| **RESEARCH ARTICLE**

On Impact of Algorithm Technology on Film Industry in Post-Epidemic Era

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| **ABSTRACT**

Nowadays, the epidemic (COVID-19) accelerates media convergence of films and streaming media. Under the background, this study mainly explores how algorithm technology affects the film industry. The objective of the study is to discuss the interventions that algorithmic technology produces in the traditional film ecosystem, using the film production process as a reference timeline to consider how creator-investors should make trade-offs between the rational stance of algorithms and the emotional creation of film art.

1. Introduction

Affected by COVID-19, more people are actively online. As of December 2021, there were 1.032 billion netizens in China, with an increase of 178 million compared with 854 million in June 2019 before the outbreak of COVID-19. By the end of December 2021, 975 million users viewed online videos (including short videos) in China, accounting for 94.5% of total netizens (China Internet Network Information Center 2019b; China Internet Network Information Center 2019a; China Internet Network Information Center 2022). COVID-19 accelerates media convergence between film and streaming media. When cinemas are sluggish, streaming platforms evolve into an integral part of film distribution and dissemination.

The film Lost in Russia was originally scheduled to be released during the Spring Festival in 2020, but it was finally launched on streaming media such as Xigua Video due to COVID-19, becoming the world's first film shot with an IMAX camera but released on streaming media platform. Clearly, this has caused fierce controversy, but it is undeniable that COVID-19 expedites the process of Chinese films from screening to streaming. Also, in the United States, streaming media giant Netflix saw a net increase of about 9 million paying users from January to March 2020 alone. Moreover, Disney+ was launched by Disney at the end of 2019, which developed fast during COVID-19 and attracted 50 million+ users by April 2020 (Levy 2022). Due to the transition of films to streaming media, it is inevitable that the development direction of the whole film industry will establish deeper connections with algorithm technology. Therefore, witnessing that the film industry has gradually adapted to streaming media platforms in the post-epidemic era, this study decides to reveal the impact of algorithm technology on film production and distribution.

2. Filmmakers: Capital Choices Coerced by Algorithms

Algorithms can predict audience range through data and roughly judge the box office of films. At the same time, they provide a reference for production companies in light of input cost or contribute adjustment suggestions for film production based on film type, main creative team, plot rhythm, etc., by virtue of an intelligent distribution system. Under media convergence, click rate also indicates box office.

In January 2020, Warner Bros, an American Hollywood giant, announced the signing of Cinelytic (an artificial intelligence project management system) to provide guidance and decision-making for film content and personnel at greenlight stage by applying artificial intelligence technologies (Tatiana 2020). The announcement indicates algorithm technology is officially used by film production companies, which directly shows creative teams, and the shooting content of films is probably directly affected by results obtained by algorithm technology.

2.1 Selection of Main Creative Team: Limitation of Algorithm Rationality
Through algorithm technology, film investors usually require the main creative team (such as directors, stars, etc.) to judge the commercial value of films. Algorithm technology analyzes user behaviors by collecting audience information, such as content browsing time, content collection, forwarding, comment scoring, and other data, to predict the later development of films. It leads to a situation: when the main creative team is eager to introduce new forces (new directors or actors) or there are transitional members in the team, previous samples will be deficient if investors refer to conclusions drawn by algorithm technology in the absence of past data as a reference. This shall impact the choice of the main creative team, as well as film types to be discussed next. Under the circumstances where innovation is required, algorithm technology's rational analysis ability based on data will be greatly uncertain. This affects the innovation choices of investment companies and deprives new forces which are striving to develop steadily of opportunities or forces them to ignore possibilities that may be released better in other films. More importantly, computational thinking of algorithm technology needs to digitize characters, weakening the uniqueness of human beings in a sense. To be specific, factors such as personality charm can be judged by popularity data only; but the emotional value or a small design factor in films cannot be measured accurately.

Personal emotion shall prevail in case investment companies judge whether a film is worth production at the beginning or whether content should be adjusted by algorithm technology so that artistic creation is castrated by algorithm technology.

2.2 Film Type, Plot Architecture: Category Boundaries
What algorithm technology adopts is the computer language that aims to complete a task. It is an extremely simplified language, and each judgment is made from a clear standpoint. While the audio-visual language of films is perceptually complex and even cumbersome, it serves as a tool to convey the emotional storytelling process. In film creation, unique emotional expressions of creators are reflected in the text, images, art, music, editing rhythm, etc., and there is not such a clear position and rational expression. This is like boundaries, sometimes blurred, between literary films and commercial films since literary films are probably of high commercial value, or suspense films may discuss love.

