

Analysis of AIGC in Film and Television Production

BiYu Tang^{1,a,*}

¹*School of Business, Guangdong University of Foreign Studies, Guangzhou, 511436, China
a. 18022868896@163.com*

**corresponding author*

Abstract: The development of film and television is inextricably connected to the progress of science and technology. This paper commences by examining the utilization of AIGC in film and television production and its effects on the sector. It is determined that the implementation of AIGC in script production, scene production, post-production, and other areas reduces a great deal of time, production, and labour expenses, broadens the scope of film and television production, and offers the potential for inexpensive mass film and television production. Despite the progress made in the film and television industry, AIGC still has to confront problems such as a lack of logical consistency and emotional detachment, which necessitates human creators. It may also lead to the disappearance of creative works, a copyright crisis and the impairment of labour rights, with the risk of massive unemployment. It is essential to investigate the provisions of AIGC Guidelines.

Keywords: AIGC, artificial intelligence, Film and Television, Application scenarios

1. Introduction

The emergence of ChatGPT, Dall-e2, midjourney, and other AI painting programs on the web has sparked a great deal of enthusiasm for AI-Generated Content (AIGC). It took only two months for ChatGPT to reach 100 million monthly active users. The massive amount of content data generated by participants, and public acceptance of AIGC has increased significantly.

The emergence of AI technology has enabled AIGC to become more widely used in the film and television industry, with its applications ranging from scriptwriting and video editing to scene production and special effects. In spite of this, they can also lead to copyright violations, a lack of creativity, and violations of workers' rights and interests. On July 14th, 2023, the Screen Actors Guild declared the start of a strike, which was supported by more than 160,000 members, including actors, stuntmen, voice actors, motion-capture actors, models, radio hosts, etc. The AMPTP's aspiration to facilitate "a revolutionary technology" enabling AI to supplant actors in the future, a proposition that sparked significant discontent among actors' unions, played a pivotal role in the strike. So, how is AIGC being used in film and television? What purpose has it served? What is the trajectory of future growth? What challenges does it entail?

2. Definition of AIGC

AIGC (Artificial Intelligence Generated Content) is a type of technology that is able to generate content that is applicable to a wide range of situations by utilizing AI techniques such as generative adversarial networks and large pre-trained models, and by learning and recognizing existing data.[1]

In simple terms, AI-generated content describes pieces of writing or designs that were created by machine learning based on human inputs rather than traditional content creation.[2] AIGC can quickly produce a substantial amount of pertinent material in a limited amount of time through the use of training models and analysis of a great deal of data, depending on input conditions or instructions[3]. Currently, AIGC model functions mainly include AI Text Generation i.e. text-to-text (e.g. ChatGPT) and AI Image Generation (e.g. DALLÉ-2)[4], AI Audio Generation which includes text-to-audio as well as speech cloning, AI Video Generation.

3. Application of AIGC in film and television production

The extended duration of the film and television industry's production cycle, which requires a substantial initial investment with a long return on investment, makes it hard to accurately forecast market demand, and renders the entire production process highly unpredictable. Currently, AIGC technology has become increasingly popular in the film and television industry due to its instrumental ability to automatically generate text and images. Despite this, scriptwriting, shooting, and post-production can still be enhanced to create a more user-friendly and comprehensive platform for film and television production.

3.1. Scriptwriting

The production of films and television shows requires the creative team to invest a great deal of effort in refining the script, thus creating scripts is a critical part of the process. Consequently, it is critical to employ tools to cut expenses and enhance productivity in the creation of plays. AIGC is able to analyze and generalize a great deal of scripts, quickly create scripts, and help authors create content.[5]

In 2016, the "Benjamin" system employed LSTM neural networks to create text in the short film *Sunspring*, demonstrating how AI has been utilized in film and television screenwriting since a few years ago; however, the works with AI as the sole screenwriter often lack consistency and authenticity. The collaboration between humans and computers serves as a means of creation, offering a promising outcome. In 2017, *Sunspring*'s original creative team unveiled *It's No Game*, which was a remarkable upgrade from its forerunner in terms of narrative organization, story structure, and line writing, which is indispensable to director Oscar Sharp. As AI technology progresses, AIGC's scripts from 2020 onwards will be more cohesive and logical, such as *Solicitors* based on GPT-3 and *The Safe Zone* based on ChatGPT, however, there is still a discrepancy between the quality and complexity of the film and the work of the human audience.

