

Retraction

Retracted: The Impact of Big Data Technology on the Scale Management of China's Animation Film Industry

Mathematical Problems in Engineering

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This article has been retracted by Hindawi following an investigation undertaken by the publisher [1]. This investigation has uncovered evidence of one or more of the following indicators of systematic manipulation of the publication process:

- (1) Discrepancies in scope
- (2) Discrepancies in the description of the research reported
- (3) Discrepancies between the availability of data and the research described
- (4) Inappropriate citations
- (5) Incoherent, meaningless and/or irrelevant content included in the article
- (6) Peer-review manipulation

The presence of these indicators undermines our confidence in the integrity of the article's content and we cannot, therefore, vouch for its reliability. Please note that this notice is intended solely to alert readers that the content of this article is unreliable. We have not investigated whether authors were aware of or involved in the systematic manipulation of the publication process.

Wiley and Hindawi regrets that the usual quality checks did not identify these issues before publication and have since put additional measures in place to safeguard research integrity.

We wish to credit our own Research Integrity and Research Publishing teams and anonymous and named external researchers and research integrity experts for contributing to this investigation.

The corresponding author, as the representative of all authors, has been given the opportunity to register their agreement or disagreement to this retraction. We have kept a record of any response received.

References

- [1] K. Wang and G. Li, "The Impact of Big Data Technology on the Scale Management of China's Animation Film Industry," *Mathematical Problems in Engineering*, vol. 2022, Article ID 1060943, 14 pages, 2022.

Research Article

The Impact of Big Data Technology on the Scale Management of China's Animation Film Industry

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With the development of science and technology, social networking and digital media technology are also constantly developing. Handheld mobile smart terminals have been continuously promoted and popularized. The promotion and popularization of network and digital media technology bring convenience to people's life and work. People can use their leisure time to shop online and watch related videos. The advent of the Internet era has promoted the development of China's industry. The era of big data is coming. Big data analysis brings enormous value to all occupations. At the same time, it has brought new developments to Chinese animation films, realizing the marketing and development design of animated films. At the same time, big data has also brought opportunities for the development of the Chinese animation film industry. The application of big data brings a foundation for China's animation film industry. From investment and financing, topic development and design, marketing promotion, and distribution and development of derivative products, big data brings huge value to the entire industry chain. However, big data is not omnipotent, and there are certain problems in the use of big data in Chinese animation films. At present, the application of big data in China's animation film industry also has limitations and practical difficulties. Based on this, this paper focuses on discussing and analyzing the historical status of China's animation industry. Moreover, it analyzes the future development prospects of the animation industry and other related contents. It is hoped that the brief analysis in this article provides some reference and inspiration for relevant practitioners.

1. Introduction

With the development of science and technology, social networking, and digital media, technologies have developed rapidly. Handheld mobile smart terminals have been promoted and popularized. People's life and work are becoming more and more convenient. Everyone can use various fragmented time and space to shop and chat online. Any actions and comments made by people on the Internet are directly recorded by the system. Behaviors such as purchases are recorded. The utilization of big data also brings great value to the Chinese animation film industry [1–3]. Big data has attracted people's attention since 2009. Due to its strong abstraction, there is no universally recognized authoritative definition. The National Science Foundation defines big data

as the following characteristics. As an important form of cultural trade, animated TV is an important factor affecting its import and export trade with "cultural discount." This is also the main feature that distinguishes cultural products from other general commodities. Cultural products in the international market are not recognized or understood due to differences in cultural backgrounds. (1) Data sources are generated from various data sources such as scientific instruments, sensing equipment, Internet transactions, emails, audio and video software, and network click streams. The data sources have the characteristics of large-scale, diversified, complex, and long-term distribution. (2) The book "The Era of Big Data" understands big data as a specialized concept in an unprecedented way. Through the analysis of massive data, products and services with great value can be

obtained. (3) According to the definitions of various parties, the basic characteristics of big data can be summarized. Data is massive, diverse, and of high growth. The way data is processed is highly complex and requires high-end technology. 3. The result of data processing can bring great value, thereby, reducing its value. As far as China's animation TV export regions are concerned, the average animation TV exports to Asia from 2011 to 2016 were 63.9%. Animations exported to the Americas accounted for an average of 19.6%. Exports to Europe accounted for an average of 13.7%. This explains why Chinese animation TV exports are relatively concentrated in Asia. East Asian countries are deeply influenced by Confucian culture and Taoism.

Then comes the content for analysis and research. It contains huge data value. This data is used by big data scientists for analytical research. By establishing a mathematical model, it can provide a basis for the decision-making behavior of various industries. According to statistics, the log data generated on the social networking site Facebook exceeds 300 TB every day. Taobao generates more than 20 TB of transaction data every day. According to McKinsey's forecast, in 2010, the new data stored on hard disks worldwide will exceed 7 EB. By 2020, the total amount of global data will reach about 35 ZB. (1) Big data is influencing all lifestyles at an exponential growth rate. The development of big data has attracted great attention. The American video website Netflix used big data analysis to produce the series "House of Cards" and achieved great success. The case was widely circulated and hotly debated. "The first share of Chinese TV series" is Huace Film and Television. The project acquired Keton Media, a big data research company, with a big move of more than 1.6 billion yuan. The use of big data has also become hot in the Chinese film and television industry. The animation film industry is an important part of the film and television industry [4–7]. In 2009, big data received attention and research. With the widespread application of science and technology, existing research has redefined big data. Specifically it was defined as massive and complex data information that needs to be processed by high-end technology. At present, people's comments, purchases, and other behaviors on the Internet are recorded by the system. At the same time, system developers also need to analyze the information of big data and build a data model based on the results of the analysis. The impact of cultural discounts is relatively small. Therefore, it has naturally become the main export concentration of Chinese animation TV. Although the phenomenon of "cultural discount" is widespread, American animation can still occupy the Chinese market. The main reason is that American animation not only inherits the tradition of Hollywood's intensive cultivation in production. This paper conducts analysis by investigating data information from the Chinese WeChat platform. The daily volume of user communication data on the WeChat platform has reached 400 TB. It can see that the growth rate of big data affects all lifestyles and attracts people's great attention. The animation film industry needs to make good use of big data and develop better products. This will further enhance the status of Chinese animation films [8–11].

In recent years, China has driven the development of China's animation film industry through policy support. With the rapid growth of animation film production, the style of animation works tends to be diversified. This will bring new opportunities to the Chinese animation film market. However, the current Chinese animation film industry still has a big gap compared with foreign animation. The weak link of Chinese animation films is, first, the lack of imagination in the story ideas. As a result, the animation quality is poor and cannot attract the audience. The narrative, as always, highlights the superiority of American culture. At the same time, the U.S. has carefully laid out Chinese elements in themes, ideas, shapes, and fields. This also reminds us that Chinese animation must overcome cultural discounts in order to break through Asia and enter the European and American markets. As a result, animated films cannot occupy a strong position in the economic market. It cannot compete with animation films from other countries. Market positioning is not accurate [12–15]. The R&D team of Chinese animation films has an inaccurate positioning of the market. At present, the industry does not understand the market conditions, which leads to the market positioning of Chinese animation film audiences tending to be low level. As a result, the audience for the movie is small, and the age group of the audience is relatively small. Investment risk is high and the cycle is long. At present, China's animation film production is relatively complex. Therefore, the biggest difficulty facing the film industry is the large amount of investment. Movie production takes a long time. As a result, many companies do not dare to easily invest in the animation film industry, because Chinese animation films are affected by economic costs and production cycles. Marketing problems existed during the production of the film. This causes problems with the quality of animated films [16–19].

