Research Article

Design and Implementation of 3D Film and Television Scene Production Algorithm Based on the Internet of Things

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Film and television itself is a product of culture and innovation, combining digital technology, creative thinking, and artistic design. In the rapid development of 3D film and television, the situation of scene design and production has also become an important role. In a typical environment, the main scene plays the role of film and television and coherent plot. This thesis mainly analyzes the design and implementation of a 3D movie scene production algorithm based on the Internet of Things and also makes 3D movie scenes through the algorithm of Internet of Things technology. This article also analyzes the traditional 3D scene-making algorithm, which is mainly composed of a plane mapping part, a basic primitive generation part, a collision detection and positioning part, and a terrain generation part. Among them, the plane mapping technology provides the function of using plane mapping to simulate 3D objects. The basic primitive generation part uses the OpenGL function to draw 3D primitives and paste the BMP format image on each surface of the stereo primitives, so that the 3D model can be represented by a plane texture; collision detection is a key part of mechanical physics, which can detect games of the physical edge of the object in the middle; the terrain generation part uses the converted gray height value as the corresponding grid terrain height and uses planar mapping technology to capture the image of the entire terrain, that is, paste and generate a terrain map. The results show that a characteristic of the algorithm of the Internet of Things technology is that the 3D scene is completely mapped. This avoids the trouble of using 3DMAX and other tools to create 3D models and also reduces the difficulty of creating 3D scenes and makes the execution efficient, which is better than directly importing 3D models, runs faster, and runs very smoothly. The Internet of Things is an important development trend in the Internet information age and can be used to produce 3D film and television scenes to reduce development difficulty and cost and has a variety of research and development value and practical value. In the analysis part, this article also introduces the algorithms used in the scene production and passes the tests of 4 different files in 4 different frames and also found that more than 83% of people feel that the use of Internet of Things algorithms in the production of 3D movie scenes has improved production efficiency.

1. Introduction

1.1. Background of Topic Selection. In recent years, China's digital technology and Internet multimedia technology have developed rapidly, and the shooting, production, and transmission of 3D film and television have achieved unprecedented progress and results. Among them, the combination of digital technology and traditional art design challenged many ways of expressing traditional art design and gradually formed a new form of art creation, namely, traditional digital art. In the production of 3D film and television scenes, it has a wide range of application prospects and strong development momentum. From the perspective of the architec-

tural design of the main 3D film and television scenes we studied, with the rapid development of the domestic film and television industry, the concept of the Internet of Things has become more and more important and irreplaceable. The creation of 3D film and television in my country is still in its infancy. In terms of film and television scene design, China still has room for further research on the artistic features and technical methods of the main scene design.

1.2. Significance of the Research. 3D film and television scenes are usually the second visual level of the works on the screen, because they are the settings of character performances and fictional spaces. Successful 3D movies need

good scenes to improve their artistic quality. Therefore, the design of the scene requires both high aesthetics and strict rationality. A good main scene structure and design can enhance the beauty of the film and television, enhance the personality of the character, and improve the emotional resonance with the audience. Appropriate design of the main scene can also establish the style of the entire film and television production. Therefore, in 3D film and television, the main scene must be the main “character” that explains the storyline. This shows the importance of scene production. The scene produced by the Internet of Things algorithm can achieve low development difficulty, low cost, safety, and reliability and has a variety of research and development value and practical value.