Nowadays, screenwriters are utilizing Artificial Intelligence in their scripts. AIGC can be employed to bridge the writing voids, rapidly grow, augment existing ideas, and capitalize on the AI's multiple choices for particular goals. AI possesses the capability to employ the acquired knowledge from prior research to provide various choices for specific objectives, including "breaking the siege", "escaping danger", and other dramatic aims. AI can leverage its data analysis capabilities to provide the necessary components for script production, allowing scriptwriters to read and query quickly, thereby reducing the amount of time needed for script production and improving the quality of the scripts. AIGC technology aids in the conversion of text forms and scripts for film and television, relieving screenwriters from the burden of rewriting scripts. The "Novel Adaptation Script" intelligent writing function, launched by Chinese company Haima Light Sail 2021, has been utilized to evaluate and modify a great deal of film and TV scripts in China's film and TV industry, such as *Hi, Mom* and *The Wandering Earth*.

3.2. Scene production

It can be difficult to shoot scenes in traditional film and television, so pre-set and post-production are often required. In order to create a more captivating experience for viewers, the *Transformers* series of films has incorporated a variety of special lens designs, employed various filming techniques to modify the scene's layout, and introduced fresh techniques to experiment with.[6] In recent years, Hollywood movies like *Avengers: Endgame* and *Mulan* have made great use of green screen shooting to make the post-production of the scene easier.

AIGC technology reduces the investment in live-action filming by not only compositing virtual scenes, but also combining it with real-time rendering technology to achieve on-set previews of the results, which greatly reduces post-production time. Stagecraft was extensively utilized in the live-action series *The Mandalorian*, capturing footage within a 270° circle of LED screens, ascending to a height of approximately 6 meters, while the actors exhibited their acting within a physical performance space measuring approximately 23 meters in diameter, linked to a technical terminal. The computer image simulation technology was used to quickly calculate the LED 3D background scene, and then modify it to match the camera's movement. The director was able to provide real-time previews of the pictures and assist the actors by accurately reflecting the changes in the camera angle in the background modifications.

The application of AI-assisted scene production is also relevant to the realm of commercial animation. In January 2023, Netflix, together with Japanese AI software company Rinna and WIT STUDIO, created the three-minute animated short film *The Dog and The boy*, in which all the animated backgrounds were generated by AI.[7] At the end of the film, the production crew illustrates the general procedure of AI-aided scene production, which can be broken down into four stages: layout - AI generation - AI generation - Final BG, that is, the artist initially hand-painted a rough scene, then passed it on to the AI twice to create, and finally the artist in the AI created based on the ultimate alterations. Out of all of them, the laborious steps 2 and 3 have been entirely delegated to AI. During the interview, the producer noted that human animation producers often have to manage multiple tasks at the same time, making it difficult to concentrate on a single project, whereas AIGC allows human producers to focus more on creative content.

3.3. Post-production

3.3.1. Image Restoration

Artificial Intelligence utilizes a sophisticated system to assess images of historical artifacts, such as noise, coding distortion, motion, and other complex components, and then applies restoration algorithms to rectify the images, removing any detrimental elements, and eventually accomplishing the aim of image enhancement. The "Classic Hong Kong Movie Restoration Project" was launched in 2023 by Tik Tok, the China Film Archive, and Volcano Engine, with the goal of restoring 100 classic Hong Kong movies from the 1970s to the 1990s through "AI+manual" methods. Aiming at using the Volcano engine visual model to optimize the algorithms to do restoration and fix the goof and improve the film's clarity, smoothness, colour, defects, etc. in an all-round way.

3.3.2. AI Face Swap

Artificial intelligence generates authentic face-swapping effects through the acquisition of pre-existing image characteristics and the automatic superimposition of the target task's facial image onto the video of the source character.[8] It is often utilized to "rejuvenate" a deceased actor, rejuvenate an actor's youthful state, and replace an actor with an unfavorable history. Paul Walker passed away in a car collision during the production of *Fast & Furious 7*, and the team employed AI face-swapping

to "conclude" the remainder of the episode with a stunt double. Through the utilization of AI face-swapping, *Gemini Man* (2019) successfully captured the essence of both a youthful and an elderly Will Smith within a solitary frame, enabling the portrayal of a personal struggle.