Weak product marketing links: At present, the marketing team of Chinese animation films does not pay attention to the promotion of animation films when promoting them and interact through the market audience. As a result, the public did not know Chinese animated films before they were released. This led to low box office sales of animated films [20–24]. The dependence of the animation industry on foreign trade is very important. The total amount of animation import and export in a certain period is analyzed. Then the proportion of this quota in the total output of China's animation industry is analyzed. It reflects the dependence of a country's animation economy on import and export trade. Based on the statistical data of "China Radio and Television Yearbook," "China Statistical Yearbook," and "China Information Industry Yearbook," this paper measures and calculates the foreign trade dependence of China's animation TV from 2006 to 2016. In line with the principle of consistent data sources of the same type, this paper conducts separate calculations [25–28]. From 2006 to 2016, the average import dependence of Chinese animation TV was 116.7%. From 2006 to 2012, this indicator did not increase much, with an average of 6.54%. However, the metric rallied strongly in 2013 and has soared ever since. In 2015, it reached a new high of 568.17%. The development of

Internet technology has led to the rapid development of China's animation film industry. At present, the animation film research and development team is analyzing big data. We know that the big data that serves as the animation film industry mainly comes from WeChat, Weibo, and many other social media and e-commerce platforms. It can be seen that the value of big data runs through almost all aspects of the entire animation film. For example, preanimated films require script selection. In the later stage, the animation film needs to be marketed and promoted. At present, the transformation of the animation film industry by big data is still in the initial stage of exploration. The import dependence of China's animation TV first decreased and then increased, indicating that the Chinese animation market has changed from closed to open. It shows a series of developments in the animation market from restriction to release. The policies and measures of the animation industry have achieved initial results. China's animation market is increasingly open and prosperous. From 2006 to 2016, the average export dependence of Chinese animation TV was 49.37%. From 2006 to 2011, this indicator was relatively stable, with an average of 16.97%. This indicator rose to 45.15% in 2012 and as high as 138.39% in 2015 [29, 30]. The steady increase in China's animation export dependence shows that China's animation TV has broken through the domestic market. At present, it is rapidly entering the international market. The impact of different links on big data is also different. First, R&D personnel need to use big data to analyze the consumption habits and consumption characteristics of Chinese consumers. Thus, the research results of animated films are obtained. The current market demand for animated films is understood by analyzing the research results. To provide the basis for animation character and scene modeling design, second, the Chinese animation film R&D team also needs to analyze similar projects screened by the Chinese film industry, conduct research on the market conditions of animated films, and conduct marketing market estimates and risk assessments. The international competitiveness of Chinese animation is increasing day by day. From 2006 to 2016, the average net dependence on animation TV in China was 11.29%. Before 2010, this indicator has been growing slightly, with an average of 12.61%. It has since dropped abruptly to 3.38% in 2011. By 2012, it had climbed strongly to 34.8%. There was a negative growth in 2013, and by 2015, the indicator plummeted to -429.78%. The sharp drop in the net dependence of Chinese animation TV shows that the cultural security problem of Chinese animation has been quite serious. The cultural soft power of Chinese animation needs to be strengthened urgently. The research framework of this paper is shown in Figure 1.

2. The Value of Big Data to the Animation Film Industry

2.1. Status Quo of Animated Film Import Dependence. In recent years, under the support and guidance of the state for the animation industry, China's animation film industry has entered a period of rapid development. The output of animation films has grown rapidly, the production strength of

animation has steadily improved, and the styles of animation works have become more diversified. The artistic quality and technical level of animation have developed rapidly. However, at present, there are still many difficulties in China's animation film industry. Compared with foreign animation, there is still a big gap. Animated films have the characteristics of large investment, high risk, and long cycle, thereby reducing investment risk. Because Chinese animation films are constrained and restricted by production costs, investors have no solid basis for their audience preferences. They often rely on experience to judge, resulting in blind investment. Furthermore, the Chinese animation film R&D team cannot occupy a strong position in the economic market. In addition, the Chinese animation film marketing team also needs to investigate the audience's age and preferences. The investment cost of a 90-minute animated film in Hollywood is mostly more than \$100 million. However, judging from the domestic market situation in recent years, the cost of investing in a 2D animation film should be at least 10 million yuan. 3D animated films generally cost more than 30 million yuan. The investment in several Chinese-made animated films such as "Mobis Ring" is even more than 100 million yuan. Such a huge investment does not necessarily have a good return. In recent years, "Pleasant Goat and Big Big Wolf" and "The Bears" and other series of animated films have exceeded 100 million yuan at the box office. The model research framework shown in Figure 2.

The Chinese-made animated films have failed miserably at the box office. There are even dozens of animated films that do not even have the chance of release. It generally takes about three years to produce a high-quality original animated film. Film production is a high investment, high risk, and long cycle. Therefore, this is also the main reason why it is difficult for Chinese-made animated films to gain the favor of investors. Many funds do not dare to easily invest in the animation film industry. They like the characters that obviously played, like the data information of the animated two-dimensional protagonists and so on. The animation film research and development team can analyze consumers' viewing needs based on this information. In order to customize the animation movies that meet the needs of consumers. This has become a more prominent problem in the current development of Chinese animation. Even if a huge amount of money is invested, it is built with international top technology and an elite team. The use of A-list stars to dub the film will not prevent the box office fiasco of Chinese animation films. From the perspective of many domestic animation films and market analysis, there are mainly the following reasons. The first is a lack of creativity and a failure to tell a good story. The weak link of Chinese animation films: First, the lack of imagination in the story ideas. Story compilation blindly follows the trend, and the homogeneity is serious. It is difficult to win the favor of the market. This makes it difficult to compete with Hollywood animated films.

2.2. Status Quo of the Market Openness of Animated Films. Secondly, the audience positioning of animated films is low. The market positioning of Chinese animation film audiences

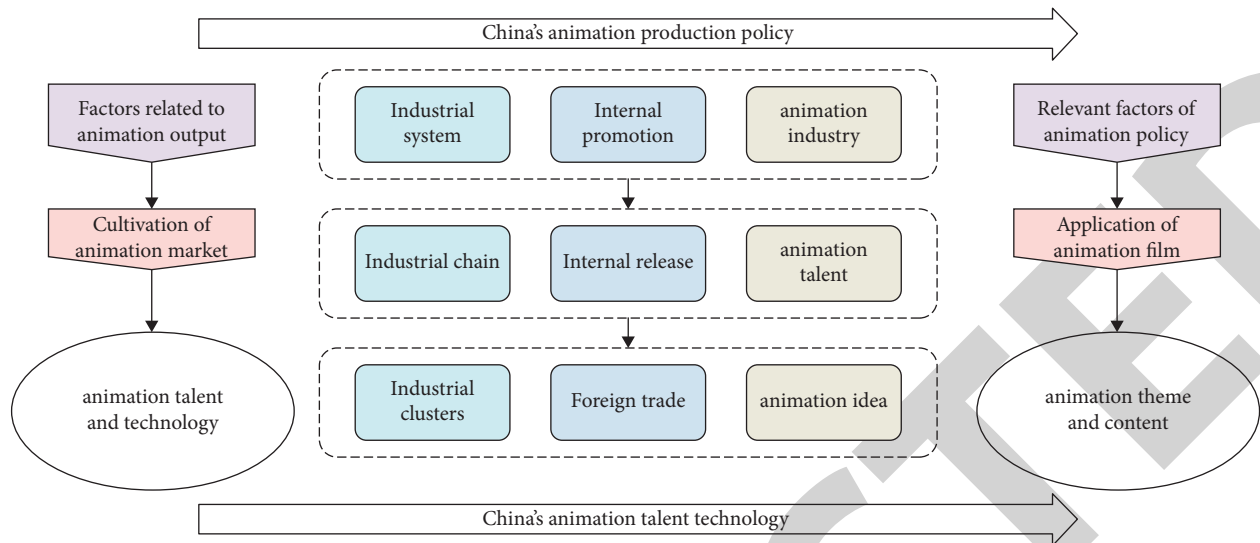


FIGURE 1: The overall framework of China's animation film industry.

tends to be of low level, reducing the scope of the audience. This is a consistent problem with Chinese animation films. It limits the development of animation film industry. A good animated film should be suitable for all ages. With insufficient upfront investment, due to the limitation of production funds, many Chinese animation films have insufficient investment in the early stage. As a result, the market research in the early stage of animation projects is relatively weak. Script selection and optimization are very important. There is insufficient preparation in character modeling design and demonstration, thus affecting the final quality of the entire film and the development of derivative products. Product marketing is relatively weak. Every aspect of the animation film industry is inseparable from

marketing. However, today's Chinese animation films generally only pay attention to the production of films. However, they ignore the marketing. This is another important reason for the failure of Chinese animation films at the box office. This will help to clarify the needs of consumers. In this way to control the animation film market, you need to know how to impress them. For example, by extracting the big data of the video playback of LeTV and Youku, we can know what kind of movie programs young people aged 24–30 like to watch. Then, based on the results of the analysis, the trailers of animation movies that young people like are shown. Derivatives from the film industry are underdeveloped. According to international practice, about 70% of the animation industry's income should come from

