International Journal for Housing Science and Its Applications
Publish August 6, 2025. Volume 46, Issue 3 Pages 8671-8680

https,//doi.org/10.70517/ijhsa463741

Investigation on New Media Film and Television Special Effects Based on Computer Vision Technology

Pengfei Sun[1,*], Yue Hu[1] and Yan Kang[1]
[1] Shanghai XingJian College, Shanghai, 200072, China
Corresponding authors: (e-mail: spf2050@163.com).

Abstract With the development of the economy and social progress, people's concept of life is gradually changing, and the quality of life is also continuously improving, which has played a significant role in promoting the development of the new media film and television industry. Compared with other countries' film and television special effects, there is still a lot of room for improvement in China's film and television special effects technology, partly due to technological reasons. Therefore, using Computer Vision (CV) technology to study new media film and television special effects is of great significance for enhancing the international competitiveness of Chinese film and television and enhancing China's comprehensive national strength. CV technology has a wide range of applications in three-dimensional (3D) film and television special effects, and has significant application value in enriching and innovating film and television shooting methods, reducing the cost of live action shooting, and other aspects. This article provided an in-depth analysis of the development of CV technology in new media film and television special effects, and compared it with the effects of two-dimensional (2D) film and television, thus hoping to provide technical support for promoting the sustainable development of the new media film and television industry. This article discussed scene 3D reconstruction and character 3D reconstruction based on CV technology, and compared their production efficiency. The experimental results of this article indicated that there were 25 and 106 viewers respectively who were very interested in 2D and 3D films, with 18 and 123 viewers indicating a strong sense of experience in 2D and 3D films. It could be seen that 3D movies and television based on CV technology were more popular because their special effects were very realistic and shocking, which was deeply loved by people.

Index Terms Computer Vision, Special Effects, Three-dimensional Reconstruction, New Media

I. Introduction

New media film and television special effects have emerged with the development of the times, industrial progress, and the development and application of new technologies. How to use visual elements to naturally, smoothly, and efficiently express the ideas of film and television works, and express the emotions of film and television characters, so as to elaborate on the viewing experience and promote the worldview, outlook on life, and values is the core content of film and television. However, due to the relatively lagging development of new media film and television special effects and the immature technology, they are still in a disadvantaged position in the production of Chinese film and television special effects. New media film and television special effects should keep up with the pace of the times and be closely linked to the informationization and intelligence development of the entire society, so as to continuously improve visual impact, shock, and influence. Therefore, the innovation of new media film and television special effects by relevant personnel and the exploration of a new method that is suitable for the characteristics of the times and industry requirements are of great significance for improving the audio-visual quality and creative level of film and television. This has a very important practical role in promoting the healthy and sustainable development of China's film and television industry.

In recent years, with the deep integration and rapid development of CV technology and new media film and television special effects, CV technology has gradually created objective practical value. Wang Yuwei found that CV technology played a key role in film and television special effects and advertising special effects. As a new type of multimedia data, human motion capture data could be used for 3D human model modeling and human motion simulation due to its high fidelity. It provided a feasible method for human motion recognition and modeling based on captured data in video animation [1]. On the basis of studying film and television special effects, Zhang Lei proposed a 3D film and television automatic generation technology based on CV technology. The 3D film and television images were rendered using the object hierarchy and surface layer following information fusion method of animated images, thus achieving 3D reconstruction and dynamic generation of animated images [2]. Xie Xiao-lu

proposed that 3D movies and television became very popular. However, due to insufficient accuracy in mechanical alignment during the shooting process, there were vertical differences between the left and right views of 3D frames. In order to improve reconstruction accuracy, he proposed a 3D reconstruction technology for film and television special effects. Compared with traditional reconstruction methods, this method could obtain higher precision surface normals and better 3D reconstruction quality [3]. Yuan Henning conducted in-depth analysis and research on the simulation of 3D human animation visualization technology by enhancing machine learning algorithms. On the basis of statistical analysis of data obtained by different measurement methods, he achieved human feature parameter extraction based on millimeter wave point cloud data, and used parameterized human modeling software to achieve 3D reconstruction and simulation of the human body [4]. Arshad Mohd Rosli found that in the 3D film and television pipeline, the term rigging was commonly used to describe the process of creating a skeletal system within the completed 3D character geometry and assigning animation controllers to animators to animate 3D characters. His research would focus on the conceptual design of roles and how to implement appropriate techniques and workflows based on the provided primary and secondary data [5]. The above scholars proposed that with the continuous progress of current CV technology, it became an important means of researching and exploring new media film and television special effects.

