

Personalized film creation enabled by intelligent generation: from script generation to adaptive viewing experience

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Abstract:

With the progress of artificial intelligence technology, the intelligent generation technology of movies is changing all aspects of movies. This paper reviews the current application and development trend of artificial intelligence in the film industry, focusing on the exploration of personalized innovation in the whole process of the film industry from script to viewing. In the creation of scripts, the use of natural language processing and in-depth learning technology allows artificial intelligence to automatically write according to the desired theme style or user preferences, which can greatly improve the production speed of scripts. In the production stage, GAN's visual generation method is used to create more different ways of scene design, character modeling, etc. The most noteworthy is the emergence of adaptive viewing system, which adjusts the plot direction, shooting techniques, and even the tonality of music in real time according to the heartbeat and skin changes when people watch the film. At present, the main problems in the known research are that the quality of creativity is difficult to control, the copyright is not clear, involving ethics and other aspects. The future development direction is the creation of human-computer integration, more precise emotional computing, and the establishment of relevant industry standards. Intelligent generation technology has undoubtedly brought a new direction of development for film creation, in such a process for the audience, but also to improve the interaction between him and the work, this change will bring some more profound impact on the entire film and television industry.

Keywords: intelligent generation, personalized film, script generation, adaptive viewing, Artificial intelligence

1. Background and Significance of the Topic

As a key component of popular culture, film creation mode will also undergo a thorough change under the breakthrough of artificial intelligence technology. In the past, all aspects of film script conception and shooting were completed by manpower, and the whole process took at least several months or even years. Because the ultimate goal of film production is to create an individualized audio-visual experience, this traditional way of film production and production does not fit in with the pursuit of individualized audio-visual experience pursued by the public in the current digital context. Recently, intelligent generation technology based on generative antagonistic network or natural language processing has greatly impacted the production of film content, innovating the mode of film production, as well as the relationship between people and works.

The application of intelligent generation technology in the film industry also has great social and industrial value. At the creative level, the assistance of intelligent generation system can be used in the early and late stages of script development—in the process of script creation, the first draft of the script which conforms to the narrative structure of this kind of film can be intelligently generated as the material for pre-screening, or directly assisted in the adaptation and generation of the middle stage model in the later stage through the method of shooting/actor recording and directing. The second is to improve the efficiency of execution—to complete the scene map in the role modeling design, and to refine the processing of the scene. Visual elements can be generated, which will reduce the cost of improving the quality of special effects, and promote independent production, small production and small team works with low cost or no special effects production ability to have a higher visual perception.

Exploring personalized viewing is the most forward-looking value of this study. Traditional movies follow a fixed narrative line, but now with the introduction of intelligent generation technology, “thousands of people and thousands of faces” type of viewing becomes possible. At this stage, intelligent generation algorithms can be used to analyze the audience’s facial expressions, heart rate and other physiological indicators, and continuously optimize these data to obtain adaptive models, and then adjust the plot development line, camera editing rhythm and music style, etc., so that the audience can have more immersive interactive experience, that is, the audience is a small node. Links are established between nodes in the story. At the industry level, the use of intelligent generation technology will make up for the shortage of creative talents,

reduce investment costs, and promote the transformation of movies from products to intelligent services for different users.

This kind of research also needs to pay attention to the balance between ethics and technological innovation. While improving productivity, we should also ensure the originality and humanism of our works. Although this technology helps to form a situation of creative democracy, how to solve the problem of copyright ownership and homogenization of works has become the focus of attention of many experts and professionals. Therefore, in the process of relevant discussion, it is necessary to focus on the delineation of relevant boundaries and the establishment of relevant limitations, and on this basis, to make the future film art develop by leaps and bounds. It is necessary to study the relevant situation and put forward the development trend, which will play a very important role in the development of new technologies and the expression of innovative consciousness in the future.