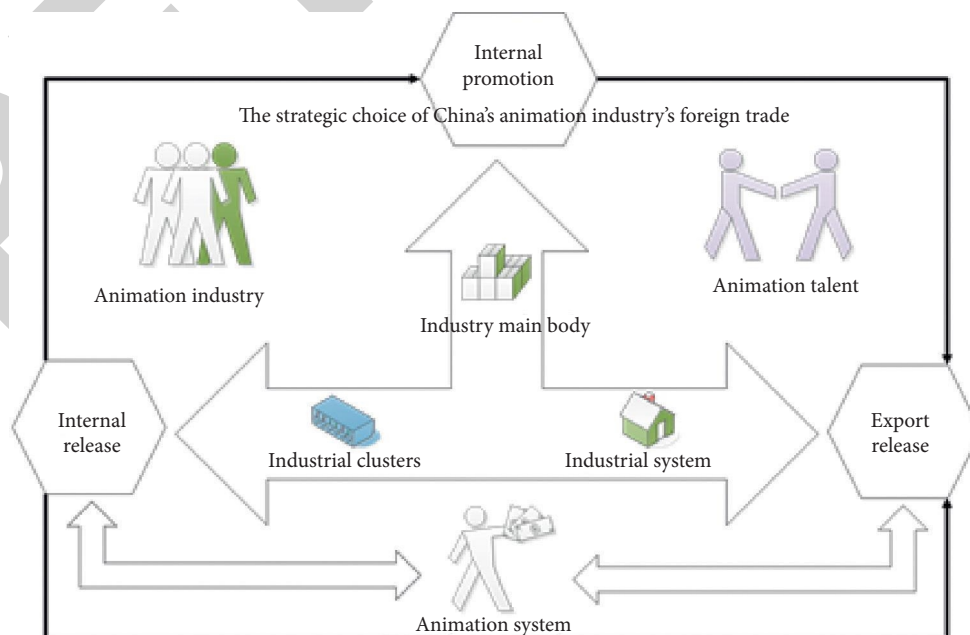


FIGURE 2: General framework of China's animation and film industry chain promotion model.

animation derivatives such as toys. However, most Chinese-made animated films have not made much effort on derivative products. Rather, it relies too heavily on box office revenue. Based on the current predicament of China's animation film industry, in the era of big data, we should fully tap the value of big data and then provide decision-making basis for China's animation film industry and then promote the rapid development of China's animation film industry.

2.3. The Development Status of China's Animation Film Industry. Facing such a dilemma, China's animation and film industry urgently needs to find a way to break through. The arrival of the era of big data has brought good news to the Chinese animation film industry. Through the analysis and prediction of big data, it can provide a basis for decision makers, thereby promoting the rapid and healthy development of China's animation film industry. Use big data analysis to serve the animation film industry, we need to know where this big data comes from. At present, the data sources that can serve the animation film industry are mainly divided into the following categories. The first is social platforms such as WeChat, Weibo, and Renren. The second is video websites, such as Youku Tudou, iQiyi, LeTV, Fengxing.com, and other platforms. The third is the search platform, such as Google, Baidu, Sogou, and other platforms. The fourth is e-commerce platforms, such as Taobao.com, Jingdong Mall, Mtime.com, and Dianping.com. In addition, the National Film Special Fund Office also announced to the public the nationwide box office data of theaters. The value of big data to the animation film industry runs through almost all links in the animation film industry. The preliminary content includes investment and financing, script selection and optimization, character and scene design, etc. The mid-to-late content includes marketing planning, publicity and promotion, terminal screening, film publicity evaluation, and box office forecasting. The development and marketing of derivative products is also very important. Almost every link of the animation film industry contains the huge value of the application of big data. However, at present, the transformation of big data to the animation film industry has just begun. The use of big data in the animation film industry is still in the initial stage of exploration. Different aspects of the use of big data are also different. The main influencing factors of sports performance and training process are shown in Figure 3.

3. The Development Dilemma of China's Animation Film Industry

3.1. Problems Existing in China's Animation Film Industry. Investment and financing, topic selection, development, and design are the first steps in animation film production. Big data analysis is needed to provide decision-making assistance. The first application of big data is market research. In addition, marketing teams can broadcast trailers of animated films on social media to attract young people to the cinema to watch the film. The marketing team can also cooperate with the manufacturer, which can receive a part of the

copyright fee in advance. It also allows toy manufacturers to produce toys. This allows the audience to understand the protagonist of the animated movie while buying the toy. Through big data analysis of consumers, age groups, personality characteristics, occupations, etc., in this way, information such as consumers' hobbies, consumption preferences, consumption trajectories, and needs can be obtained and the correlations therein. This provides a basis for the selection and optimization of the script, the design of character and scene modeling, and the design of derivative products. Secondly, through the analysis and induction of various related data of the same type of animation films in recent years, it provides assistance in estimating ROI, risk assessment, and more for movies, thereby reducing investment risk. Due to the constraints of production costs, the premarket research of animated film projects has always been undervalued in China. Investors are not sure what kind of stories the audience likes. There is no definite basis for what kind of character modeling is more popular. Decisions are often made based on empirical judgment. It is easy to cause blind investment. Model analysis results are shown in Figure 4.

Our attention should be paid to investment and financing, topic selection, development, and design. On the one hand, animation companies can collect relevant user usage data on social platforms, search platforms, e-commerce platforms, and video websites, for example, the number of posts and reprints on animation topics, the click-through rate and download rate of animation works, and the purchase of animation books. In-depth analysis of consumer preferences and needs, create videos with different characteristics, target development of derivative products that the audience likes, and meet the personalized and differentiated needs of consumers. On the other hand, animation companies can put content such as paragraphs and character modeling of animation scripts on social networks, analyze this script based on user comments and reprint data, and analyze the popularity of this shape and the design of derivative products. On the other hand, whether it needs to be improved, it should be improved. It is better to meet the needs of the audience. In addition, you can also comment on various hot issues that everyone cares about in social networks, review data on successful animated films, capturing audience understanding of certain genres and story content, and analyze the audience's interest in character modeling, picture style, derivative products, etc., thereby modifying and implanting the content of the animated film. Model analysis results are shown in Figure 5.

The marketing and promotion of animated films has little to do with the creation. It plays a vital role in the final box office and profitability of the film. Therefore, the capital investment in this link may be as high as half investment in the entire film. Therefore, the use of big data is particularly important in this link. Every time people search for a movie on a search tool matters. Communication and sharing on platforms such as WeChat, Weibo, Fengxing.com, and Mtime.com is very important. The data generated by these behaviors can provide the basis for the marketing decisions of animated films. A random comment or a reprint made by

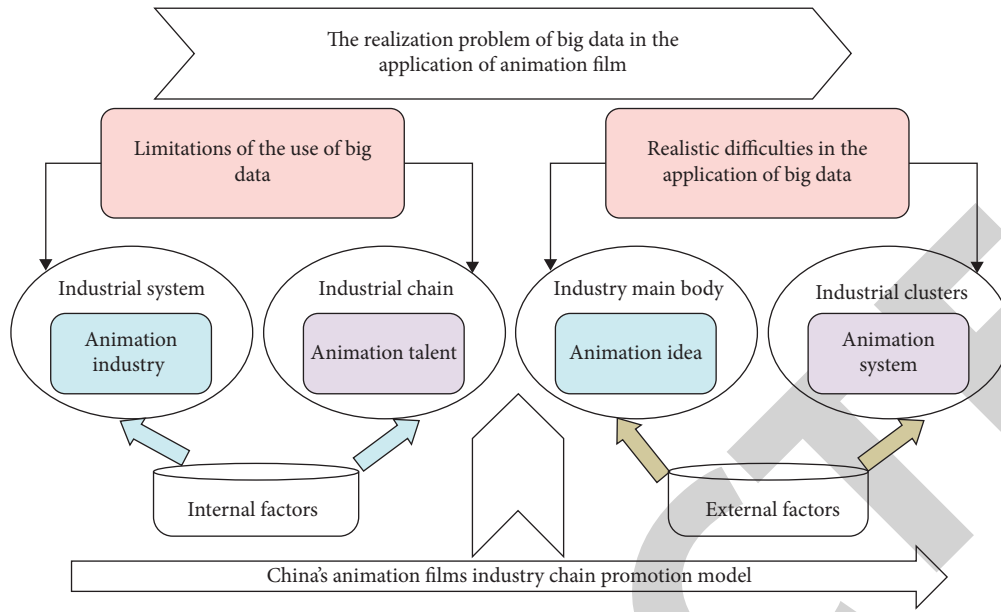


FIGURE 3: The main factors for the application of big data in China's animation film industry.