The development of new media film and television special effects cannot be separated from the deep integration between modern technology and film and television culture, which also cannot be separated from the effective combination of new generation information technologies such as CV, computer graphics and images, big data mining and analysis, machine learning, artificial intelligence, cognitive computing, and film and television creation [6], [7]. With the continuous evolution from traditional information technology to new information technology, the film and television industry is accelerating its pace towards intelligence. China's film and television industry needs to adapt to the requirements of intelligent development, and accurately grasp the trend of the new round of technological revolution and industrial transformation. It needs to carry out more strategic planning and forward-looking deployment, and shift the focus from data and information to other aspects, so as to promote the deep integration of new media film and television special effects and CV technology, and bring new opportunities for the innovative development of film and television special effects [8].

II. 3D Special Effects for Film and Television Based on CV Technology

II. A.3D Technology in Film and Television Special Effects

In the early stages of the development of film and television, computer technology was not yet widespread, and the post production and special effects of film and television were only simple editing and collage. In traditional film and television, special effects were achieved through makeup, setting, and other means [9]. For example, in Journey to the West, the Monkey King's somersault was like jumping off a trampoline. the Monkey King's somersaults are clouds made of cotton, with a background made of physical objects and smoke added to create a heavenly atmosphere. The monsters and ghosts in the film are all portrayed through makeup and masks.

The continuous updating of computers and the widespread application of various devices have greatly improved the production speed and quality of new media film and television special effects. Nowadays, people only need to perform some simple operations to allow computers to automatically combine images and video clips. Film and television special effects can be divided into visual effects and sound effects. The development of visual effects has gone through two periods, namely the film and television period and the computer animation period. Sound effects are generally produced by a collaboration of three parties: onomatopoeia, recording, and mixing.

Figure 1: Different film and television special effects

Nowadays, CV has officially entered the film and television industry and gradually become the main direction of film and television development. From modeling, mapping to post production special effects, CV has penetrated into the film and television industry, thus driving its rapid development [10]. Films such as Lord of the Rings and Kong: Skull Island give people a strong visual impact. Different film and television special effects are shown in Figure 1.

As shown in Figure 1: a is a virtual character from Jurassic Park; b is a special effect scene in the Lord of the Rings; c and d are fragments from Kong: Skull Island. These are all very shocking.

Gravity starts with a beautiful 18 minute long shot, telling a beautiful story. It takes the earth and the space station as the background. The scene ranges from a dead space, to a spaceship hit by debris, to a desperate floating astronaut, to a screw coming in the face. The picture is very real, thus giving the audience a very shocking feeling. Life of Pi presents the spectacular scene of floating islands in the sea to the audience, thus giving people a dual impact in both visual and spiritual aspects and making them dizzy.

In Avatar, a camera is mounted on a helmet to capture subtle facial expressions such as eyeballs and muscles of the character, and more than 90% of the character's facial activity is transmitted to a database for optimization, ultimately forming the facial expressions of the virtual character. In this case, the clarity of the shooting is more than six times higher than traditional facial capture technology, and every tiny shake of the character's eyes, lips, muscles, and even the eyes can be captured. In previous film and television productions, some facial expressions and action shots often had some flaws in the later processing, which could not meet the overall requirements of the film. At this point, it was necessary to remake [11], [12]. In Avatar, people can create the necessary facial and dialogue images based on the captured and saved data, making the character's expressions more rich. For example, the pain of Netrey's father's death, despair, the wildness and bravery of fighting enemies, all vividly depict the character's personality, allowing people to feel real emotions in this virtual world and better integrate into this character. The film and television special effects in Warcraft are shown in Figure 2:

Figure 2: Special effects in Warcraft

As shown in Figure 2, the film and television version of Warcraft has ushered in a new era, with a typical film and television special effects shot size of around 300 to 400. There are over 2000 Warcraft, even surpassing the Avatar, which used to sell visual effects. The muscles and fangs on the orc's face are even more lifelike. In terms of visual effects, Durotan wore a gentle smile on his face when talking to his wife. When he fought against Gul'dan, his facial muscles would be twisted with anger, while Gul'dan would express his ambition with his insidious eyes. As the emotions of characters change, the effects of special effects would also improve. The production team of Warcraft created fur special effects to showcase the length, color, softness, curl, and different weaving methods and tightness of orc fur. Every action of a character would have an impact on the response of sensors, even the eyes, which would make facial capture more accurate in responding to the character.