In terms of content identification, algorithm technology pushes precise vertical content in the form of classification. The algorithm attaches more simple labels to films, and in response to market needs, production may consult algorithm technology to shoot films that are most typical or prone to a category. Therefore, the boundary between commercial and art films will be much clearer. Various commercial films are similar to category keywords given by algorithms. Logical judgment of keyword associations tends to be data amount, gradually forming a closed loop. As a result, producers and audiences are gradually and dramatically trapped in several film categories. In the process of producers constantly accommodating audiences and short videos, the film storyline is probably "standardized" by the algorithm, becoming a fragmented product composed of popular clips. This reflects film boundaries are clear due to the contradiction between accuracy and diversity of content recommended by algorithm technology. In addition, algorithm technology potentially templatizes content integrity and perceptual expression to emotional processes, so industrial production and personal emotional expression are restricted.

2.3 Decision Publicity: Audience Range Deviation
In decision publicity links, the producer prefers to create a selling point for the film to hold an audience in suspense in streaming media in order to achieve better publicity effects. Aiming to attract users to spend more time in videos, algorithm technology dominated by streaming media will vertically label different publicity materials and push them to users who are interested in each category. This undoubtedly increases possible film viewers but may ignore the most important labels.

Long Day's Journey Into Night is a literary film. In order to expand revenue, the publicity team designed the selling point of "One Kiss for New Year's Eve" during the marketing and released a trailer to cater to the selling point. With the aid of a selling point and trailer, "One Kiss for New Year's Eve" highlights the film as a love film with strong narrativity for audiences who seldom watch literary movies. Algorithm technology on short video platforms represented by Tik Tok may directly push films to users who rarely watch literary films but prefer couple videos by knowing that a small number of users like couples' content and ignore literary and artistic films. As a result, the film receives a box office of up to 263 million on the first day of release. However, on the second day, it experiences multiple drops in the box office, film arrangement, number of viewers, and word of mouth, plummeting to 10 million. As of 16 August 2022, MaoYan has a rating of 2.6, while Douban has a rating of 6.9 (Douban 2022; Maoyan 2022).

2.4 Screening Selection

Media convergence accelerates the viewing of films. Some cinemas are streamed online when film keys are still in theaters. The key of Return to Dust has been extended to September 12, 2022, but was launched via streaming media in early August. Most software uses algorithm technology to attract users. Users in streaming media subscribe to long-term videos, with time as a consumption unit. By contrast, traditional films in a cinema environment highlight duration of a film. In the post-epidemic era, film investors will also consider the timing and value of online streaming media through data generated by algorithm technology.

Due to the inseparability of traditional films and cinemas, films display strong spatiotemporal attributes that are reshaped by streaming media technology. Moreover, it weakens spatial attributes of space and strengthens time attributes. Thanks to the precise recommendation of algorithm technology, some users become interested in films every day. The characteristics of streaming media reduce viewing costs and improve viewing efficiency so that users can select from different content recommended by an efficient algorithm. Streaming media, in turn, allows viewers to choose non-linear narratives, and viewers decide the timeline. When a film is launched on streaming media, film value is judged according to the number of clicks and topic data. Platform publicity is more suitable for algorithm technology, which makes video label segments arousing the interest of information recipients a key publicity way.

3. Social Diffusion
3.1 User Output
Due to the influence of COVID-19, films have shifted from screening to streaming. The film industry relies heavily on streaming media, and bullet screen changes films from immersive viewing without communication to interactive viewing. Secondary creations are complementary to films through algorithm technology. Users will search for secondary creations through films or prefer films due to interest in secondary creations. Based on content online focused on users, algorithm technology pushes secondary creations of we-media to audiences with similar cognition and viewing records. These creations have diverse labels, and users who are attracted to watching films on streaming media access more channels than traditional viewing ways.