AIGC revolutionizes the traditional 3D motion face transplantation process. 3D motion capture is a kind of Face Painting that uses computer graphics to map the movement of the face to the anchor points of the face. It requires a lot of pre-film CG character modelling work, syncing facial anchor points during production, setting up a professional facial camera to shoot, and actors wearing special motion-capture suits.

AIGC has lowered the bar for this face-changing technology. In March 2023, Tye Sheridan and Nikola Todorovic joined forces to create Wonder Studio, a video effects processing platform that allows users to effortlessly upload a CG character model and film a piece of motion video, upload it to a shot or an entire scene, and the system will automatically detect the actor's behavior throughout the sequence based on a single shot, capturing body movements, hand motions, lighting compositing, and advanced redirection work to automatically set up CGI animation. Wonder Studio seeks to provide a broad selection of CGI films, thus allowing more people to make VFX films at a much lower cost.

3.3.3. Film and video editing

By learning the semantic content and emotional expression in the video, AI automatically selects the best frames and highlights, ensuring more efficient editing and film quality, thereby replacing a large amount of post-production labor costs. IBM's Watson system created an enthralling trailer for *Morgan* in August 2016, a captivating horror film animated by 21st Century Fox. Gaston painstakingly scrutinized the visual, auditory, and scene organization of 100 horror film trailers, ultimately opting for a six-minute episode focused on *Morgan*. Subsequently, a human editor meticulously edited the six-minute video to craft the ultimate trailer.[9] Although the AI does not handle all the editing by itself, its quick screening of film clips can drastically reduce the workload of human editors.

3.3.4. Sound processing

AI employs speech recognition and speech synthesis technology to convert audio from voice to text, text to audio, and even pre-sampling and post-adjustment with the help of AI for voice restoration. TikTok's video editing software CapCut in the voice recognition as well as voice generation function allows users to quickly generate video subtitles through voice recognition, voice generation function quickly "Dubbing", the operation is very simple. However, this type of voice generation is more rigid, the tone of voice lacks authenticity, more applied to the field of short videos.

Microsoft recently introduced VALLE, a groundbreaking tool that facilitates an almost impeccable reproduction of an individual's voice using a mere three-second audio sample. This novel text-to-speech model possesses the capability to synthesize speech with authentic intonation and emotion, taking into account the text's context. VALLE has been trained through the utilization of 60,000 hours of English voice recordings, aiming to achieve an impeccable replication of emotion and intonation, thereby challenging the conventional notion of text-to-speech.

3.4. Film and Television Promotion

AIGC can assist in generating posters and trailers, producing a large amount of content promotion video copy and materials, enhancing the efficiency and effect of promotion and distribution, and also generating more high-quality cover artwork for the film, enhancing the personalised promotion of the content. Take *Go to your island*, a Chinese animated film adapted from a novel of the same name on Jinjiang Literature website as an example, the official announcement poster released by ENLIGHT

PICTURES is AI-produced. ENLIGHT's team used ChatGPT, Midjourney, and Stable Diffusion, input tens of thousands of characters, generated thousands of posters with innovative styles, and finally presented a poster with fairy tale style and realistic details.

4. Impact of AIGC on film and television production

According to Artificial Intelligence: context, selective issues and policy considerations, published by Congressional Research Service in 2021, private and public funds invested in AI globally have been growing consistently since 2015. The value of investments in AI companies has increased from \$12.8 billion in 2015 to \$67.8 billion in 2020.[10]Goldman Sachs, one of the biggest investment banks in the world, released a comprehensive AI investment analysis article on its website, predicting that global AI investment will reach \$200 billion by 2025.[11] It is clear that as investment increases, AI and AIGC technology will be further developed and integrated into film and television production, resulting in a more significant and far-reaching impact.

4.1. AIGC broadens creative boundaries

The use of human intelligence is crucial to artistic creation, and AIGC as a technical tool enables more imaginative concepts to emerge and be realized. As mentioned above, screenwriters can use AIGC to collate information and AI brainstorm ideas for screenwriting. Automated imaging software such as Dalle-E can be used directly for conceptual design, costume design, scene design, etc., which greatly reduces the threshold of content creation. This drastically reduces the amount of content that needs to be produced. This not only helps traditional film and TV companies reduce the cost of hiring scene designers, concept designers, and split-screen designers, but also helps more ordinary users to express themselves.