II. B.3D Reconstruction Based on CV

The so-called CV is to endow machines (or computers) with human "seeing" ability, which means using computers and cameras to replace human eyes to complete 3D measurement and tracking of objects, and then processing images to match them with human eyes, thus achieving better results. Its main research content is to map 3D scenes to single or multiple images, such as 3D modeling of film and television virtual assets, collection of human actions and expressions based on images or videos, modeling of digital characters and scenes, control and generation of interactive characters' actions, etc.

(1) 3D reconstruction of digital characters

The research focus of this article was to use CV technology in film and television to achieve an effective and realistic 3D character. This method only requires the input of 3D point clouds and unshaded images of the character's face to obtain a realistic 3D character. The generated model is simple and standardized, and can be directly used for new media film and television special effects, thus greatly improving the production efficiency of virtual characters.

According to reports from major media outlets, the application of CV technology is reflected in movies and TV shows such as Star Wars, Matrix, and Lord of the Rings, demonstrating the charm of characters. People can simulate real-life facial expressions through computers, such as the geometric shape of characters' faces, skin texture, wrinkles, and even the movement of hair, allowing virtual characters to express real and complex emotions, thereby attracting the attention of the audience. For example, the most exciting scene in the Matrix Reloaded is "Neo vs. one hundred secret service Smiths", which cannot be performed by real people. The film and television producer copies the real person and live materials to the computer, creates a virtual character, and performs in this virtual scene.

Stereo calibration is used to determine the geometric relationship of the camera in space. When calibrating stereo vision, first of all, it is necessary to obtain the internal parameters of the two cameras with the calibration of a single camera, and then use stereo calibration to obtain the structural parameters between the two cameras, that is, the relative attitude and position between the cameras, as well as the rotation matrix R and the movement vector. The left camera coordinate system is used as the world coordinate system:

$$R = R_r \left(R_l \right)_t \tag{1}$$

$$t = t_r - Rt_l \tag{2}$$

Among them, R_r and R_l are the rotation matrix of the left and right cameras respectively. The same object is observed from two angles to obtain images of the object at both angles. The external parameters of the object are calibrated using a camera, and the 3D spatial position information of the object is obtained using a re projection matrix. This method is simple in calculation and yields a 3D point cloud with high accuracy. The projection relationship between spatial 3D points and 2D image points is represented as sP_1:

$$sP_1 = K\left[R, t\right]P \tag{3}$$

Through affine transformation, the known point cloud is rotated, translated and non-uniformly reduced to obtain the known basic grid, which provides a better initial value for subsequent iterative calculation and compares it with the known data. In the corresponding feature area of the point cloud, feature points are calibrated and used to achieve initial alignment between the basic grid and the scanned point cloud. It is assumed that the feature point α_i of the basic grid is as follows:

$$\alpha_i = \left[x_i, y_i, z_i, 1\right]^T \tag{4}$$

The least square method is used to find the optimal value of the affine transformation matrix, which is applied to the basic grid. That is to say, the initial alignment between the basic grid and the scanning point cloud is achieved, so that a good initial value can be provided for the iterative deformation process, thus greatly improving the calculation speed.

In order to iteratively deform the basic mesh and approach the scanning point cloud, only the vertex coordinate positions are iteratively optimized, and the energy function $E\left(v\right)$ is defined as follows:

$$E\left(v\right) = E_{dist}\left(v, p\right) + \alpha E_{dist}\left(v\right) \tag{5}$$

Among them, v refers to the basic mesh vertices that need to be optimized, while p refers to all vertex vectors on the point cloud. In addition, $E\left(v\right)$ has certain feature point constraints on data missing and data noise on the scanned point cloud:

$$E_i\left(v\right) = \left(v_j - \frac{1}{\deg\left(v_j\right)} \right)^2 \tag{6}$$

$\deg(v_j)$ represents the dimension of v. The feature point constraint $E_i(v)$ represents the distance between all corresponding feature points of the deformed basic grid and the scanned point cloud, and also represents the degree of correspondence between the deformed basic grid and the scanned point cloud's feature points.

Using virtual 3D characters in movies and television can also save production costs. Without virtual characters, it is impossible to restore the battle between humans and demons in Lord of the Rings to reality [13]. This is because it means finding thousands of characters to play samurai and fighting each other in armor, thus making such a huge investment unbearable. In the end, only a few real characters were actually performing in this scene, while the rest were a large number of virtual characters generated by computers. The magnificent scenes in the original work were perfectly copied onto the screen.