To some extent, films maintained popularity for a long time due to secondary creations combined with streaming media of the film industry. The timeliness of films has been extended from cinema schedules to streaming media platforms. In other words, as long as users are immersed in secondary creations based on films, algorithm technology is able to identify various labels from content and push them to those who may be interested. We-media became the publicity output of films after they launched on streaming media. These labels may have nothing to do with the publicity materials of the film itself. Fortunately, through the free creation of we-media, more labels are identified by algorithm technology, and most users will receive customized push notifications. Some users, stimulated by secondary creations, tend to watch the original film. In this way, both the watchable life and promotion cycle is extended indefinitely. Here is a case. Harry Potter series of films are unfailing, which attributes to not only original literature and other factors, but also the key role of second creations, including ghosts and animals montage. When the film is released, some viewers fail to view it in theater due to age or other problems, but they watch it on streaming media platforms after appreciating secondary creations such as montages on the short video platform.

However, when publishing content, we-media is increasingly influenced by keywords published set by algorithm technology. Many platforms hope we-media publishers can choose videos from categories specified by the algorithm when submitting articles. Clearly, this facilitates algorithm technology to push more accurate content. For both publisher and receiver, it may be a behavior that solidifies their thinking; we-media is gradually deprived of the ability to jump out algorithm classification.

3.2 Information Cocoon Room Leads to Overflow of Discussion Scope and Polarization of Word-of-Mouth Comments
Algorithm technology creates an opportunity for audiences fond of a certain type of film or a specific film to find partners. Intelligent distribution will push secondary creations released by the audience on streaming media platforms to users who are concerned with the same fields. The function of cinema as a public domain is amplified. Meanwhile, discussion heat and topics rise relatively. In a streaming media environment, network content is spread by individuals mainly through social networks, and the audience is dramatically complex. Nowadays, each individual has a speaking right, so he/she is more willing to express opinions in public. Group polarization is catalyzed by the audience's psychological convergence towards hot topics. Director Guidance is a variety show played on Tencent through which the film Crazy Alien by LIANG Long is the first film to be stopped due to leaving of audience representatives before it is over. Very soon, professional film critics debate disagreements with the audience. In this show, the audience represents the vast majority of viewing people, the main crowd of algorithmic technical reference databases. Film critics argue that decision of the average audience is likely to kill an excellent director, while the audience expresses directly they don't know what the film talks about. In their debates, audience and film critics who are unwilling to express opinions begin to contribute positive statements when they clearly feel that many people convey similar opinions, but the "opposite camp" seems to be constantly attacking.

It is easier to spread content reposed on emotion than that appeals to rationality. Information will be disseminated extensively if we-media produces various content and the audience receives it via diverse channels. Most people display personal emotions

when disseminating information. Accordingly, retelling events may also be fragmented and extreme, with more emotion accompanied by the sharing. After some information selected from we-media is processed, platform algorithm technology accelerates diffusion, so receivers with similar cognition gather to communicate and discuss the information, further polarizing groups. This shall cause that once an issue in the film is explicitly labeled, the algorithm will push similar content according to hot issues, including audiences who haven't seen the film. Discussions among netizens become intense when screenshots and words are involved. People probably ignore the description and shaping of the event in the film, and the question is cut out in fragments. At this level, whether they have viewed the film is insignificant because discussions are overwhelming. The influence of algorithm technology spreads fast. Once the filmmaker responds to public opinions, it is likely to flare a second discussion. Without a response, algorithm technology is highly likely to further catalyze group polarization and build an information cocoon for the audience. In fact, films should be commented on rationally after watching. Films, to a great extent, are closely related to personal emotions, and they are art without a clear position. Although films can attract more people due to word-of-mouth polarization caused by hot issues, it is unsure whether to impose a positive impact on films.

4. Conclusion

In an environment of unavoidable media convergence, Against continuous advancements in science and technology, algorithm technology is hopeful to provide an efficient industrialization path for films and establish more templates for films based on data. At that time, many jobs involved in human emotions will be replaced by data calculation, so is a film still an art?

Once film production relies on algorithm technology and investment creators are locked in a data cocoon, where should the expression of perceptual emotions and content innovation in films start?

Although algorithm technology enhances the speed of film dissemination and allows audiences to receive accurate film information, technological advancements may also result in creation drawbacks, and algorithm technology does not yet do an excellent job of incorporating elements of uncertainty, such as human emotions, into the data. From this, it seems that Algorithm technology boasts of absolute rationality, which fails to fuse well with human emotions. It is difficult to quantify art by data. As the seventh art, the film carries different emotions of various people in each link. The famous film director Tarkovsky believed that the function of art is to express the idea of the absolute freedom of the human spirit's potential (Andrei 1989). When we start to refer to algorithmic techniques that use data as a framework for judgment, we may have already begun to move away from the idea of freedom.

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