AIGC eliminates the need for individuals to expend a great deal of energy and time, enabling them to concentrate on more stimulating and stimulating activities by blending their own works with automated machine-generated material.

4.1.1.Reducing costs and shortening the film and television production cycle

In addition, AIGC's substitution of certain types of work can not only reduce employment costs, but also bring about noticeable advantages in terms of production speed. The film and television production cycle has a major impact on the production cost, and AIGC's capacity to generate large amounts of data through computer learning and simulation not only allows for a larger scale and a more varied style of text, but also surpasses human visual recognition speed and production efficiency.[12] Unlike the human creative process, AI creation is distinguished by its rapidity, expansiveness, and diverse range of styles; what previously required a human screenwriter 2 to 3 weeks to accomplish has now been significantly diminished to a few minutes with the assistance of AI.[13] *Morgan's* trailer production, from the Waston system to the human editor, was completed in a mere 24 hours, which is much shorter than the typical 10-30 days required for a trailer production. In terms of scene production, the synthetic virtual scene greatly reduces the time for physical scene setup, and reduces the time for bouncing between different shooting locations; AIGC's "substitution" for simple scenes also helps human creators focus on other more important tasks, improving overall production efficiency. Overall, the introduction of AI has drastically reduced the amount of time and money devoted to film and television production, resulting in a decrease in the budget and an increase in the money flow.

5. Challenges

5.1. AIGC have clear shortcomings

The lack of semantic coherence in AI automatic writing models significantly impedes their capacity to produce more extensive creative writing.[14] Although AI-aided screenwriters have the capacity to rapidly create and include certain plot elements, there is a noticeable distinction between AI's depiction of individual character lines, storylines [15], and scenes and the general narrative, which requires human creators to adjust it, as seen in the production of *It's No Game*. Emotional expression is also a major challenge for AIGC, as AI is presently having difficulty forming and understanding complex human emotions, relationships, and human social behavior. The scriptwriter's job is not only to build a framework for the story, but also to explore the characters' innermost thoughts and emotions in great detail, create unique dialogues, and express feelings, and so on. The development of these components requires a combination of emotional intelligence and life experience. During the interview, the Solicits actor articulated, "Deciphering the underlying motivations of my character and deciphering the intentions behind the dialogue posed as my main challenge in a predominantly AI-driven film." [16] The lack of a deeply moving screenplay in AIGC makes it difficult for the actor to accurately portray the character, requiring extra time to become completely engrossed in the role and deepen their emotional connection.

5.2. AIGC impedes the creativity of the work

Most AI-generated stories tend to follow the traditional scriptwriting style, which is often dull and uninspiring, and lacks the ability to be creative, making it difficult to depict personal stories, recollections, and life stories." [17] The production of the AIGC requires the algorithmic model to be extensively trained, which requires a great deal of material inputs and necessitates the AI to gain knowledge from the existing text, images, video, audio, etc. AIGC does not, in a way, create a unique piece of work, but rather combines existing works. It has been noted that AIGC is currently lacking in certain areas, thus preventing it from having a significant impact on the essential components of film and television production, such as storytelling and characterization. Due to AIGC's impressive accomplishments in multiple areas and the substantial decrease in expenses resulting from AIGC, movie and TV companies may be inclined to believe that AI is "all-powerful", which could put human creators at risk and obstruct the inventiveness of upcoming projects. Adam Conover, a member of the Writers Guild of America's Negotiating Committee, emphasized that as writers, their priority does not revolve around being replaced. Their apprehension stems from companies declaring, 'Hey, we have the capability to create this outstanding script utilizing ChatGPT. Allowing them to continue in such a manner will result in the permanent demise of our profession. According to a professor in the Department of Cinematic Arts at the University of Southern California, the true terror lies in the fact that the art of scriptwriting might fade away, and individuals will presume that AI alone can create scripts, rendering human cognition and writing unnecessary.