(2) Scene 3D reconstruction

For scenes in a film and television, people can quickly digitize them in 3D, and also achieve editable and recombinable functions, which can meet the needs of various image production. This can avoid visual problems caused by the lack of some scenes in the post production process of the film and television. At the same time, similar virtual scenes can also be provided when shooting film and television works with similar themes to reduce shooting costs. 3D reconstruction, as an important research direction in CV, involves shooting from different perspectives using two cameras in the same scene. Based on the principle of triangulation and stereo matching, the 3D coordinates of each object in the scene are restored, and rendered and reconstructed.

In space, the horizontal and vertical lines are the x and y axes respectively, and the main axis is the Z axis. Assuming that the principal axis Z intersects the image plane at the principal point as follows:

$$Z\begin{pmatrix} x \\ y \\ 1 \end{pmatrix} = \begin{pmatrix} f & 0 & p_x \\ 0 & f & p_y \\ 0 & 0 & 1 \end{pmatrix} \tag{7}$$

Formula 7 can also be written as follows:

$$Z\begin{pmatrix} x \\ y \\ 1 \end{pmatrix} = \begin{pmatrix} f & s & p_x \\ 0 & \alpha f & p_y \\ 0 & 0 & 1 \end{pmatrix} \tag{8}$$

Among them, the scale factor α indicates that the image captured by the camera is not square but approximately rectangular. Neither the camera nor the image coordinate system can provide the exact position of an object in 3D space. In addition, the position of the camera is usually not fixed. In capturing images, position conversion is required, so it is necessary to construct a coordinate system that can describe the positions of all objects in the scene, including the camera, known as the world coordinate system.

The transformation from the world coordinate system to the camera coordinate system yields the following formula:

$$X_{cam} = \begin{pmatrix} R & -RC \\ 0 & 1 \end{pmatrix} X_W \tag{9}$$

C is the center of the camera. The focus of camera calibration in 3D is to determine the positional relationship between cameras, without considering the specific position of the camera in the scene. According to the known internal parameters of the camera and the fundamental matrix, the essential matrix H is calculated:

$$H = F_2^T K_{12} F_1^T \tag{10}$$

Among them, F_1^T and F_2^T represent the internal parameter matrices of the two cameras. In virtual scenes, the director can not only freely change the actions of the characters, but also freely change the scene, lighting, and lens angle, thus providing more creative space for the director. For example, in film and television, the movement speed of the camera is very high, which brings a huge visual impact to the audience. This is something that cannot happen when shooting in the real world.

2.3 3D Scene and Character Production Efficiency

Many film and television works that use virtual characters not only provide people with the maximum visual enjoyment, but also achieve high artistic effects and generate good commercial effects. This article closely combined the actual situation in film and television production and analyzed the production efficiency of 36 3D

scenes and 36 3D characters based on CV technology. The efficiency of 3D scene and character production is shown in Figure 3:

