football game "FIFA", one of the most popular online games "World of Warcraft" and so on. In addition to the field of film and television animation and multimedia, motion capture technology has also begun its application in sports training, medical research, virtual reality, judicial recurrence, and distance education. It can be expected that with the continuous improvement of its technical level, motion capture technology will be applied more deeply and widely.

Motion capture technology itself also has its own development constraints. For example, optical motion capture devices are too expensive, capture light spots that need to be attached to performers, post adjustment, and change the error data workload. Therefore, motion capture technology itself is also constantly developing and improving. In the process of optical motion capture, precisely because of the use of light spots, many problems occur in the later processing of motion data. Researchers in the field are currently using image processing techniques and video processing techniques to identify the trajectories of performers, rather than directly capturing the information of the light spots, thereby simplifying the capture process. For example, at the 2006 SIGGRAPH (Special Interest Group on Computer Graphics Image) Seminar, MOVA released the latest technology “Contour” that can accurately scan human facial expression movements. This technology changes the light spot to phosphor to capture it. Significantly reduced the cost of capture; In the 2008 SIGGRAPH Conference, iPi Soft released the “Shoot3D” desktop motion capture system, which uses only one digital video camera during its use, which also reduces the level of The cost of motion capture.

5. Conclusion

Although motion capture technology is widely used in the field of three-dimensional animation, the use of this technology has indeed brought new life to the creation of three-dimensional animation. However, in the field of 3D animation, technology can't be oversimplified. Technology is only one aspect of the action. For example, traditional Chinese ink animation is a type of animation unique to the world. This cannot be achieved with so-called advanced technology. Therefore, the production of three-dimensional animation should pay more attention to the artistic

rules of animation creation, including story drawing, story background, character design, and lens use. Only in this way, the production of three-dimensional animation can reach a new level.

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