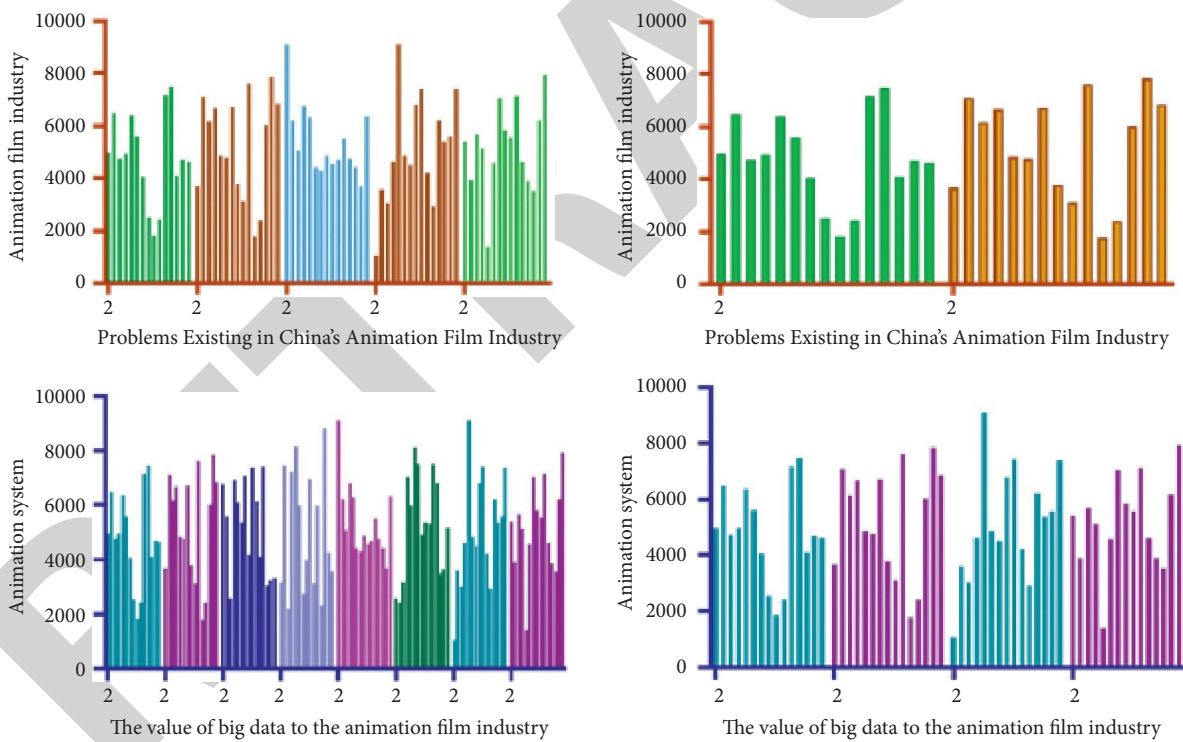


FIGURE 4: Analysis of problems existing in China's animation film industry.

people on the Internet may cause a big discussion. In terms of animation film creation, the most important factor that determines the box office of an animated film is actually the quality of the film itself. If the quality of the movie itself is not high, it is impossible to use big data analysis for marketing to achieve high box office. Animated films in the era of big data should combine artistic creation with the use of big data analysis, to promote the dissemination of information. As a result, the film's box office fluctuated greatly,

even deciding the fate of the film. According to statistics, users in Ozone affect 98 friends per capita. One comment or even one expression from each person may be conveyed to 98 friends in an instant. They will continue to generate comments, retweets and other behaviors and affect more people. A strong word-of-mouth effect is formed in a relatively short period. In addition, animation film marketing should analyze the sociological attributes of the audience, such as gender, age, education, geographical distribution,

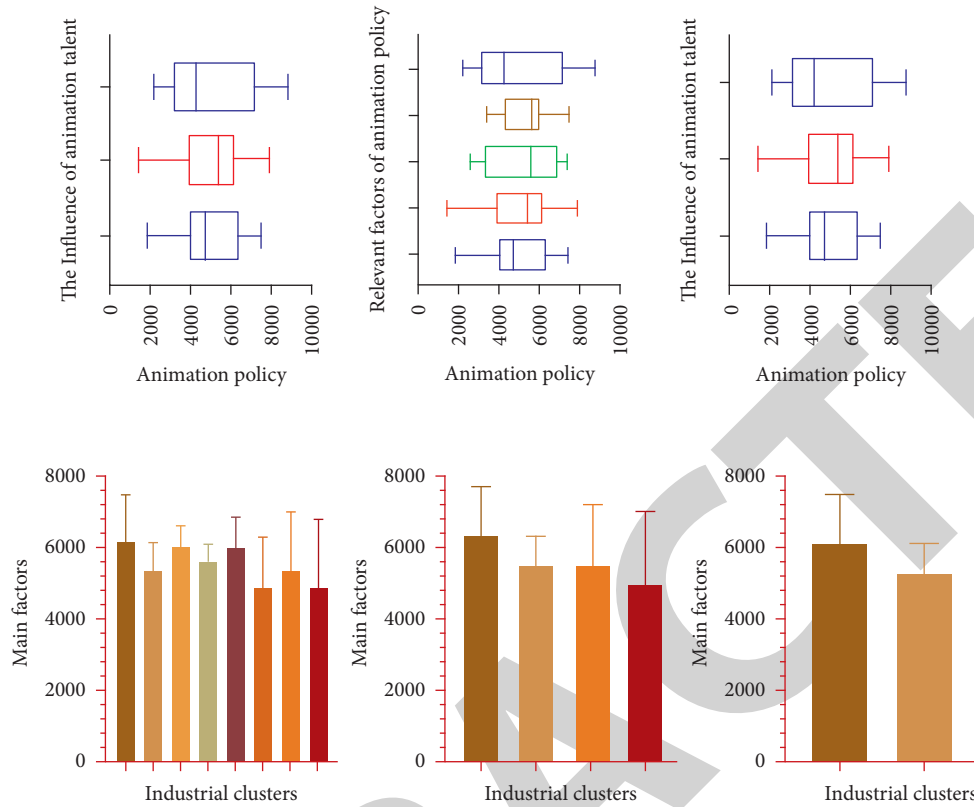


FIGURE 5: Reviewing the development process of China's animation film industry over the years.

and other information. It is also necessary to dig out the preferences and behaviors of moviegoers, for example, which websites they frequently use, which online interaction methods they like, which stars they like, which variety shows they like, etc. Through the big data analysis, marketers can know exactly where the target consumers of animated films are, including what they like, what they need, and what marketing strategies can impress them, and which media is used effectively communicate to target consumers, for example, extracting video playback big data from LeTV and Fengxing.com. By analysis and summarization you can know what type of animated movies men in the age group of 24–30 like to watch at 8–10 o'clock every day and then show them the relevant genre of animated movie trailers, so as to attract them into the cinema to watch the movie. Model analysis results are shown in Figure 6.