1.3. Related Work of 3D Film and Television Scene Production. With the continuous development of the Internet of Things technology, we should calm down while creating, sum up the experience of previous production, and study its theories, so that the production of 3D animation scenes can be more systematic, and the creation and appreciation issues can be closely linked, so that technology and art can be more perfectly combined. Pikul and Ning said that all history is modern history. It can be said that all historical dramas are modern film and television, and the success of historical dramas lies in the modernization of historical themes and historical culture [1]. In this sense, as the indoor scene design of the place for characters in film and television, the traditional indoor design style in historical drama should be guided by the aesthetic value of modern people. And the essence of traditional national culture should be used in modern design technology. Showing it make the past serve the present and develop innovatively. However, the view that history is all modern history is wrong. Yang et al. believe that making film and television is a very complicated process. This is a labor-intensive process that requires a team to complete, which is the crystallization of collective wisdom [2]. There are many ways to make movies, such as hand-made movies and cut-out methods. However, through the Internet of Things technology, the production of film and television scenes can be very simple, safe, reliable, and efficient. Liu et al. believe that another important reason for studying 3D movie scenes is its wide application in live action movies [3]. In current movies and TV movies, more and more digital technologies are used to create various virtual scenes and special effects to produce movies and TV images. This effect can achieve visual effects, which is impossible to achieve in actual shooting. However, the actual shooting can be done through the Internet of Things technology.

1.4. Innovation Points of This Research

- (1) 3D film and television scene production adopts the algorithm of Internet of Things technology, which can make the scene production process very intelligent, safe, and reliable
- (2) Compared with traditional algorithms, the algorithm of the Internet of Things technology is more intelligent, convenient, safe, and reliable

2. Design and Implementation Method of 3D Film and Television Scene Production Algorithm Based on the Internet of Things

2.1. IoT Architecture. Internet of Things applications are widely used, but because applications cover different industries and different scenarios, they have different functions and structural characteristics [4]. Currently, there is no uniformly recognized standard for the structure of IoT applications [5]. Experts, technicians, and production personnel usually accept the “three-tier structure” of IoT applications [6]. This structure divides the Internet of Things application into three layers, which are the application layer, the network layer, and the perception layer. The “three-layer structure” of the Internet of Things application is shown in Figure 1.

2.2. Concept of Scenes in Film and Television. Film and television scenes are usually specific environmental spaces that can tell stories, shape characters, expand the plot, and promote the development of film and television [7]. In addition to modeling characters in film and television, it usually refers to scenes in film and television. Modeling design of all things changes over time, including living environment, furniture, social environment, natural environment, and historical environment where the role is located [8]. Stage design requires a high degree of creativity and strong artistry. The movie scene can be divided into two parts: scene and background. The so-called scene is the active scene or natural landscape that the character can pass through, and the background is the scene behind the character and the atmosphere, such as the scene. To display each lens image, there must be a scene [9]. It is impossible for the character to appear in every frame of the cartoon, but the scene always occupies the main screen or the auxiliary screen. Animated films and TV scenes are usually based on scripts at the beginning of design, providing background design to develop plot and character creation space [10]. The content of the scene is very extensive, as long as there are various entities in the space related to the object, from minor characters to fixed or uncorrected scenes; they are all called scenes [11].

2.3. Style of the 3D Scene. The content determines the format. The title, content, and theme of the script and the aesthetic inclination of the creator determine the style of the scene.

2.3.1. Realistic Style. Realism is a relatively true reflection of time and space, and a faithful recording and reproduction of objective reality. In traditional two-dimensional animation or three-dimensional animation, realistic style scenes are the most common scene styles, which refer to the use of design methods from modeling styles, natural materials, viewing angles, light and shadow relationships, color laws, etc. In terms of processing, it follows the basic historical nature and natural laws, conforms to the physical characteristics of objects at a certain time, specific environment, and specific light conditions, and conforms to human traditional

FIGURE 1: Secure Internet of Things architecture.

psychological and physiological habits [12]. 3D animation scenes have a strong sense of reality and serve the appreciation habits of audiences of all ages. It not only has a real sense of light but also a real texture. The rich images make people feel excited [13].

2.3.2. Decorative Style. Any artistic style with regularity and order can be called a decorative style. The decoration style has regular beauty, order beauty, universal beauty, and formal beauty. This style is to carry out a specific artistic and organic generalization, standardization, and processing of a large number of natural shapes and complex colors of the original life form in order to realize the beauty of form [14].

2.3.3. Comic Style. Comic style is also a commonly used modeling form in 3D animation scene design. Comic books and TV animation works are usually adapted from comics, and their modeling usually shows universality, simplicity, and exaggeration [15].