5.3. Copyright issues

On January 23, 2023, three American comic book artists filed a class action lawsuit in the Northern District Court of California against three AIGC commercial application companies. The lawsuit claims that the Stable Diffusion model created by Stability AI, along with the paid AI image generation tools created using the aforementioned model and introduced by each of the three defendants, amounts to copyright violation. Various types of AIGC models make use of existing works to train the model and generate the desired results in a similar way: the data from the works database is inputted into the AIGC model after a certain degree of formal transformation, and the

AIGC model's autonomous learning capability extracts valuable content from it, and then the outcomes are created in line with the input instructions. The sheer amount of data makes it difficult to determine if the input works have been breached, and AIGC's "adaptation" further complicates the original work's characteristics, causing numerous artists to be apprehensive that the AI company is violating their rights, making it difficult to ascertain if the other party is doing so.

Artists' semi-finished products, in addition to finished works of art, are also "at risk". On October 12, 2022, a Korean artist had his drawings stolen, causing a stir among the artist community. Haruno_intro, a Twitter artist, employed AI technology to produce a live illustration on Twitch, and musaish took advantage of the artist's unfinished drawings, delivering the finished artwork five hours before the original artist.

On March 16, 2023, the United States Copyright Office (USCO) issued the Code of Regulations Part 202, which declared that AI-generated works are not subject to copyright law, and that copyright law only safeguards "the fruits of intellectual labor" that are "based on human creativity" and that human authorship is a prerequisite for copyright protection. The copyright industry has been abuzz with passionate discussions. Generally, AIGC's copyright rulings in various countries remain unclear, and there is still room for improvement in the legal framework.

5.4. Labor Rights

Negotiations between striking Hollywood actors and Hollywood studio bosses were abruptly terminated on 11 October 2023, shattering any hope for a swift resumption of film and TV production following the prolonged strike. The main cause of the disagreement between the two groups is the potential to replace performers with AI in this unprecedented assault. The SAG negotiators had previously conveyed to journalists that AMTP is proposing the scrutiny of all group performers and providing them with a day's compensation. Consequently, the studios now possess digitized files, images, and portraits of the collectives, which they can freely employ in any forthcoming film and TV endeavor, without necessitating the groups' consent or supplementary funds. SAG-AFTRA has urged the production houses to ensure that they refrain from replacing actors with artificial intelligence and computer-generated facial expressions and voices.

At present, the majority of AI technology is under the control of major corporations, with low-income earners such as crowd-sourced actors being the initial targets of AIGC's influence. Most of the burden of AI automation to date has fallen on less-educated workers, already disadvantaged by earlier forms of digital automation. Its most major likely impact is to further lower wages for many people, not create a completely workless future. [18] Actors are apprehensive about the prospect of being compelled to repeatedly witness prominent studios utilizing their likenesses following the sale of their likeness rights. They harbor concerns regarding the potential obsolescence of real-life actors.

Goldman Sachs predicts that the new wave of AI will replace 3 million jobs worldwide. AI may gradually invade every aspect of film and television production, and practitioners across the entire chain of the film and television industry might face unemployment.

6. Conclusion

It is foreseeable that AIGC's influence on the future of the film and television industry will become increasingly significant. At present, AIGC has been applied to script creation, scene production, post-production, film and television distribution and other areas of film and television creation, which reduces the cost and workload of film and television creation, improves the production efficiency, and reduces the production threshold. The film and television production industry still relies on Artificial Intelligence as a tool, yet its imperfections necessitate human involvement and make it difficult to identify as a legitimate work of art. The accelerated growth of AIGC has brought

challenges to artistic creativity copyright protection, and the safeguarding of labor rights of film and television production, leading to an increased risk of unemployment for middle- and low-income individuals and a heightened sense of insecurity in the advancement of society. It is imperative to bear in mind that the advancement of AI technology should take into account the ethical ramifications of "safety" and the necessity of "benefiting humanity as a whole" as AIGC gains momentum. [19] Expedite the development of standards for the utilization of AIGC, in order to mitigate the adverse effects of AI-induced reform within a reasonable scope.