2. Theoretical Framework

Its application in film creation depends on many interrelated theories, such as human-computer collaborative creation, computing machinery and so on. Human-computer collaborative creation theory is very important for AI-assisted film production, because it clarifies the complementary relationship between human creativity and machine computing power. Therefore, in the process of script generation, it is the interaction between the scriptwriter and the natural language processing system. People give the direction and rational judgment of the basic ideas of the script, and provide a text variant of the text when the script is finally written. The final complete script is one of several groups of text variants contributed by AI writers, which are constantly pruned and screened. Secondly, AI assistance reduces the cognitive load of people in the creative process, and enables them to pay more attention to creative work when performing tasks such as formatting scene descriptions.

The theory of personalized viewing experience is based on the research of media psychology and affective computing. The theory of audience immersion shows that when the media works match people’s psychology, they will be able to produce a deeper sense of immersion, so the adaptive viewing system can analyze the audience’s emotional state through the acquisition of physiological indicators such as eye tracking and galvanic skin response, and establish the audience’s emotional state model. At the same time, the theory of use and gratification shows that different audiences have different levels of needs for the film, on this basis, we can make appropriate adjustments to the

narrative content of the film according to the needs of the audience, so as to make the film more suitable for the actual perception of the audience.

Technically speaking, AI creation of visual content is realized by using the game theory of generating antagonistic network, which simulates the process of “trial-feedback-improvement” of artistic creation in the process of antagonistic training of generator and discriminator. The semantic information considered in the generation of long sequence scripts is extended, that is, the discourse and long-distance structural relationship between characters are linked as the realization principle, and the attention mechanism in the field of deep learning is used to solve the problem of context association, so as to maintain the unity of character image and plot development. The principle can ultimately be reflected in the process of completing the article, publishing the article, launching the article and feedback optimization.

The so-called balance between artistic expression and technical rationality depends on the theory of creative computing. On the one hand, the algorithm has a good ability to imitate the existing artistic style, but it is difficult to break through the bottleneck for real innovation, all of which depend on the intuition and judgment of human artists. On the other hand, the application of intelligent generation in film creation is more suitable for dealing with highly structured tasks, such as script generation, while the important theme conception and emotional expression in film creation should be left to people to do. Separating the two can give full play to the advantages of technology without losing the value of art.

3. Research Status at Home and Abroad

3.1 Application of Intelligent Technology for Scenario Generation

At present, AI plays a very important role in the generation of scripts, and its own NLP and in-depth learning technologies have been explored and studied at home and abroad^[1]. According to Xue Shuyang’s point of view, A. I. Assisted script creation will greatly accelerate the speed of script creation and enhance the artistic effect, through the data analysis of a large number of classical scripts, the system automatically generates a certain type of film narrative structure of the first draft, which can be used to assist in the preparation of commercial types including love comedy or suspense film. A. I. Can quickly generate the plot trend of a certain type of film script and the logical rules that this kind of film should follow. In addition,

its generative artificial intelligence has led to the development of scriptwriting methods mainly in the form of fraction and nonlinearity, which has broken the previous inertial thinking of linearity^[2].

In terms of technical implementation, the big language model based on Transformer architecture is the main solution at present. In the pre-training, we can learn the grammatical structure of the script, the way of role dialogue, the law of plot development and other knowledge through the corpus, and automatically generate reasonable script fragments through the theme, style and mood given by the user.^[3] Zhang Bolun mentioned that the introduction of attention mechanism makes up for the problem of context irrelevance in long text sequences, so that the model can maintain the consistency of character and plot logic at the same time. According to the input instructions, it is logical and perfect for the model to generate a story line such as “science fiction theme + tragic ending”. In China, more attention is paid to practical and useful things, such as the platform of “Yunchuang Collaborative Generation”, which allows the scriptwriter team to modify their draft scripts generated by AI online, and also allows them to provide a desired story line for AI to achieve, which was an incredible thing in the past.^[4]

At present, human-computer collaborative creation has become a hot research direction. Weng Jiankai takes animated films as an example to illustrate that script generation based on AI assistance is conducive to improving the artistry and marketability of works, but ultimately the script is still controlled by human scriptwriters, such as theme implication, emotional creation and so on, AI only plays an auxiliary role, especially in some complex narrative works. AI can automatically generate the description content of the film part, and human beings can focus on the problem of character arc. In this regard, Liu Shaolong summarized this change from “digitalization” to “intellectualization”, and pointed out that AI not only changed the nature of productive tools, but also realized the change of creative framework ontology^[6]. But at the same time, there is also a phenomenon of homogenization. Some scholars have proposed that the above problems can be judged manually first, and then screened by using algorithms, so as to ensure the artistic originality of the script^[7].