2.3.4. Fantasy Style. Fantasy refers to unreality, unconventional vision and imagination, unconventional thoughts and fantasy that exceed people's daily life, and conventional vision and imagination. According to the needs of the plot, most fantasy-style movies and TV shows use unconventional imagination in the scenes and props, adopt bold and exaggerated methods, and adopt new, bold, and transcending human psychology when using colors [16]. Selective color processing provides viewers with a brand-new visual experience and produces powerful emotional and peculiar effects in people's vision and psychology, while the space-time effects have an illusion that surpasses the conventional human imagination.

2.4. Scene Design Ideas. The stage design of a movie must first closely follow the script, understand the director's expression style and intentions, and conform to the histori-

cal background of the story. Secondly, when designing movie scenes, we must also ensure the unity of film art style, that is, the unity of tones between the scene and the characters, as well as the unity of consciousness and technology of the creative team [17]. The design of movie scenes requires a rich imagination, a process of thinking and creativity. Collect data during the design process, reprocess and recreate materials with the help of imagination, and create new designs. Imagination mainly uses collective thinking and comprehensive thinking such as similarity, correlation, and contrast [18]. Combinatorial thinking is mainly to combine unrelated things or certain parts of things to form a new way of thinking. Combinatorial thinking is the most common method of designing scenes and drawing characters in film and television.

2.5. Key Technologies of the Internet of Things

2.5.1. Radio Frequency Identification Technology. Radio frequency identification technology is a noncontact automatic identification system that can automatically detect targets and receive related data through radio frequency signals. The system mainly includes electronic tags, readers, and computer networks [19]. An electronic tag is composed of a chip and an antenna and is mainly associated with an object used to identify it. The electronic tag has a unique electronic code for storing related object information.

2.5.2. Global Positioning System. The Global Positioning System is a technical application that combines satellites and communications. GPS is not affected by weather and time and can quickly and accurately obtain 3D position, speed, and time information of an object and has the characteristics of high precision, high efficiency, and automation [20]. GPS is an integral part of the Internet of Things system.

FIGURE 2: Design flow chart.

2.5.3. Data Analysis and Processing Technology. At the architecture level of the Internet of Things, the type and amount of information sent from the perception layer to the application layer are gradually increasing, doubling the amount of data that needs to be processed and analyzed. For the Internet of Things, how to effectively mine, classify, and apply a large amount of information is a difficult problem. Data analysis and processing functions are the key to the effective application of the Internet of Things, and the emergence of cloud computing makes these possibilities possible [21]. Cloud computing can process hundreds or billions of information in a few seconds. It provides a quick way to process large amounts of information collected from IoT systems.

2.6. Overview of the Design of the Scene. Through the generation of 3D movie scenes, users will feel the visual experience brought by movie scenes, understand the importance of the main scene in creating movies, and be familiar with movie scenes and the art theory of creating the main scene and the main scene. Exploring how to create a scene, 3D technology has improved the audience's awareness of the film and television scene and allowed them to experience the artistry of the scene itself [19].

The following is the flow chart of the thesis design, researches the relevant background under the premise of

multianalysis, and completes the thesis according to the rules of scene art construction. The design flow chart of the scene is shown in Figure 2.

2.7. Description of Traditional 3D Scene-Making Algorithm

2.7.1. Plane Texture Part. Usually, landscapes such as stones, trees, and grass are added to the 3D scene. This is a real 3D object used to give it a 3D feel when viewed in the scene. In order to make the imported objects look 3D rather than flat, you can create a scene with a flat map and then replace the 3D scene with a flat map to ensure that the front of the flat map always faces the player's field [20]. This ensures that no matter what the player is doing, the front of the scene always faces the player's field of vision. This rotating plane mapping technology provides the function of using plane mapping to simulate 3D objects.