3.2. The Realization Problem of Big Data in the Application of Animation Film. Animated film marketing is very dependent on search platforms such as Baidu. Including social platforms such as Weibo and WeChat, e-commerce platforms such as Taobao, and video websites such as Youku will rely more and more on big data. Only in this way can we meet the ever-changing audience viewing needs of the market and create a high box office. In terms of animation film marketing, the analysis results of big data have a certain lag. Everything in the world is constantly evolving, including the audience of animated films and the external environment that influences marketing. The results obtained

through big data analysis, such as audience viewing preferences and consumption habits, are data that happened in the past. There may be changes. If you blindly make decisions based on the analysis results of big data, it will inevitably weaken the marketing effect in some cases. The big data make precise marketing and even customized marketing of animated films possible. Animated movie marketing should refer to the marketing strategies and feedback data of previous movies of the same type and choose the appropriate marketing strategy according to the characteristics of the video and its audience positioning. At the same time, the marketing effect should be monitored in real time, including box office, sales of derivative products, etc. Through the analysis of relevant data, the current marketing plan can be adjusted in time and used as the main guiding basis for the next marketing plan. In the marketing process, it is necessary to use some marketing skills. For example, on social networking sites, WeChat, and Weibo, there is a big discussion of animated film works.

The calculation formula of information entropy of each node is as follows:

$$\begin{aligned}
 \text{gain} &= \text{info}(T) - \sum_{i=1}^s \frac{|T_i|}{|T|} \times \text{info}(T_i), \\
 \text{info}(T) &= - \sum_{j=1}^{N_{\text{Class}}} \frac{\text{freq}(C_j, T)}{|T|} \times \log_2 \left(\frac{\text{freq}(C_j, T)}{|T|} \right).
 \end{aligned} \tag{1}$$

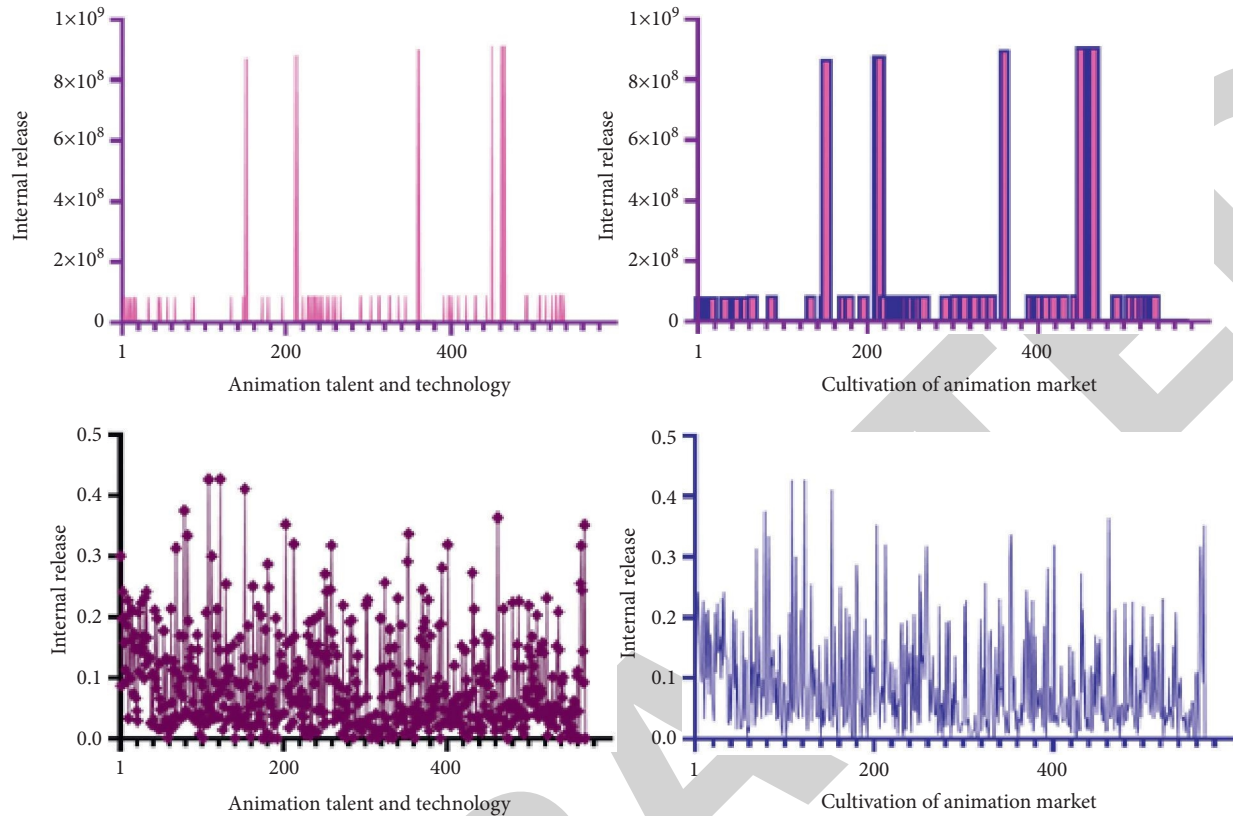


FIGURE 6: The limitations and practical difficulties in the application of big data.

The calculation principle of local consistency is relatively simple, mainly using Kendall Concorde coefficient, and the specific calculation formula is as follows:

$$W = \frac{\sum (R_i)^2 - n(\bar{R})^2}{1/12K^2(n^3 - n)}. \quad (2)$$

The calculation formula of single-sample statistics is as follows:

$$t = \frac{\bar{X} - \mu}{\delta_x / \sqrt{n - 1}}. \quad (3)$$

The calculation of the statistics of the hypothesis of the single-body sample is as follows:

$$t = \frac{\bar{X}_1 - \bar{X}_2}{\sqrt{(n_1 - 1)S_1^2 + (n_2 - 1)S_2^2/n_1 + n_2 - 2(1/n_1 - 1/n_2)}}. \quad (4)$$

Attract crowds, make an impact, inspire audience enthusiasm, and increase the attention of animated films. Another example is to forward the trailer of an animated movie through the Weibo of a celebrity that the target audience prefers. It will get a good publicity effect and the kind of topics is designed to be the most likely to cause heated discussions, and when posting on Weibo or WeChat, you will get more views and reprints. This data is very valuable for marketing. In addition, inspire audiences to reprint animation trailers, stills, animation music, etc. on social media. In this way, the popularity of the animated film

can be improved and the marketing cost of the animated film can be reduced. Model analysis results are shown in Figure 7.

The distribution of animated films and the development of spin-offs require consideration of many factors. Through the analysis of big data, we can know the advantages and disadvantages of target audiences in different provinces in terms of preferences and consumption habits. Taking into account the differences between different groups of people in terms of work and rest rules, this allows producers to target product development, marketing, and distribution. First, due to the scattered and complicated data sources, the analysis of the big data of domestic animation movies is more difficult. The big data of domestic animation films comes from social platforms, search platforms, e-commerce platforms, video websites, and other fields. Secondly, the big data of domestic animation films lacks transparency, authenticity, and credibility. The Disney Company of the United States is selecting and optimizing the script of the animated film and designing the character modeling. The company does a lot of research on whether the characters in the film can be turned into good spin-offs, so as to provide a lot of basis for the selection and optimization of the script. Chinese animation films should conduct research on the development of derivative products in advance. In addition, in the stage of script selection and character modeling design, the tastes and consumption preferences of the target audience are understood through big data analysis.