References

- [1] Quantum Bits.Diffusion's Fire, Just a Microcosm of AIGC/Quantum Bits Think Tank Report (with download) [EB/OL]. (2022-09-22) [2023-01-05]. <https://www.qbitai.com/2022/09/38066.html>.
- [2] Conor Baker (2023)Everything You Need to Know About AI-Generated Content. <https://www.conductor.com/academy/ai-generated-content/>
- [3] Yihan Cao, Siyu Li,Yixin Liu, et al. A Comprehensive Survey of AI-Generated Content(AIGC): a History of Generative AI from GAN to ChatGPT[J].J.ACM,. 2018, 37(4):1-44.
- [4] Li, C., Zhang, C., Waghware, A., Lee, L. H., Rameau, F., Yang, Y., ... & Hong, C. S. (2023). Generative AI meets 3D: A Survey on Text-to-3D in AIGC Era. *arXiv preprint arXiv:2305.06131*.
- [5] Guo, Quanzhong & Zhang, Jinyi. (2023).AI+humanities: development and trend of AIGC. *Journalism Enthusiast* (03), 8-14. doi:10.16017/j.cnki.xwahz.2023.03.004.
- [6] Xu Le, Zhu Baiyu. Analysis of 3D filming techniques in Transformers 3[J]. *Journal of Beijing Film Academy*,2012(06):51-57.
- [7] Mascha Deikova.Netflix Uses AI to Generate Anime Short Film-Reactions Follow[EB/OL].<https://www.cined.com/etflix-uses-ai-to-generate-anime-short-film-reactions-follow/>.2023-2-6.
- [8] Nguyen, Thanh Thi, et al., Deep learning for deepfakes creation and detection: a survey, <http://hfffga1ec829cc3224f71soowbc0nfwofc66pv.fxyh.librra.gdufs.edu.co.uk/abs/1909.11573>, accessed 18 March 2022
- [9] John R. Smith.IBM Research Takes Watson to Hollywood with the First "Cognitive Movie Trailer" [EB/OL]. <http://hfffg72d597e8acec4870sf65oo5k6q6fb66ck.fxyh.librra.gdufs.edu.co.uk/blogs/think/2016/08/cognitive-movietrailer/>.2016-8-31.
- [10] Congressional Research Service,Artificial Intelligence:Background,Selected Issues,and Policy Considerations[EB/OL].<https://crsreports.congress.gov/product/pdf/R/R46795>.2021-5-19.
- [11] Discover Goldman Sachs (2023).AI investment forecast to approach \$200 billion globally by 2025. <https://www.goldmansachs.com/intelligence/pages/ai-investment-forecast-to-approach-200-billion-globally-by-2025.html>
- [12] Baiyang Li, Yun Bai, Xini Zhan, et al. Technical characteristics and morphological evolution of artificial intelligence generated content (AIGC) [J/O L]. *Book Intelligence Knowledge*.2023:1-9. <http://kns.cnki.net/kcms/detail/42.1085.G2.20221128.1005.002.html>.
- [13] Reported by People's Daily Overseas Edition (15 September 2023, 07 edition, reporter Miao Chun)
- [14] P Mirowski,K.W.Mathewson,J Pittman,et al. Co-writing screenplays and theatre scripts with language models: an evaluation by industry professionals[J].ar Xiv preprint,2022.
- [15] T Pradyumna,D Murtaza,JMLara,et al.Controllable Neural Story Plot Generation via Reward Shaping[J].IJCAI,2019.
- [16] Luke Dormehla.A.I.creativity is improving fast.This hilarious GPT3-generated film is proof[EB/OL].<https://www.digitaltrends.com/movies/solicitors-gpt3-future-offilmmaking/>.2020-10-20.
- [17] Kanya Pandey.First Film Ever Written and Directed by AI: The Safe Zone[EB/OL].[https://www.jumpstartmag.com/first-filmever-written-and-directed-byai-the-safezone/#:~:text=On%20December%2017%2C%202022%2C%2028,has%20taken%20over%20the%20world](https://www.jumpstartmag.com/first-filmever-written-and-directed-byai-the-safezone/#:~:text=On%20December%2017%2C%202022%2C%2028,has%20taken%20over%20the%20world.2023-1-4).2023-1-4.
- [18] Acemoglu, D, Johnson, S. (2023) POWER AND PROGRESS. Hachette Book Group, New York
- [19] Yang Junlei, ChatGPT: Generative AI versus Socratic Question [J]. *Journal of Shanghai Normal University (Philosophy and Social Science Edition)*,2023(2):17-19.