2.7.2. Basic Graphic Element Production Part. When creating a 3D scene, importing the model created in 3D MAX will greatly reduce the speed of the game. Therefore, consider another way to add a model created using basic primitives. Therefore, the 3D scene is decomposed into basic primitives, such as cuboid and triangular vertebrae. When creating primitives, use the OpenGL function to draw 3D primitives

and paste the BMP format image on each surface of the stereo primitives so that the 3D model can be represented by a plane texture [22].

2.7.3. Collision Detection and Positioning Part. Collision detection is a key part of mechanical physics, which can detect the physical edges of objects in the game. If two 3D objects collide, this technique prevents the objects from passing through each other. This ensures that when an entity hits a wall, collision detection determines its position and interaction so that the entity does not pass through the wall or hit the wall. The solid and the wall are based on two features [23]. When creating 3D basic primitives to simulate the real world and prevent characters from roaming in the game, collision detection is added to each primitive. Create a graphic element and add a check box of appropriate size to this graphic element. When using primitives to build large 3D scenes, collision detection is not difficult because it adds collision detection to the basic primitives.

2.7.4. Terrain Generation Part. The terrain generation part uses contour line generation technology. In the first step, use white to represent the high position and black to represent the low position. In this way, you can use the grayscale map to display the terrain. The second step is to convert the black and white of the grayscale image into a terrain height value. The third step is to split the entire scene map into a grid map, use the converted gray height value as the corresponding grid terrain height, and use planar mapping technology to capture the image of the entire terrain, that is, paste and generate the terrain map.

2.8. Functions of 3D Film and Television Scene Design. The functions of 3D film and television scene design are embodied in the following three aspects.

2.8.1. Set the Emotional Tone of the Work. In 3D film and television, scene design needs to provide ideas expressed in work. Designers should start from the overall picture, grasp the theme of the entire film and television, and make a keen observation of life. Make adjustments and designs to use the completed experience. Bright colors are used as the main tone for creating interesting and relaxing rhythms; warm colors are used to create a warm and peaceful atmosphere; gray is used to express painful and depressed emotions and to understand the unique lifestyle, the creation of true touches and the establishment of the emotional tone of the work.

2.8.2. Character Characteristics. Characters and scenes are interdependent in 3D movies and TV. The design of the scene must be logically structured in order to provide space for performance and mental activity for the characters and through suggestive and symbolic arrangements to shape the character of the character. Creators can enhance the image of characters in film and television by making the audience feel the setting of the psychological space of the scene and infer the characters' interests, hobbies, lifestyle, and other personalities and make them more vivid and rich. 3D film and television scene design can easily identify the

identity, psychology, and personality of the character and achieve the goal, usually focusing on the characteristics. It is the most obvious sky, landscape, architecture, flower, and tree style in history. Rely on the landscape to provide the owner, and borrow the landscape to express emotions.

2.8.3. The Development of the Storyline. Scene design serves the plot of the story, and the development of 3D film and television is inseparable from the interpretation of the plot. The design of the activity space and the role scene must be based on the narrative and accurately describe the environmental characteristics of the story. Show the background and local style, combine the narrative function and the metaphor function, and establish the space-time relationship. By changing the scene factors (such as time, location, and environment), the design provides suitable opportunities for role-playing. The scene factors are suitable not only for the theme but also for the dramatic style that promotes the development of the story.

2.9. Performance Analysis of Algorithm Production. The principle of performance analysis of algorithm production based on the Internet of Things is shown in Figure 3. Data security requirements are the key integration of the entire algorithm; all selected data structures must require data reliability and stability and be able to maintain a stable working condition for a long time. Typical time requirements are mainly to limit the waiting time for information query. If the client sends a query request, the corresponding performance of the server is extremely slow, and it is impossible to quickly find a query that meets the requirements. The operating efficiency of the system will be very low.

3. Experiments Based on the Design and Implementation of the 3D Film and Television Scene Production Algorithm of the Internet of Things

3.1. Production of the 3D Scene of "Fantasy Variations." By studying the artistic rules of the main stages of fantasy style, this chapter focuses on the process of completing the scene production. It is mainly divided into two processes: one is to make models of mountains, castles, and trees, and the other is to use tents to roam and switch between seasons. Modeling and virtual tour development are inseparable from software support. The main software used in this theme is 3D modeling software and image editing software. Combining the functions of this theme, the specific production process is shown in Figure 4.