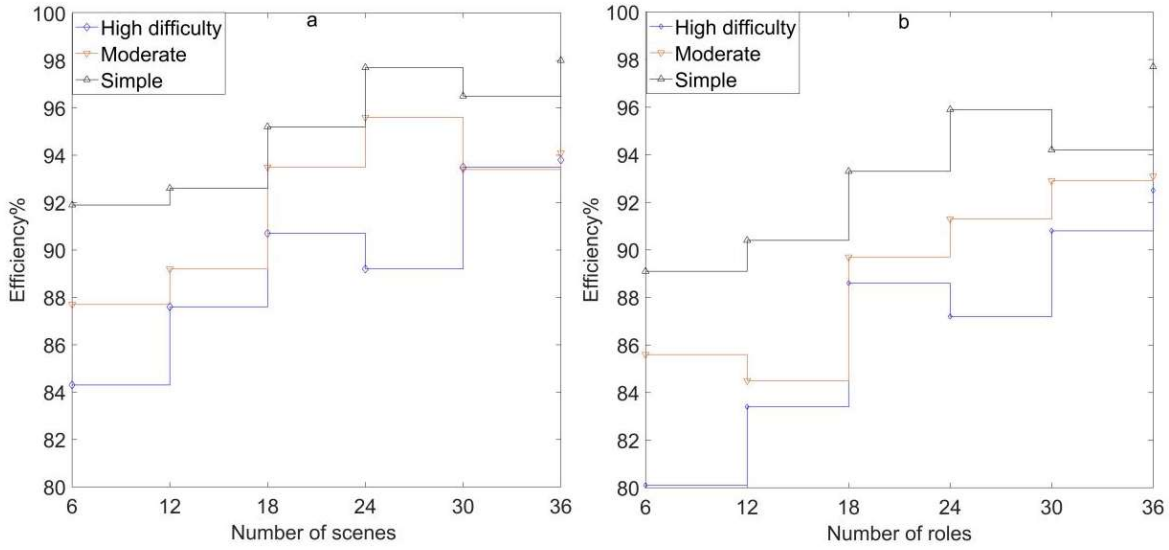

Figure 3: 3D Scene and character production efficiency

Figure 3 (a) Scene production efficiency

Figure 3 (b) Character production efficiency

As shown in Figure 3: Figure 3 (a) compared the production efficiency of 3D reconstruction for scenes with different difficulty levels. When there were 6 high difficulty scenes, moderate difficulty scenes, and simple scenes that require 3D reconstruction, the production efficiency was 84.3%, 87.7%, and 91.9%, respectively; when there were 36 high difficulty scenes, moderate difficulty scenes, and simple scenes that require 3D reconstruction, the efficiency was 93.8%, 94.1%, and 98%, respectively. It could be seen that the production efficiency of high difficulty scenes was lower than that of moderate difficulty scenes and simple scenes. Although the efficiency of scene production varied with different levels of difficulty, the overall production efficiency was still high at over 80%.

Figure 3 (b) shows that when there were 6 high difficulty characters, moderate difficulty characters, and simple characters to be created, the production efficiency was 80.1%, 85.6%, and 89.1%, respectively; when there were 36 high difficulty characters, moderate difficulty characters, and simple characters to be created, the production efficiency was 92.5%, 93.1%, and 97.7%, respectively;

CV technology plays a very important role in special effects. It is a technology that can measure and record the motion trajectory or posture of objects in real 3D space in real time and accurately, and reconstruct the motion state of moving objects at every moment in virtual 3D space. By conducting 3D numerical analysis of human movements and expressions, realistic 3D motion data can be obtained for simulation. This can be used to reproduce various complex actions and expressions, thereby improving the effectiveness of new media film and television special effects. More importantly, this not only improves the efficiency of animation production, but also greatly reduces labor costs and shortens the production cycle. Animation workers can spend more time on creative and expressive details, thereby improving the overall production level.

III. Experimental Evaluation of Film and Television Special Effects Based on CV Technology

With the comprehensive entry of human society into the era of new media and high-speed internet, the methods of film and television special effects are also continuously innovating and developing, showing characteristics such as technicality, interactivity, diversification, networking, and virtualization [14]. The continuous pursuit of excellent visual quality and viewing experience by relevant personnel gives the audience a sense of immersive and lifelike experience, which is the development trend of film and television special effects technology [15]. In order to understand the differences between 2D and 3D special effects in the eyes of audiences, this article selected 200 viewers from a certain city for investigation and analysis. They watched two movies on the same day. They

watched traditional 2D movies in the morning and 3D movies based on CV technology in the afternoon. Their experiences and feelings were analyzed.

III. A. Interest Comparison

Film and television have become an indispensable form of entertainment in people's lives. With the development of the film and television industry, watching movies has become a way for young people to pass time. Major film and television companies have also well grasped the special effects of film and television, and have launched 3D effect film and television works. Magnificent flames, majestic peaks, and even tornadoes appear vividly before people's eyes. Although traditional 2D film and television are still classic, the continuous innovation of technology requires the use of 3D special effects to enrich the screen during the production process. The audience's level of interest in 2D and 3D films is shown in Table 1:

Table 1: Audience's level of interest in 2D and 3D film and television

Degree of interest	2D	3D
Very interested	25	106
Relatively interested	24	83
No interest	71	11
Very uninterested	80	0

As shown in Table 1, there were 25 and 106 viewers who were very interested in 2D and 3D films, respectively; there were 24 and 83 viewers who were relatively interested in 2D and 3D films, respectively; there were 80 and 0 viewers who were very uninterested in 2D and 3D films, respectively.

