

Innovative Applications and Challenges of Artificial Intelligence in Film and Television Post-stunts

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ABSTRACT

With the rapid development of artificial intelligence technology, the combination of science and technology with the film industry, as well as film and television creation, has become increasingly close and is triggering profound changes in the entire industry. The wide application of AI technology in the creation of post-production stunts in film and television not only provides innovative solutions to improve the production quality of film and television artworks but also brings unprecedented challenges.

Keywords: *Artificial intelligence, Film and television stunts, Innovative applications, Challenges.*

1. INTRODUCTION

From June 25 to 30, 2024, the first China-Chongqing Science and Technology Film Week was held in Yongchuan District. Artificial Intelligence became the most popular topic of focus in this movie week. The virtual production and generative artificial intelligence (AIGC) technologies, which are closely related to AI, attracted extensive attention from academia, industry and the technology sector. Experts and industry insiders agreed that these two technologies will become the main direction of future technological film and television development. Through the discussions and demonstrations at this Film Week, we can gain a deeper understanding of the application prospects of AI technology in film and television production, as well as its far-reaching impact on the future development of the industry.

2. ARTIFICIAL INTELLIGENCE

Artificial Intelligence (AI), i.e., intellectual apparatus or machine intelligence, has become an important direction in the development of modern technology[1]. In February, 2024, the release of the Sora literate video software by the AI company OpenAI attracted much attention in the industry. In terms of generated visuals, Sora is indeed superior to previously released systems such as MidJourney and Pika. By comparing and analyzing the big

model behind Sora with ChatGPT 4.0, it can be found that the two have a high degree of similarity in their core technologies.

This technological innovation will not only have a profound impact in the fields of design, film and television education and careers, but it will also promote the development of creativity and change the nature of careers such as software programming. Ordinary people will also fully embrace AI, and smart assistants will become important companions in everyday life. This change will undoubtedly drive social progress, but at the same time, we need to be wary of the potential risks. By delving into the application and impact of AI technology, we can better understand its potential and challenges in various fields, thus guiding future development.

3. FILM AND TELEVISION STUNTS

Film and television stunts can be divided into two categories: one is the mechanical stunt effect realized by using sets, props, pyrotechnics and other mechanical means; the other is the visual stunt effect produced by using high-tech photography. In the past hundred years, the development of film and television stunt effects has gone through three main stages:

- The use of the camera's function to produce stunts
- Synthetic photography and optical production of stunts

- Electronic synthesis and mathematical stunts

Film and television stunts occupy a pivotal position in modern movie shooting, especially in war films, disaster films and science fiction films; the stunt effect is a great show, creating many breathtaking visual wonders. These stunts not only greatly improve the ideology of film and television art, ornamental and interesting, but also promote the continuous progress and innovation of movie art. Through the continuous exploration and application of film and television stunt technology, filmmakers are able to reproduce complex scenes and plots more realistically, thus enhancing the audience's sense of immersion and visual experience.

3.1 Connotation of Film and Television Post-production

Film and television post-production refers to the post-processing work carried out by the crew on the content of the film after the shooting is completed. Its purpose is to make the presentation of film and television works reach the expected level and enhance the audience's visual and auditory experience by adding special effects and text and processing the sound.

3.2 Content and Methods of Film and Television Post-production

Film and television post-production covers editing, special effects production, sound production, and traditional editing methods. Editing, i.e., assembling shots and splicing shooting segments into a whole to enhance the coherence of a film or television work, is the most common post-production method. Special effects production is also a common post-production method, usually including special transitions, fades and circles. As the level of film and television production continues to improve, the processing of 3D multi-dimensional special effects has gradually become an important element of special effects processing. Sound production marks the new height of the development of the film and television industry, especially the emergence of stereo sound, which makes the presentation of film and television works more exciting, and also puts forward new production requirements, and promotes the enrichment of related film theories, which guides sound production [2]. The traditional film and television post-production method, known as television editing, is mainly completed on the

editing machine, which is usually a combination of a playback machine and a VCR, and the editor edits through these two machines in conjunction with each other, adjusts the color of the screen and produces subtitles. This traditional linear editing method has limitations; the editor must follow the order of operation and can not insert or delete the picture in the existing picture, and once the error must be re-recorded. It is not only complicated to operate but also binds the imagination of the editors, which could be more conducive to the overall improvement of the post-production level.