3.2. Internet of Things Algorithms. In terms of Internet of Things technology, in order to ensure the security of the Internet of Things system, we need to further improve the data encryption of the terminals in the system. On the basis of existing algorithms, the focus will be on whether the Internet of Things is suitable for embedded systems and whether it is more effective. The security encryption algorithm that can be applied to the Internet of Things environment will be researched and tested.

FIGURE 3: Is there an analysis of film and television scenes made using IoT algorithms.

The Advanced Encryption Standard algorithm is a symmetric, block encryption algorithm; the algorithm uses a multiround replacement mode.

- (1) Arrange the plaintext and the key into the state matrix with 128 bits in units of words

$$\begin{aligned} &\{H_{0,0}, H_{0,1}, H_{0,2}, H_{0,3}, \dots, H_{3,3}\}, \\ &\{G_{0,0}, G_{0,1}, G_{0,2}, G_{0,3}, \dots, G_{3,3}\} \end{aligned} \quad (1)$$

- (2) XOR the key and ciphertext as shown in

$$\begin{aligned} &\begin{bmatrix} H_{0,0} & H_{0,1} & H_{0,2} & H_{0,3} \\ H_{1,0} & H_{1,1} & H_{1,2} & H_{1,3} \\ H_{2,0} & H_{2,1} & H_{2,2} & H_{2,3} \\ H_{3,0} & H_{3,1} & H_{3,2} & H_{3,3} \end{bmatrix} \oplus \begin{bmatrix} G_0 & G_4 & G_8 & G_{12} \\ G_1 & G_5 & G_9 & G_{13} \\ G_2 & G_6 & G_{10} & G_{14} \\ G_3 & G_7 & G_{11} & G_{15} \end{bmatrix} \\ &= \begin{bmatrix} H'_{0,0} & H'_{0,1} & H'_{0,2} & H'_{0,3} \\ H'_{1,0} & H'_{1,1} & H'_{1,2} & H'_{1,3} \\ H'_{2,0} & H'_{2,1} & H'_{2,2} & H'_{2,3} \\ H'_{3,0} & H'_{3,1} & H'_{3,2} & H'_{3,3} \end{bmatrix} \end{aligned} \quad (2)$$

- (3) H-box byte transformation, including multiplication inverse and radiation process

In order to improve the efficiency of the algorithm, the creator of the AES algorithm made the H-box through a nonlinear algorithm. The user can quickly obtain the corre-

sponding replacement data by using the table look-up method to improve the calculation speed. The H-box operation is shown in

$$\begin{bmatrix} H_0 \\ H_1 \\ H_2 \\ H_3 \\ H_4 \\ H_5 \\ H_6 \\ H_7 \end{bmatrix} = \begin{bmatrix} 1 & 0 & 0 & 0 & 1 & 1 & 1 & 1 \\ 1 & 1 & 0 & 0 & 0 & 1 & 1 & 1 \\ 1 & 1 & 1 & 0 & 0 & 0 & 1 & 1 \\ 1 & 1 & 1 & 1 & 0 & 0 & 0 & 1 \\ 1 & 1 & 1 & 1 & 1 & 0 & 0 & 0 \\ 0 & 1 & 1 & 1 & 1 & 1 & 0 & 0 \\ 0 & 0 & 1 & 1 & 1 & 1 & 1 & 0 \\ 0 & 0 & 0 & 1 & 1 & 1 & 1 & 1 \end{bmatrix} \begin{bmatrix} H'_0 \\ H'_1 \\ H'_2 \\ H'_3 \\ H'_4 \\ H'_5 \\ H'_6 \\ H'_7 \end{bmatrix} + \begin{bmatrix} 1 \\ 1 \\ 0 \\ 0 \\ 0 \\ 1 \\ 1 \\ 0 \end{bmatrix} \quad (3)$$