III. B. Sense of Experience

In the creation of film and television, the design of scenes is very important and crucial. It not only reflects various elements and entities in the space related to the subject, but also plays a reference role. In the plot of film and television, scenes convey information about the existence of various characters and things, as well as their associations. In the film, the lens space should not only have a vivid feeling, but also have a mysterious and compact feeling. In different situations, different scenes need to be designed and related to the ups and downs of the film's plot development, as well as the psychological changes of the protagonist and other characters in the film. The free spatiotemporal perspective, magnificent scenes, and realism in 3D movies and TV can all give people a sense of immersive experience. The experience of 2D and 3D film and television is shown in Table 2:

Table 2: Experience of 2D and 3D film and television

Experience	2D	3D
Very strong	18	123
Relatively strong	21	75
Poor	59	2
Very poor	102	0

As shown in Table 2, 18 and 123 viewers respectively indicated that the 2D and 3D film and television experiences were very strong; 21 and 75 viewers expressed a relatively strong sense of experience in 2D and 3D film and television; 102 and 0 viewers indicated that the 2D and 3D film and television experiences were very poor.

The intelligence of the film and television industry would also become an important development direction. China's film and television industry needs to combine data, technology, and applications, accelerate the implementation of the collection, processing, storage, mining, analysis, and visualization of film and television data, and promote the in-depth application of CV technology. The film and television process and industrial structure should be optimized, and the optimization and upgrading of film and television special effects, film and television production processes, and industrial service models should be promoted. The transformation of the film and television industry from providing raw data services to providing deep data services needs to be promoted, so as to achieve the goal of scientifically discovering industry laws, accurately grasping industry trends, and effectively avoiding industry risks.

III. C. Sense of Reality

With the continuous development of the film and television industry, it brings people an artistic feast and even more amazing visual enjoyment, especially the further application of 3D film and television special effects, which adds

new added value to the new era of film and television works. CV technology is an important factor driving the development of the film and television industry and gradually penetrating into people's daily lives. With the improvement of technological level and the diversification of auxiliary methods, CV technology would develop towards the depth and breadth of the animation industry, and would play a crucial role in the film and television industry, thus providing audiences with more visual experiences and sense of reality. The sense of reality of 2D and 3D film and television is shown in Figure 4:

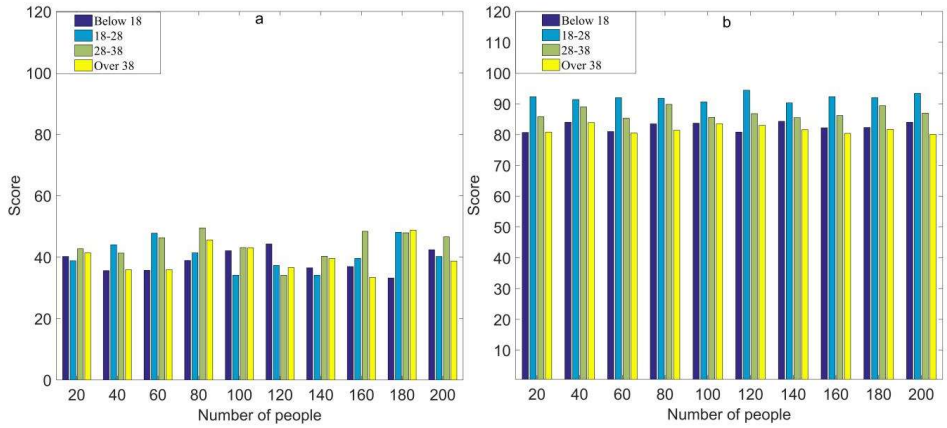

Figure 4: Sense of reality of 2D and 3D film and television

Figure 4 (a) Sense of reality of 2D Film and Television

Figure 4 (b). Sense of reality of 3D Film and Television

As shown in Figure 4: Figure 4 (a) shows that in a survey of 200 viewers, it was found that viewers under the age of 18 rated 2D film and television sense of reality the highest at 44.3 points, while viewers aged 18-28 rated 2D film and television sense of reality the highest at 49.8 points. The highest rating for 2D film and television sense of reality among audiences aged 28 to 38 was 47.3; audiences over the age of 38 rated 2D film and television sense of reality the highest at 48.2 points. It could be seen that audiences of any age group did not have high ratings for 2D film and television sense of reality.

Figure 4 (b) shows that viewers under the age of 18 had the highest rating for 3D film and television sense of reality at 85 points, while viewers between the ages of 18 and 28 had the highest rating for 3D film and television sense of reality at 94.5 points. The highest rating for 3D film and television sense of reality among viewers aged 28 to 38 was 89.2; audiences over the age of 38 rated 3D film and television sense of reality the highest at 84.8 points.

3D film and television is a 3D technology based on images, which has gradually evolved from 2D images. Its manipulation of space has become more casual and in line with the actual situation, thus creating realistic scenes to enhance the appeal of the work.