4. APPLICATION AND INNOVATION OF ARTIFICIAL INTELLIGENCE IN FILM AND TELEVISION LATE STUNTS

The application of Artificial Intelligence (AI) in the post-production of film and television stunts has become an inevitable trend in the development of the film and television industry in the new era. The introduction of AI technology not only improves the efficiency and quality of post-production but also opens up a lot of new possibilities and promotes the innovation and development of film and television stunts [3].

4.1 Automated Effects Generation

Automated special effects generation is an important application area for AI in film and television post-production. Through image generation techniques, AI is able to effectively generate pictures of specific objects, as well as backgrounds and images related to the video. These techniques not only improve the efficiency of special effects production but also significantly enhance the quality and diversity of images. Image generation techniques utilize deep learning models such as Generative Adversarial Networks (GAN) to create high-quality images. BigGAN is an advanced generative adversarial network capable of generating high-quality images. With independent models, BigGAN can generate backgrounds and images that are relevant to the video and can control the diversity of the image. For example, BigGAN can generate an image of a stallion, describing its reddish-brown fur, black hooves, and short tail. Text-to-image generation techniques utilize variants of GANs to generate more accurate images from textual descriptions. For example, by describing "three skiers, all carrying school bags, skiing down a high snowy hill", the AI can generate a corresponding image. This technique can be

trained on different datasets to meet the requirements of textual descriptions and generate images of monolithic entities or multi-body scenes. The image manipulation class GAN can analyze the edges of the entities set the contours based on the analysis results, and generate high-quality entity images. This technique can directly generate example image material with personalized characteristics and reduce the cost of manually producing material.

Application examples include studio decoration, movie and TV effects and background generation. In terms of studio decoration, decorations for different TV programs can be generated through simple operations. For example, using AI to generate logos and related items for different programs makes the studio set richer and more diverse. In terms of movie and television special effects, AI can automatically generate complex visual effects such as smoke, flames and explosions. Through image generation technology, AI can simulate natural phenomena and complex physical effects, making special effects more realistic and natural. In terms of background generation, AI can generate background images for movies or TV shows, reducing the need for live-action shooting. For example, by generating different background images of cityscapes and natural scenery, the visual effect of the movie is enhanced. Through automated special effects generation technology, film and television production can significantly reduce the cost of manually producing material and save a lot of human and material resources. Not only improves the production efficiency but also enhances the overall quality and economic benefits of the film. The application of AI technology makes film and television post-production more convenient and efficient and promotes the development and innovation of the entire film and television industry.

4.2 Image and Video Restoration

Image and video restoration is a key area in film and television post-stunt production, and traditional methods are often time-consuming and laborious, and the results could be more satisfactory. The introduction of artificial intelligence, especially the application of deep learning and image processing technology, has greatly improved the efficiency and quality of image and video restoration. The application of AI in image and video restoration is mainly embodied in the de-field effect, automated restoration and color correction and

enhancement[4]. The de-fielding effect refers to the elimination of inter-field interference in the video to make the picture clearer. Traditional algorithms often need to be more efficient and effective in dealing with such problems. Through AI, especially deep learning models, these interferences can be efficiently identified and eliminated to restore the picture to its original HD state. In terms of automated restoration, AI technology can automatically repair damaged parts of images and videos, such as scratches, noise, and blurring. For example, using Convolutional Neural Networks (CNN), AI can automatically fill in the missing parts of an image to make it complete again. For color correction and enhancement, AI can automatically perform color correction and enhancement to restore vivid colors to old movies or low-quality videos. By training the model, AI can learn how to convert black and white videos into color videos or enhance the contrast and brightness of videos.