- (4) Column transformation: multiply each column of the state matrix by a fixed polynomial $f(y)$. Because of the AES algorithm, $\text{mod}(y^4 + 1)$ modulus transformation is performed. The definition of $f(y)$ is shown in

$$f(y) = 03y^2 + 01y + 02 \quad (4)$$

The inverse column transformation multiplies each column of the state matrix by the polynomial $g(y)$ to perform $\text{mod}(y^4 + 1)$ modular transformation. The definition of $g(y)$ is shown in

$$g(y) = 0By^3 + 0Dy^2 + 09y + 0E. \quad (5)$$

The column transformation has the characteristics of

$$g(y) = f^{-1}(y) \text{ mod } (y^4 + 1). \quad (6)$$

FIGURE 4: Production flow chart.

The specific transformation process of column transformation and inverse column transformation is shown in

$$\begin{bmatrix} 02 & 03 & 01 & 01 \\ 01 & 02 & 03 & 01 \\ 01 & 01 & 02 & 03 \\ 03 & 01 & 01 & 02 \end{bmatrix} \begin{bmatrix} H_{0,0} & H_{0,1} & H_{0,2} & H_{0,3} \\ H_{1,0} & H_{1,1} & H_{1,2} & H_{1,3} \\ H_{2,0} & H_{2,1} & H_{2,2} & H_{2,3} \\ H_{3,0} & H_{3,1} & H_{3,2} & H_{3,3} \end{bmatrix} = \begin{bmatrix} H'_{0,0} & H'_{0,1} & H'_{0,2} & H'_{0,3} \\ H'_{1,0} & H'_{1,1} & H'_{1,2} & H'_{1,3} \\ H'_{2,0} & H'_{2,1} & H'_{2,2} & H'_{2,3} \\ H'_{3,0} & H'_{3,1} & H'_{3,2} & H'_{3,3} \end{bmatrix} \quad (7)$$

Correspondingly,

$$\begin{bmatrix} 0E & 0B & 0D & 09 \\ 09 & 0E & 0B & 0D \\ 0D & 09 & 0E & 0B \\ 0B & 0D & 09 & 0E \end{bmatrix} \begin{bmatrix} 02 & 03 & 01 & 01 \\ 01 & 02 & 03 & 01 \\ 01 & 01 & 02 & 03 \\ 03 & 01 & 01 & 02 \end{bmatrix} = \begin{bmatrix} 1 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 \\ 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 1 \end{bmatrix} \quad (8)$$

3.3. Singular Value Decomposition. Singular value decomposition is one of the commonly used methods in mathematical statistics. It is widely used in infinite minimum cube problems, matrix order estimation, norm correlation analysis, and other problem solving. In the information retrieval problem, a special form of unique value decomposition is used to retrieve information, because the matrix that

TABLE 1: Introduction to 4 test scenarios.

Serial number	Scene file name	Original scene size	Total texture size	Number of texture files	The total size of scene files and textures	Total number of frames	Animation characteristics	Remarks
1	s1.max	18.2 MB	5.33 MB	32	23.6 MB	124	Have	People, houses
2	s2.max	18.1 MB	757 kB	3	18.8 MB	101	Have	Furniture
3	s3.max	51.1 MB	817 kB	5	51.9 MB	100	Have	Teapot
4	s4.max	151 MB	817 kB	5	152 MB	100	Have	Teapot

TABLE 2: Split data statistics table of s1.max file under different split granularities.

Split granularity	Number of subscene file blocks	Average size of subscene files (MB)	Average size of subscene texture (MB)	Average number of textures in subscene	Average size of subscene and texture files (MB)	Split processing delay (s)
25 frames	25	3.468	5.246	31.4	8.784	993
50 frames	13	3.562	5.244	31.385	8.898	411
75 frames	7	3.866	5.250	31.429	9.124	259
100 frames	3	4.62	5.237	31.333	9.83	147

requires unique value decomposition is usually a sparse high-order matrix.