III. D. Viewing Effects

Due to the application of CV technology, effective shading or related texture processing can be used in the post production process of film and television works, resulting in more vivid and vivid effects. CV technology can also be used to modify the facial expressions of characters in the work, so as to achieve better expression effects. By using CV technology to process dynamic images, different special effects can be achieved, which can restore scenes in movies and enhance the visual experience of movies and television. The viewing effect is analyzed from three aspects: sound, vision, and emotion. The viewing effect of 2D and 3D films and television is shown in Figure 5:

Figure 5 (a) Viewing effect of 2D film and television

Figure 5 (b). Viewing effect of 3D film and television

As shown in Figure 5: When the number of viewers in Figure 5 (a) was 20, the scores of 2D film and television sound, visual, and emotional were 48.6 points, 30.1 points, and 62.9 points, respectively; when the audience size was 200, 2D film and television scores for sound, visual, and emotional aspects were 47.8 points, 31.3 points, and 60.5 points, respectively; in terms of sound, visual, and emotional scores, emotional scores were higher.

From Figure 5 (b), it could be observed that when the number of viewers was 20, the sound, visual, and emotional scores of 3D film and television were 76.0 points, 87.1 points, and 80.2 points, respectively; when the audience size was 200, the sound, visual, and emotional scores of 3D film and television were 75.9 points, 86.6 points, and 80.7 points, respectively; 3D film and television had high scores in terms of sound, vision, and emotion, with scores above 75.

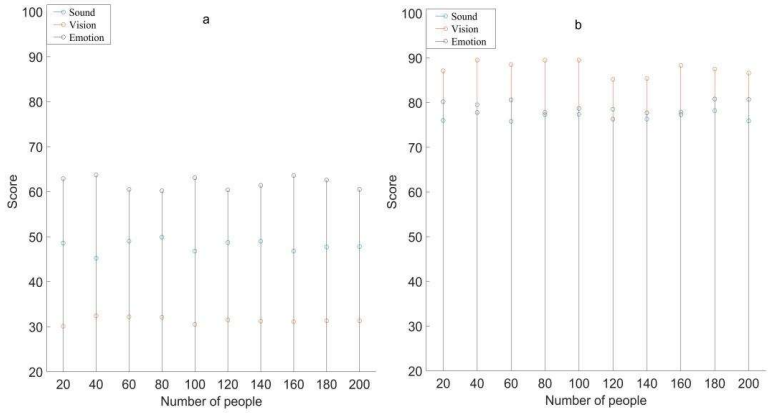

Figure 5: Viewing effects of 2D and 3D film and television

Science and technology are the foundation and precursor of the film and television industry. Therefore, the transformation and upgrading of China's film and television industry must fully absorb the advanced experience of other countries, adapt to China's national conditions, and embark on a creative development path with Chinese characteristics. Therefore, film and television special effects need to be combined with high-tech methods such as CV, computer graphics and images, machine learning, and virtual photography in order to synchronize the development of film and television effects with the times. People should take the research and application experiments of key supporting technologies for new special effects in film and television as an opportunity to actively expand the visual perception and cognitive models of film and television, so as to achieve innovative development at a higher level.

III. E. Cost

2D film and television is actually a traditional handcrafted film and television, with cumbersome processes and high requirements for creators. Generally, it is produced by multiple people working together to complete the preliminary drawing. However, with the advancement of technology, 2D film and television no longer need to be as complex as before. Although the order of this work has not changed, the emergence of many technological software has made the production and modification of film and television special effects more convenient, thus greatly saving manpower and material resources, and reducing the production cost of 3D film and television. With the continuous development of 3D film and television, more and more high-quality film and television works are entering people's vision and attracting people's attention.

The labor production costs for 2D and 3D films are shown in Table 3:

Table 3: Labor production costs

Cost	2D	3D
Very high	98	26
Relatively high	85	37
Low	15	82
Very low	2	55

As shown in Table 3, there were 98 and 26 viewers who believed that the manual production costs of 2D and 3D films were very high, respectively; there were 85 and 37 viewers who believed that the manual production costs of 2D and 3D films were relatively high, respectively; there were 2 and 55 viewers who believed that the manual production costs of 2D and 3D films were very low, respectively.