Extra relative risk (ER) is used to reflect the effect of environmental factors on sports health risks. The ER value is

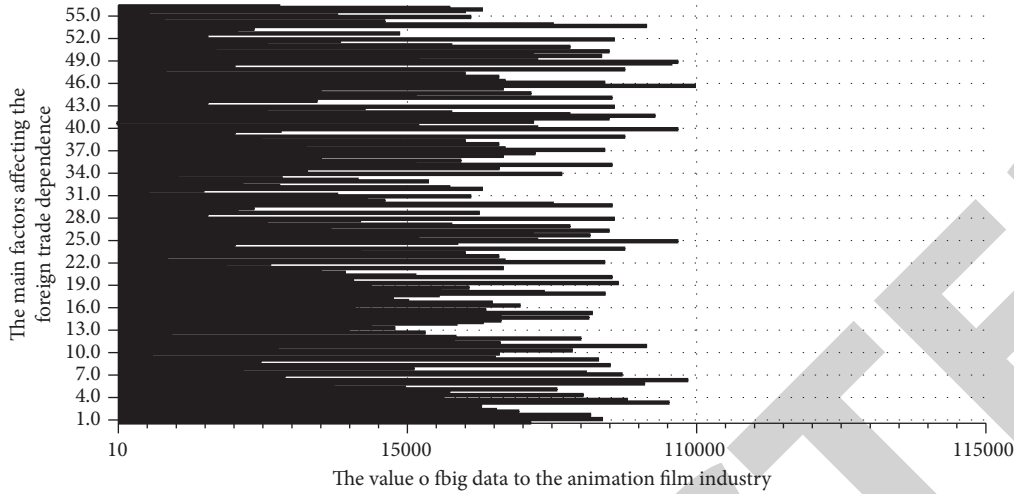


FIGURE 7: The value of big data to the animation film industry.

based on the relationship coefficient in the regression model β . The calculation formula is

$$\begin{aligned} RR &= \exp(\beta x), \\ ER &= (RR - 1) * 100, \\ ER(95\%CI) &= [\exp[(\beta \pm 1.96se)x] - 1] * 100. \end{aligned} \tag{5}$$

Among them, B_i is used as the scale element corresponding to the i -th evaluation in the data set B . Through the data set B , the data membership vector representing the injury of the athlete can be effectively integrated into a scalar. The formula is expressed as

$$V = r_j \times B. \tag{6}$$

Shape the general functional relationship between the output y of the injury model and the input x_1, x_2, \dots, x_n . The Kolmogorov-Gabor polynomial is as follows:

$$y = f(x_1, x_2) = a_0 + a_1x_1 + a_2x_2 + a_3x_1^2 + a_4x_2^2 + a_5x_1x_2. \tag{7}$$

And treat each of the monomials as m input models in the original structure of the modeling network:

$$v_1 = a_0, v_2 = a_1x_1, v_3 = a_2x_2, \dots, v_6 = a_5x_1x_2. \tag{8}$$

The final information $i_t \times C_t'$ is expressed as the value that can be obtained C_t from the output information of the joint forgetting gate:

$$C_t = f_t * C_{t-1} + i_t * C_t'. \tag{9}$$

The calculation method is

$$O_t = \sigma(W_o[h_{t-1}, x_t] + b_o). \tag{10}$$

The development of the animation film industry needs to determine which industries to develop. Different product development needs to be able to generate better market returns. At the same time, the production of derivative products requires the participation and image design of multiple roles. Different character images not only meet the preferences of the target audience, but also meet the

requirements of the production of derivative products. The production of products requires the cooperation of the manufacturer. Such work can receive a portion of the copyright fee in advance, reduce investment risk, and allow toy manufacturers to produce toys ahead of schedule. Therefore, the toys are launched through a series of marketing campaigns before the film released. This allows the audience to acquaint the characters in advance and strive for the phenomenon of "hot before the film released." Before the movie is released, the film arrangement rate of the theater has a great impact on the box office performance. The number of films on the first day has become an important factor affecting the box office of a movie. Therefore, some people think that the sum of the contribution of all film technologies to the box office is not as good as the number of film placement rates. Model analysis results are shown in Figure 8.

Before the release of animated films, the application of big data needs to be carried out. Cinema operators can watch and reprint movie trailers online. The public's attention to the content of the film requires in-depth analysis of the data. According to the analysis of the results, it can be seen that the previous experience in the arrangement of films of the same type can provide a basis for decision-making. Then you can decide which period can get better box office revenue. How to show the film can get higher box office revenue. Model analysis results are shown in Figure 9.

3.3. Limitations and Practical Difficulties in the Application of Big Data. The main factors affecting the foreign trade dependence of China's animation industry include many aspects. They mainly include the total amount of animation production, animation industry policy, animation talent reserve, animation consumption positioning, and other aspects. In addition, the selection of animation material and the cross-cultural communication of film and television animation are also very important. Different factors affect the speed and direction of animation propagation, so as to specifically affect the benefits and effects. The effect of

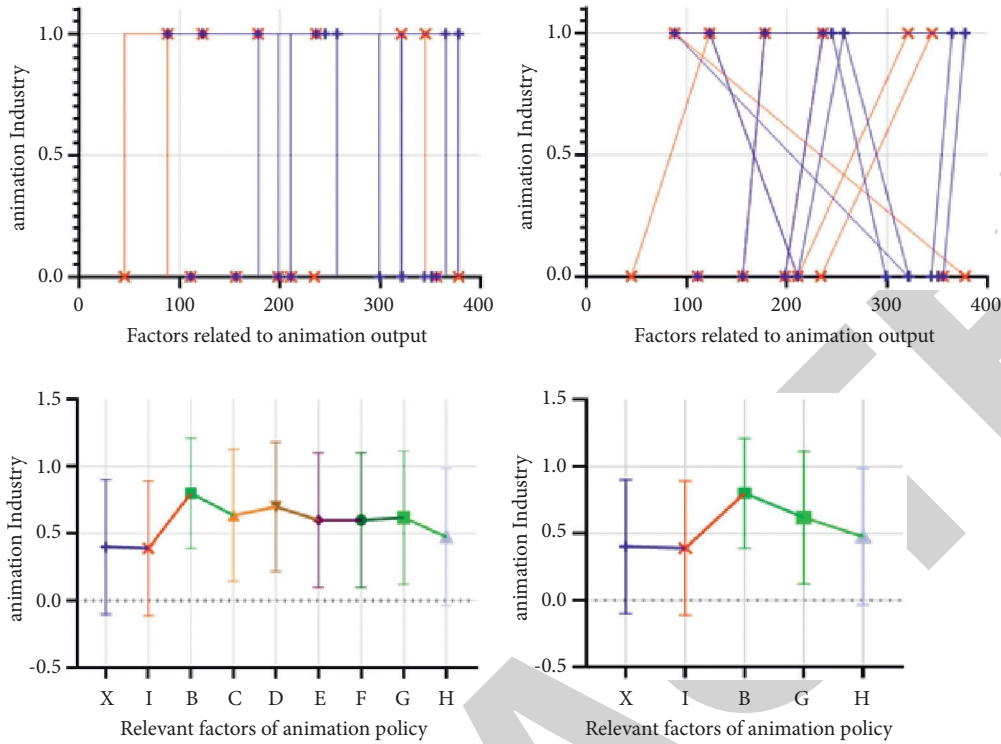


FIGURE 8: The analysis of Chinese animation film R&D team based on big data.

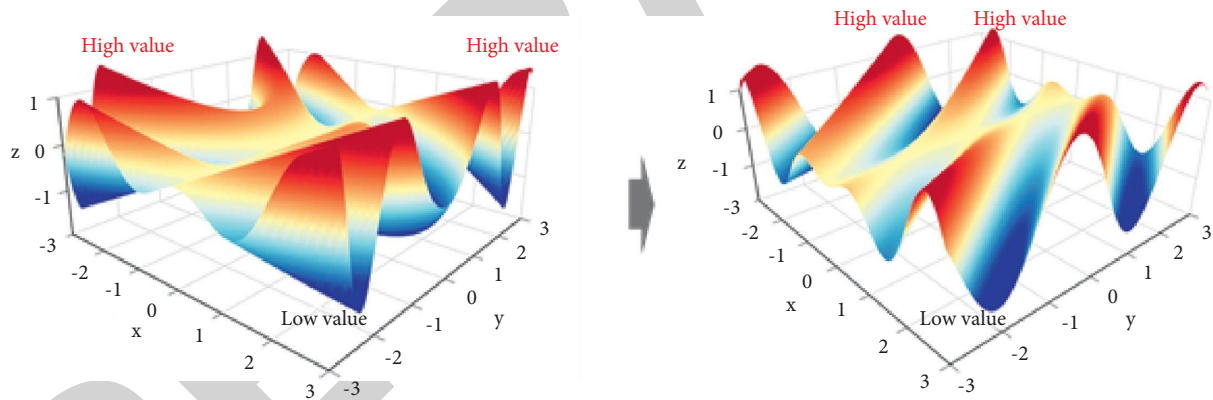


FIGURE 9: The value of big data on the development of China's animation film industry chain.

animation production factor on the total domestic production is two-sided. On the one hand, the foreign trade dependence of animation TV is inversely proportional to the total domestic production of animation TV. Under the condition of constant import and export value, the total domestic production of animation TV is relatively high. Animated film products are less dependent on foreign trade. This situation is complementary to the changes in the dependence of animation films on foreign trade. According to the data displayed on the official websites of the State Press and Publication Administration and the State Administration of Radio, Film, and Television, the results are analyzed. The analysis results are shown in Figure 10.