Lemma 1. Suppose A is a nondifferent real matrix of order n , then there must be orthogonal matrices P and Q such that

$$P^T A Q = \begin{bmatrix} a_1 & & & \\ & a_2 & & \\ & & \dots & \\ & & & a_n \end{bmatrix}, \quad (9)$$

$a_i > 0$, and a_i^2 is the characteristic value of $A^T A$: $i = 1, 2, \dots, n$.

Theorem 2. The $m \times n$ real matrix A with rank r must have a decomposition formula:

$$A = U \begin{bmatrix} a_1 & & & \\ & a_2 & & \\ & & \dots & \\ & & & a_r \end{bmatrix} V^T, \quad (10)$$

where U and V are orthogonal matrices, and $a_i > 0$; $i = 1, 2, \dots, n$.

Without loss of generality, suppose A is a sparse matrix with m rows and n columns, where $m \gg n$, and $\text{rank}(A) = r$ is known. The singular value decomposition of A can be defined as

$$A = U \Sigma V^T. \quad (11)$$

Theorem 3. Suppose the singular value decomposition of A is given by equation (11), and there are

$$a_1 \geq a_2 \geq a_3 \geq \dots \geq a_r \geq a_{r+1} = \dots = a_n = 0. \quad (12)$$

$R(A)$ and $N(A)$, respectively, represent the representation area of A and the null space of A , then

(1) Phase

$$\text{rank}(A) = r,$$

$$N(A) = \text{span}\{v_{r+1}, \dots, v_n\},$$

$$R(A) = \text{span}\{u_1, \dots, u_r\}, \quad (13)$$

$$U = [u_1, u_2, \dots, u_m],$$

$$V = [v_1, v_2, \dots, v_n]$$

(2) Connect and decompose

$$A = \sum_{i=1}^r u_i \cdot a_i \cdot v_i^T \quad (14)$$

(3) Normative

$$\begin{aligned} \|A\|_F^2 &= a_1^2 + \dots + a_r^2, \\ \|A\|_2^2 &= a_1 \end{aligned} \quad (15)$$

TABLE 3: Split data statistics table of s2.max file under different split granularities.

Split granularity	Number of subscene file blocks	Average size of subscene files (MB)	Average size of subscene texture (MB)	Average number of textures in subscene	Average size of subscene and texture files (MB)	Split processing delay (s)
25 frames	21	3.548	0.280	1.286	3.833	92
50 frames	11	4.020	0.316	1.364	4.335	63
75 frames	6	4.178	0.333	1.333	4.5	46
100 frames	3	5.373	0.250	1.333	5.647	46

TABLE 4: Split data statistics table of s3.max file under different split granularities.

Split granularity	Number of subscene file blocks	Average size of subscene files (MB)	Average size of subscene texture (MB)	Average number of textures in subscene	Average size of subscene and texture files (MB)	Split processing delay (s)
25 frames	20	7.307	0.325	3.05	7.630	139
50 frames	11	7.799	0.345	3.182	8.143	95
75 frames	5	9.218	0.378	3.4	9.596	83
100 frames	2	12.255	0.536	4	12.79	80

TABLE 5: Split data statistics table of s4.max file under different split granularities.

Split granularity	Number of subscene file blocks	Average size of subscene files (MB)	Average size of subscene texture (MB)	Average number of textures in subscene	Average size of subscene and texture files (MB)	Split processing delay (s)
25 frames	20	28.49	0.325	3.05	28.835	1377
50 frames	10	30.58	0.352	3.2	30.95	851
75 frames	5	36.28	0.378	3.4	36.68	662
100 frames	2	48.85	0.536	4	49.4	518

4. Design and Implementation of 3D Movie Scene Production Algorithm Based on the Internet of Things

4.1. Scene Production Algorithm Data Test Analysis. In order to test the effect of the script on the separation of scene files, under the assumption that the scene files can be separated, based on the 3D output as a test case and the separation processing time delay and separation processing, 4 scenes were selected. Render correctly before and after separation. Perform statistical analysis on the scene file size and the number of textures in the subscene. Table 1 briefly introduces these four situations.