In terms of examples and benefits, AI technology has significantly improved the efficiency and quality of image and video restoration. With traditional methods, a skilled restorer can only process one shot a week, while with AI, a GPU can complete the restoration task in roughly one minute. Through parallel processing, efficiency can be increased by hundreds or thousands of times. For example, the "China Film - Sense" company, using AI technology, can efficiently handle a large number of simple and repetitive restoration work through the application of AI technology so that practitioners can be freed from simple and repetitive labor, more time to devote to creativity and creation. Not only improves the overall production efficiency but also enhances the creativity and quality of the work.

4.3 Virtual Characters and Digital Doubles

Virtual characters and digital stand-ins are another important application area of AI in film and television production. Through digital virtualization technology, AI can create realistic virtual characters and even replace real actors, providing more creative freedom and possibilities. A typical example is the movie Simone, which was released by an American film company and tells the story of Simone, a virtual actress created by the director using digital virtualization technology. The virtual character Simone in the movie has all the enviable attributes to become an irreplaceable heroine. Through AI technology, the director can create

highly realistic virtual characters that simulate their appearance, expressions, and movements. This technology can be used not only to create entirely new characters but also to replace or enhance the performances of live actors. For digital stand-ins, AI can be used to generate digital stand-ins through facial recognition and motion capture technology, which can be used to replace live actors in dangerous actions or complex scenes. For example, in action movies, AI-generated digital doubles can perform difficult stunts to ensure the safety of the actors.

In terms of image thesaurus and complexity, during the digital editing process, AI needs to build a huge image thesaurus containing various materials for expressions, movements and scenes. The complexity of the image thesaurus-building process requires processing and analyzing large amounts of data to ensure the realism and diversity of virtual characters. Virtual characters and digital stand-in technology provide directors and creators with more creative freedom and can realize many effects that are difficult to achieve with traditional methods. For example, with virtual characters, directors can create fantasy characters and scenes in their films, enhancing the visual effects and view ability of the movie. Through these technologies, AI not only improves the efficiency and quality of film and television production but also opens up new creative space and promotes the continuous innovation and development of the film and television industry.

5. CHALLENGES OF ARTIFICIAL INTELLIGENCE IN FILM AND TELEVISION POST-STUNTS

While AI has shown great potential for post-production stunts in film and television, it also faces challenges such as technical limitations, ethical and legal issues, industry acceptance, and costs and resources.

In terms of technical constraints, the complexity of AI algorithms and computational resource requirements pose barriers for small and medium-sized film and TV production companies, while latency and performance issues need to be addressed in real-time applications. Optimized algorithms and hardware acceleration can increase processing power and reduce costs and resource requirements.

Ethical and legal issues include unclear copyright ownership of AI-generated content and

privacy protection in data collection and use. The development of clear laws and regulations and the adoption of data anonymization and encryption technologies are solutions.

In terms of industry acceptance, AI technologies may cause resistance from traditional practitioners and require them to acquire new skills. Providing training and educational opportunities and developing AI courses for the film and television industry can facilitate skills transition and adaptation.

In terms of costs and resources, AI technology development and applications are costly, especially for small and medium-sized companies, while computational resources and energy consumption pose challenges to environmental sustainability. These issues can be addressed by collaborating to share resources, utilizing open-source tools, seeking funding, developing efficient algorithms and adopting green energy.

These challenges need to be addressed through technological innovation, policy development, and industry collaboration in order to achieve widespread adoption and sustainable development of AI in film and television post-production stunts.

6. CONCLUSION

Artificial Intelligence (AI), as a product of the information age, is significantly affecting film and television production. Making full use of AI technology can greatly enhance the beauty and production quality of film and television works and enrich the cultural life of the public. By fully integrating AI technology with the film and television industry, we can realize the deep integration of information technology and film and television creation, promote the prosperity of the socialist cultural market, and provide strong cultural support for the construction of the socialist market economy.

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