From 2006 to 2011, the annual output of Chinese animation TV increased year by year. The yields were 82326

minutes, 101900 minutes, 131042 minutes, 171816 minutes, 220530 minutes, and 261224 minutes. As the domestic animation TV production is harvested year after year, it meet the needs of the domestic animation market. Therefore, the import dependence of animation TV during this period is relatively low. On the other hand, the total domestic production of animated films represents to a certain extent the production capacity of national animated films. Therefore, the increase in the import and export ratio is mainly based on the increase in the total output of animation TV. Since 2012, the amount of domestic animation production has experienced negative growth. From 2012 to 2016, the annual output of animation TV in China decreased year by year. This is the same as the animation. The changes in the degree of external dependence of TV are consistent.

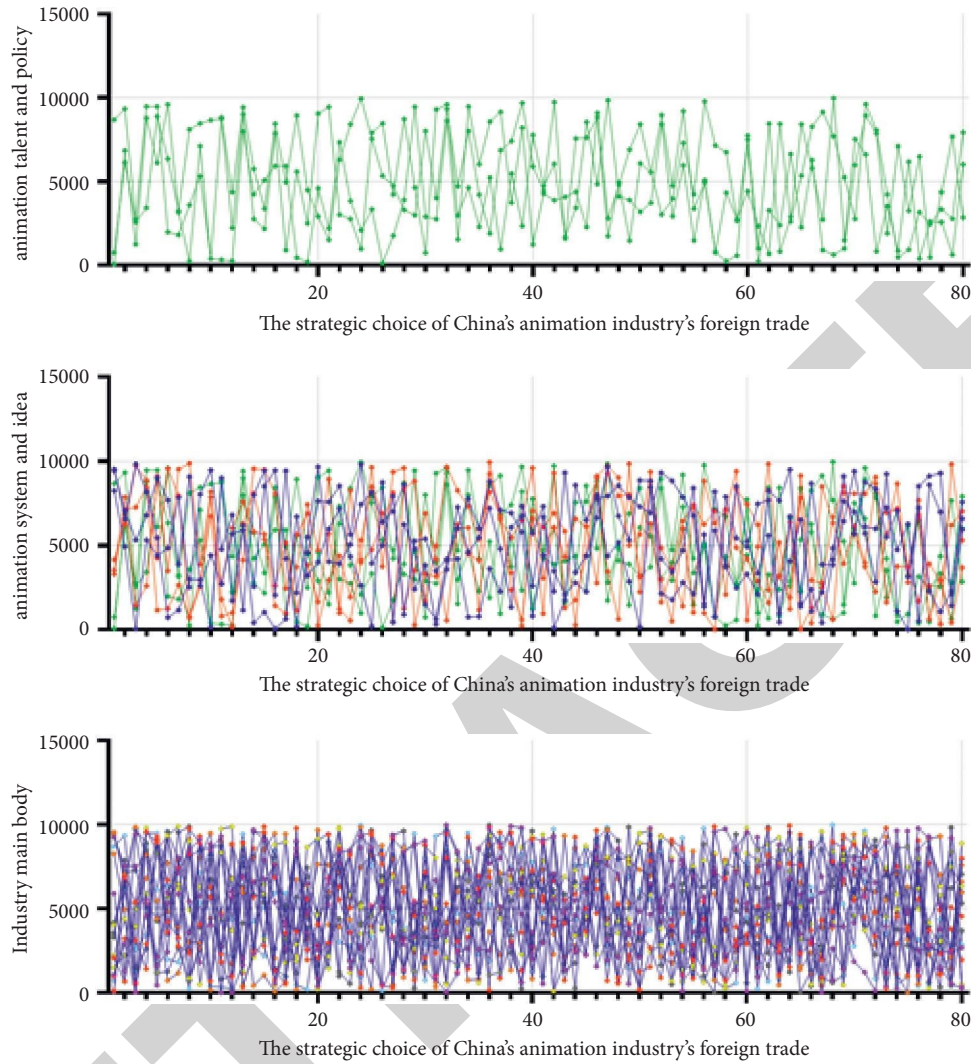


FIGURE 10: The strategic choice of China's animation industry's foreign trade.

Due to the continuous decline of domestic animation TV production capacity, the number of imported animation TVs in China has begun to rise. The development of animation films gradually meets the consumer demand of the domestic animation market. In 2016, the annual output of animation TV was the lowest, and the import dependence of China's animation TV gradually increased in the same year. It can be seen that the annual output of animation films is the key content of the external influence of Chinese animation. Model analysis results are shown in Figure 11.

3.4. The Foreign Trade Strategic Choice of China's Animation Industry. Every adjustment of relevant national policies will have an impact on the trade dependence of domestic

animated films. Animated TV enjoys the tax rebate policy. Inspired by the tax rebate policy, China's animation TV exports increased significantly in 2006. Dependence on foreign trade once jumped to 21.77%. Based on the original 8 provinces' pilot projects, the animation enterprises will be promoted to the whole country. VAT is calculated and paid at a rate of 3%. In the case of favorable import and export taxes, the dependence of China's animation TV on foreign trade increased significantly in 2012 and 2013, as high as 45.15% and 73.48%, respectively. This shows which direction the national policy is inclined to. It directly affects the profits and development ideas of animation companies. This in turn affects the import and export of animation and domestic production.

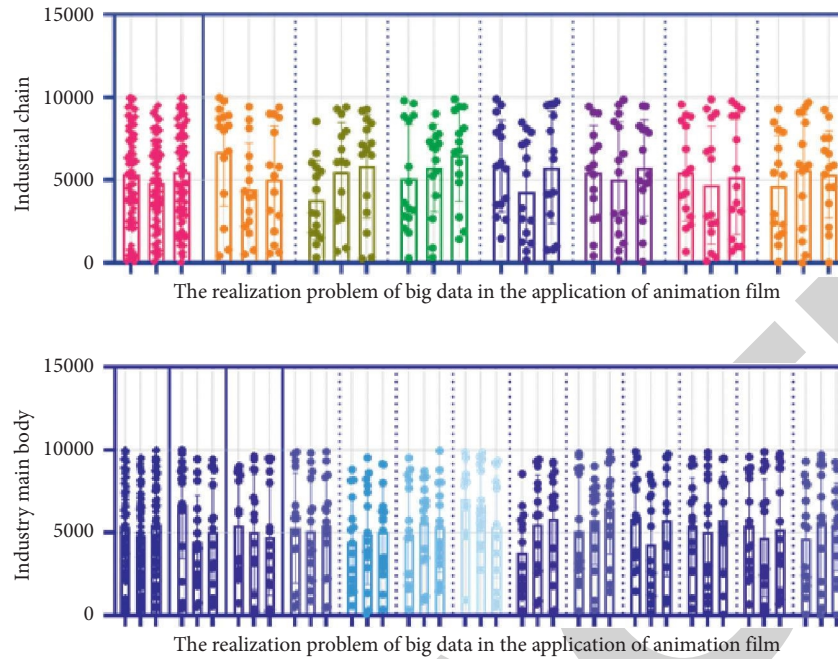


FIGURE 11: The realization problem analysis of big data in the application of animation film.