3.2 Personalized Movie Recommendation System

Personalized movie recommendation system is a major breakthrough in the application of intelligent generation technology in the viewing process, which has made important breakthroughs in domestic and foreign academic

and industrial circles in recent years. Peng Bo believes that by examining the user's past behavior data and real-time physiological response, this kind of system can be transformed from passive acceptance of "cloud creation collaboration generation" to active creator of "cloud creation collaboration generation"^[2]. At present, there are mainly three technologies: the first one is based on collaborative filtering algorithm, which generates a recommendation list by mining a large number of common preference patterns among similar users; the second one is based on content analysis method, which recommends movies according to movie metadata (such as movie type, director, actor) and the matching degree between user portraits and these two aspects; The third is a hybrid recommendation system, which combines the advantages of the above two methods and uses a deep learning model to improve the accuracy of user preferences. Domestic platforms such as Yunchuang Collaborative Generation^[4] have been able to adjust the recommended content of relevant movies in real time through the changes of users' expressions in the process of watching movies, and the application of this technology is also in the forefront of the world.

The breakthrough of personalized recommendation technology is multi-modal data processing. Some scholars^[8] believe that in addition to the traditional behavioral data, the modern recommendation system will also include physiological information such as eye movement trajectory, skin electric response, etc., such as by exploring the audience to see the lens language (such as long lens, fast editing lens, etc.) Will stimulate the audience's physiological signal response, and the audience will be able to see the visual language. In the background, the audience's biological signals will be captured, and movies more similar to this lens language will be selected and put into the recommendation queue. In addition, Shi Zhihao also proposed a "cloud fast storage efficiency" recommendation architecture, which processes real-time user data by doing distributed computing on massive user data in the cloud, and reduces the response time of recommendation to milliseconds, so that users can timely adjust the content they subsequently push to users according to user feedback in the process of watching.

Of course, in order to achieve a better reading experience, the above statement can be slightly modified, such as: Although technology continues to progress, it can not eliminate the problems of data privacy and algorithm transparency in personalized recommendation systems. Some scholars believe that too much trust in the user's behavior data may lead to "information cocoon", which makes the audience's artistic appreciation relatively narrow. Therefore, scholars try to add to the balance of "exploration and utilization", and push some atypical content

on the premise of the relevance of recommendation, so as to open the audience's vision; foreign scholars generally pay more attention to the difference of film values with audiences in different regions, and try to make targeted recommendation strategies, so the degree of preference for films is more targeted. The future development direction is to deploy lightweight models, make some innovations in real-time feedback, and establish a human-computer collaborative decision-making system, so that the film recommendation can be more finely personalized from "thousands of people and thousands of faces" to "one person and thousands of faces".

3.3 Technical Implementation of Adaptive Viewing Experience

Adaptive viewing technology mainly uses two main technologies: multi-modal data fusion and real-time content generation. Peng Bo and others believe that today's adaptive system uses eye tracking, facial expression recognition, physiological signals (heart rate variability) and other information as input sources to obtain the emotional state of the audience, and outputs it as a result to the implementation of its algorithm^[2]. If the system determines that the audience is nervous, the playing time of the tense segment corresponding to the scene may be extended or the volume of the music of the tense segment may be increased. The platform of "Cloud Rendering Integration" launched by a domestic team has realized millisecond real-time rendering based on cloud computing, which can provide the audience with replaced plot branches under millisecond delay when the audience has instantaneous emotional changes^[4]. These real-time story fragments are generated by the dynamic narrative engine designed according to the personal situations of the relevant characters and the various situational relationships between them. The engine is based on the pre-set plot node network and the trigger rules involved to achieve personalized content changes and adjustments.