In order to test the splitting effect of scene files and textures in different split granularities, 4 different situations with split granularity of 25 frames, 50 frames, 75 frames, and 100 frames are, respectively, given. The split data statistics of scene files s1.max, s2.max, s3.max, and s4.max are shown in Tables 2–5, respectively.

The split data statistics table of the s1.max file under different split granularities is shown in Table 2.

The split data statistics table of the s2.max file under different split granularities is shown in Table 3.

The split data statistics table of the s3.max file under different split granularities is shown in Table 4.

The split data statistics table of the s4.max file under different split granularities is shown in Table 5.

From the data in Tables 2–5, it can be concluded that the greater the separation, the less times the script processes the internal scene model, texture, and film data and stores them when the separation process is complete. Therefore, the overall processing delay of script separation is relatively small. Details are shown in Figure 5.

4.2. Design of the Main Scene of “Fantasy Variations.” In the process of making the main scene of the “fantasy change,” first, based on a large amount of materials, the overall plan of the plan was drawn, and then, the castle, trees, lakes, waterfalls, etc., were modeled according to the main fantasy style. Tune. Finally, the individual is placed in the whole for fine-tuning.

4.3. Film and Television Scenes Based on Internet of Things Algorithm. In the 300 questionnaires, we know the film and television scenes produced using the Internet of Things algorithm. Most people believe that the use of Internet of Things technology can significantly reduce production costs, increase production speed, make scenes more beautiful, and enrich artistic elements and make them safer and more reliable. The specific situation is shown in Figure 3.

FIGURE 5: Four different files are processed in four different frames in total processing delay.

FIGURE 6: The efficiency of different algorithms for making 3D film and television scenes.

4.4. Efficiency Analysis of IoT Algorithms and Traditional Algorithms. With the development of the times, the Internet of Things technology has become more and more popular with everyone. We have used Internet of Things algorithms in the production of 3D film and television scenes. During 2015-2021, the efficiency change trends of different algorithms for making 3D film and television scenes are as follows, as shown in Figure 6.

It can be seen from the figure that the Internet of Things technology is becoming more and more popular with everyone, because the use of the Internet of Things technology can make most items intelligent, more convenient, and efficient. The traditional method is relatively inefficient, so it is gradually replaced by the Internet of Things.

5. Conclusion

3D film and television scenes occupy a very important position in film and television and incorporate knowledge of painting, architecture, lighting, perspective, and other disciplines. 3D movie scenes have greatly changed the way traditional scenes are created. This makes us must carefully study the design of 3D animation scenes. However, at present, my country's research on film and television scenes has not attracted people's attention. Background or role, even some

film and television professionals do not pay enough attention to film and television scenes. With the continuous development of the Internet of Things technology, we should calm down while creating, sum up the experience of previous production, and study its theories, so that the production of 3D animation scenes can be more systematic, and the creation and appreciation issues can be closely linked, so that technology and art can be more perfectly combined. I hope this article can play a role in inspiring others to contribute to other practical 3D movies dedicated to theoretical research and practical creation. The following conclusions can also be drawn. Firstly, the use of Internet of Things technology when creating traditional film and television scenes can use 3D lighting, textures, and other methods to display richer artistic elements in the scene design. Excellent model and reasonable stage layout are also very important. Therefore, the use of Internet of Things technology can make up for the single shortcomings of traditional production methods. Secondly, the main stage of designing with the Internet of Things technology is not a simple technical copy but requires us to effectively create a second time according to the artistic law of fantasy style, in order to accurately process various parameters and use appropriate materials and textures. Create excellent works with a more artistic atmosphere. Thirdly, when the Internet of Things technology is widely used in film and television art, it must be effectively combined with film and television art and must not conflict with it. It is believed that this emerging Internet of Things art will achieve greater growth in the field of 3D film and television in the near future.

Data Availability

No data were used to support this study.

Conflicts of Interest

The authors declare that they have no conflicts of interest.

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