3D film and television can simulate objects in the real world, with characteristics such as realism, accuracy, and plasticity, so it has been widely used in many fields. The application of CV technology greatly reduces the cost of film and television production, while also providing protection for the safety of performers. As a result, the cost of 3D film and television would be greatly reduced, and the visuals would be even more stunning. In today's society, people's demand for material and spiritual enjoyment is constantly increasing. Taking film and television as an example, in addition to attracting the audience's attention, scripts also need to have thrilling 3D special effects, which has brought important popularity to new media film and television.

IV. Conclusions

With the rapid development of science and technology, a large number of CV technologies have penetrated into people's daily lives, and CV technology has had a significant impact on film and television production personnel. At the same time, it has directly changed the way staff work. People's attention to film and television is increasing, so there would also be corresponding requirements for the viewing effect of the film and television. In order to make China's film and television industry more competitive, this article used CV technology to improve the effectiveness of new media film and television special effects. After analysis, this article found that the development of CV technology could better promote the birth of a large number of excellent film and television works, and also provide film and television special effects workers with broader development space, thus creating a large number of film and television works. This article explored the 3D reconstruction of film and television scenes and characters based on CV technology, and found that audiences appreciated the shock generated by 3D film and television special effects more. The realism, experience, and viewing effects they bring were all eye-catching. CV technology would one day be more widely applied and bring more gospel to people.

Funding

This work was supported by Shanghai Association of Higher Education (SAHE) 2024-2026 Annual planning research topic "Research on the Digital Transformation and Development of Film and Television Majors in Higher Vocational Education under the Background of Artificial Intelligence"

Project Number: 2QYB24040

References

[1] Wang Yuwei. "3D Dynamic Image Modeling Based on Machine Learning in Film and Television Animation." Journal of Multimedia Information System 10.1 (2023): 69-78.

[2] Zhang Lei. "Application research of automatic generation technology for 3D animation based on UE4 engine in marine animation." Journal of Coastal Research 93.SI (2019): 652-658.

[3] Xie Xiao-lu. "Three-dimensional reconstruction based on multi-view photometric stereo fusion technology in movies special-effect." Multimedia Tools and Applications 79.13-14 (2020): 9565-9578.

[4] Yuan Henning, Jong Han Lee, and Sai Zhang. "Research on simulation of 3D human animation vision technology based on an enhanced machine learning algorithm." Neural Computing and Applications 35.6 (2023): 4243-4254.

[5] Arshad Mohd Rosli, Kim Hae Yoon,Azaini Manaf. "Physical rigging procedures based on character type and design in 3D animation." International Journal of Recent Technology and Engineering 8.3 (2019): 4138-4147.

[6] Cui, Qiang, and Anil Sharma. "Digital media animation control technology based on maya." Recent Advances in Electrical & Electronic Engineering (Formerly Recent Patents on Electrical & Electronic Engineering) 14.7 (2021): 735-743.

[7] Newsinger, Jack, and Doris Ruth Eikhof. "Explicit and implicit diversity policy in the UK film and television industries." Journal of British Cinema and Television 17.1 (2020): 47-69.

[8] Guo, Jian,Tong He, Leonard Lausen,Mu Li,Haibin Lin,Xingjian Shi,et al. "Gluoncv and gluonnlp: Deep learning in computer vision and natural language processing." The Journal of Machine Learning Research 21.1 (2020): 845-851.

[9] Lotz, Amanda, Ramon Lobato, and Julian Thomas. "Internet-distributed television research: A provocation." Media Industries 5.2 (2018): 1-13.

[10] Berridge, Susan. "Mum's the word: Public testimonials and gendered experiences of negotiating caring responsibilities with work in the film and television industries." European Journal of Cultural Studies 22.5-6 (2019): 646-664.

[11] Kim, Seongseop, Sangkyun Kim, and James F. Petrick. "The effect of film nostalgia on involvement, familiarity, and behavioral intentions." Journal of Travel Research 58.2 (2019): 283-297.

[12] Perkins, Claire, and Michele Schreiber. "Independent women: from film to television." Feminist Media Studies 19.7 (2019): 919-927.

[13] Lotz, Amanda D. "Teasing apart television industry disruption: Consequences of meso-level financing practices before and after the US multiplatform era." Media, Culture & Society 41.7 (2019): 923-938.

[14] Herbert, Daniel, Amanda D. Lotz, and Lee Marshall. "Approaching media industries comparatively: A case study of streaming." International journal of cultural studies 22.3 (2019): 349-366.

[15] Forceville, Charles, and Sissy Paling. "The metaphorical representation of depression in short, wordless animation films." Visual communication 20.1 (2021): 100-120.