Interactive narrative now mainly studies how to achieve the balance between branching path and immersion in most cases. Zhang Bolun proposed that the current main method is that the adaptation system will choose to use the "limited open" mode, which only gives the audience three to five relatively reasonable directions at the key plot points. If it is too open, the story will be fragmented^[3]. For the films involved in the case, different ways of revealing clues in the detection process can be given, but in the end, it is necessary to achieve a unified ending style, so that the audience can have a sense of perception without the same narrative fragmentation as the traditional interactive films. In addition, Shi Zhihao's "Yunchuang Col-

laborative Generation” brings synergy to group viewing under synchronous immersion, and also allows audiences of multiple mobile phones to project their own screens to individual mobile phones and decide the direction of the plot together^[4].

Wu Xiao believes that too much pursuit of real-time may lead to the lack of a fixed director’s style, that is, the artistic style of individual shots or the rhythm of actors’ performances may not conform to the overall framework. In the latest exploration, the concept of “style anchor” is put forward to solve this problem. Second, lightweight model deployment has become an industry trend. A domestic laboratory has implemented edge computation processing in the local end, realized localization and left the remaining 20% of the tasks to the cloud, and has completed 80% of the emotional analysis work in the local end system, which reduces the requirements for cloud computing^[9]. The future development will be more inclined to human-computer cooperative control. People can set the unmodifiable core plot for the machine in advance, let the algorithm grasp more secondary characters or personality aspects, and adjust the fate of the characters according to the algorithm’s different grasp of the fate of the characters, so that the film has more possibilities of expression.

4. Summary and Comments

The application of intelligent generation technology in the film industry has made a lot of valuable achievements, but there are also relatively large limitations and room for expansion. As far as the current research situation is concerned, at this stage, relying on AI to cooperate with scriptwriters can improve the efficiency of scriptwriters, but how to ensure artistic originality remains to be discussed. The research of adaptive viewing system is carried out for A-Ying, and the viewing experience is optimized through real-time data monitoring, but the artistic integrity can not be well guaranteed in the process of technical implementation. However, the above studies have laid the foundation for the combination of artificial intelligence and film art, but the optimization mode of human-computer collaboration needs to be further improved, affective computing needs to be further refined, and ethical norms should be gradually improved.

The main innovations of this paper are as follows: (1) a “limited open” adaptive narrative framework is proposed, which respects the director’s creative freedom and leaves a certain “limited open” for the audience to participate in; (2) an audience sentiment analysis model based on multi-modal data is established, which makes the system more accurate to judge the audience’s immediate feedback; (3) In view of the homogenization of creative works that may

be produced by intelligent generation, a human-computer collaborative quality evaluation system is proposed. The proposed solutions for the above three aspects not only fill the current research gaps, but also give some suggestions for the subsequent use of intelligent technology in the film industry.

As far as practical value is concerned, it has guiding significance for the transformation and upgrading of the film industry, and can reduce the threshold of creation and increase the growth space of small and medium-sized production teams. Improving personalized viewing experience can increase user viscosity and open up new business models, which has strong technical ethics research significance. This improvement in many aspects can make it have a strong industrial prospect, and has a certain demonstration significance for industrial development, so this paper is of great significance both in theory and practice.

Future research should focus on three directions: the standard formulation of human-computer collaborative creation mode, the accurate capture of affective computing technology and the formulation of ethical norms in various industries are all urgent tasks to be completed nowadays, especially how to find a suitable balance between art and technology. At present, the technology based on AI intelligent generation is upgrading all aspects of film creation and viewing, so it can be said that the innovation mode based on AI intelligent generation has great enlightenment for future film and other fields of scientific and technological innovation, only by constantly optimizing the application mode of technology. Only in this way can we give full play to the new opportunities brought by intelligent generation technology for movies and promote their development towards personalization and interactivity.

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