4. Conclusion

4.1. Main Strategies for Large-Scale Management of China's Animation Industry. The animation industry is a typical subindustry of the cultural industry. Creativity, innovation, and creation are the foundation of the development of Chinese film and television animation. In recent years, various colleges, universities, and social animation training institutions in China have trained a large number of animation talents. It has accumulated and provided a new force for animation production. However, due to the lack of a differentiated talent training pattern of "seeking common ground while reserving differences," the level of labor in the animation market is uneven. The popularization of new technologies such as the Internet and mobile intelligence has brought Chinese animation films into the era of big data. Therefore, the Chinese animation film research and development team needs to use big data to analyze the audience's preferences and needs and further customize animation films and related derivative products that are more popular with audiences, only by improving the production level, selecting excellent animation scripts, and making good use of big data to serve the animation film industry. In order to make great contributions to the outstanding achievements of Chinese animation films, the training of animation talents has entered the dilemma of many colleges and few talents. Since 2008, animation majors have consistently ranked at the top of the unemployment rate for undergraduate graduates. In addition, the main problem facing the development of China's animation industry is long-term OEM processing, with lack of its own international brand. The 19 of the 20 favorite animated characters of Chinese teenagers are from overseas, and only Sun Wukong is among the local animated characters. Among the favorite animation works of young people, Japanese and

Korean animations account for 60%, and European and American animations account for 29%. The proportion of original animation in mainland China and Hong Kong, which are vast and populous, is only 11%. It can be seen that the training planning and innovation ability of animation talents are directly related to the competitiveness and influence of animation products. It is also an important factor that affects Chinese animation to the world animation. Based on this, it is market-oriented, actively cultivating innovative international animation talents. It is very necessary to provide strong creative resources for "Chinese animation" to move towards "world animation."

4.2. The Relationship between China's Animation Production Policy and Talent Technology. For a long time, China's "animation is for children" mentality and production positioning has dominated the mainstream. This positioning ignores the needs of other age groups in the animation consumer market. In the animation consumer market, the phenomenon of children's "dominance" is very prominent. This wrong concept not only leads to a narrow range of cartoon subjects, but also forms a path dependence of mechanical preaching. Over time, Chinese animation has become an "exclusive product" for children. However, in fact, animation can also become a "souvenir" for adults. As the kingdom of animation in the world, Japan has both children aged 3–12 and adults over 18 years old. As a developed country of old animation, the United States has children's animations such as "Cinderella" and "Flying House." Every technological revolution will lead to the transformation and upgrading of the industry. The popularization and development of new technologies such as the Internet, new media, and mobile smart terminals have

brought the animation film industry into the era of big data. Big data allows animated film producers to deeply analyze audiences. Animated film productions are tailored to the audience's preferences and needs. According to the relevant big data analysis of the audience, the marketing of animation films and related derivative products will be launched. China's animation film industry is a huge potential stock with a huge consumer market. As long as all relevant parties in the animation film industry seize the opportunity, tell animation stories well, and improve the production level and then make good use of big data to serve the animation film industry, one day, Chinese animation films will catch up with Japan and the United States and become a world power. There are also family-friendly animations such as "Robot" and "Mulan". In the developed countries of animation, cartoons, like other films, have become a special way for people to relax and entertain. The content production of animation can only attract audiences by realizing the transformation from "young age" to "full age" and then prosperous animation market. Therefore, it is very important to broaden the positioning of animation products and conduct market research for audiences of different age groups. Design the appearance, age, character, habit, action, and demeanor of the animated image according to the psychological characteristics and preferences of the target audience. It is imperative to meet the consumption needs of animation audiences of all ages through tailor-made animation design and production.

4.3. The Perfection of Animation Theme Content and the Cultivation Strategy of Animation Market. Summarize the lessons learned from the past failures of Chinese animation. The aging theme, outdated creation, single form, thin plot, slow rhythm, and lack of attention to market demand are the main factors hindering its progress to the international market. Chinese animation products have been lingering on the edge of the international market for a long time. The main reason is that Chinese animation focuses on two themes of education and fairy tales. The theme of the performance is benevolence, righteousness, propriety, wisdom, faith, and other traditional Chinese values. Compared with the international animation market, these are too advanced and obscure content. It takes a long time to form an identity. Throughout the international animation blockbuster, it is easier to form an identity for the universal values of human beings, such as humanity, sublime, antiwar, and environmental protection. The common individual emotional experience of human beings can often arouse universal attention and resonance. Therefore, the common cultural principles and international vision of animation products are the keys for Chinese animation to enter the international market. This requires screenwriters, directors, planners, and actors to have an international perspective. In addition, in terms of theme selection and theme conception, it actively explores the meeting point of Chinese national culture and the common values of human beings, transforms the rich resources of national cultures into shared global stories and themes, uses the Chinese elements of

international packaging to tell the Chinese story of international expression, realistically shows the internationalization in the script, and reduces subject matter barriers for Chinese animation products to enter the international market.

Data Availability

The data used to support the findings of this study are available from the corresponding author upon request.

Conflicts of Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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References

- [1] K. Alexiou and J. Wiggins, "Measuring individual legitimacy perceptions: scale development and validation," *Strategic Organization*, vol. 17, no. 4, pp. 470–496, 2019.
- [2] Z. Yang and L. S. C. Pun-Cheng, "Vehicle detection in intelligent transportation systems and its applications under varying environments: a review," *Image and Vision Computing*, vol. 69, pp. 143–154, 2018.
- [3] X. Wang, X. Yu, L. Guo, F. Liu, and L. Xu, "Student performance prediction with short-term sequential campus behaviors," *Information*, vol. 11, no. 4, p. 101, 2020.
- [4] A. Chen, J. Kim, S. Lee, and Y. Kim, "Stochastic multi-objective models for network design problem," *Expert Systems with Applications*, vol. 37, no. 2, pp. 1608–1619, 2020.
- [5] M. D. Moreno, "Translation quality gained through the implementation of the iso en 17100:2015 and the usage of the blockchain," *Babel*, vol. 1, no. 2, pp. 1–9, 2020.
- [6] Z. Khan and S. Amin, "Bottleneck model with heterogeneous information," *Transportation Research Part B: Methodological*, vol. 112, no. 1, pp. 157–190, 2018.
- [7] X. Li, Y. Wang, Q.-H. Wang, Y. Liu, and X. Zhou, "Modified integral imaging reconstruction and encryption using an improved SR reconstruction algorithm," *Optics and Lasers in Engineering*, vol. 112, no. 6, pp. 162–169, 2019.
- [8] T. Fischer and C. Krauss, "Deep learning with long short-term memory networks for financial market predictions," *European Journal of Operational Research*, vol. 270, no. 2, pp. 654–669, 2018.
- [9] M. J. Mokarram, T. Niknam, J. Aghaei, M. Shafie-khah, and J. P. S. Catalao, "Hybrid optimization algorithm to solve the nonconvex multiarea economic dispatch problem," *IEEE Systems Journal*, vol. 13, no. 3, pp. 3400–3409, 2019.
- [10] S. Schnelle, J. Wang, R. Jagacinski, and H.-j. Su, "A feed-forward and feedback integrated lateral and longitudinal driver model for personalized advanced driver assistance systems," *Mechatronics*, vol. 50, pp. 177–188, 2018.
- [11] M. Guo and N. Arunkumar, "Construction of employee training program evaluation system of three exponential

- forecast based on sliding window,” *Cluster Computing*, vol. 22, no. 3, pp. 6865–6870, 2019.
- [12] J. Barrera-Martinez, M. López-Fernández, and P. M. Romero-Fernández, “The link between socially responsible human resource management and intellectual capital,” *Corporate Social Responsibility and Environmental Management*, vol. 26, no. 1, pp. 71–81, 2019.
- [13] H. Aguinis, Y. H. Ji, and H. Joo, “Gender productivity gap among star performers in STEM and other scientific fields,” *Journal of Applied Psychology*, vol. 103, no. 12, pp. 1283–1306, 2018.
- [14] E. M. A. Ahmed, “A hydrologic-economic-agronomic model with regard to salinity for an over-exploited coastal aquifer,” *Journal of Geosciences*, vol. 12, no. 12, pp. 1–12, 2019.
- [15] J. M. Cairney, K. Rajan, D. Haley et al., “Mining information from atom probe data,” *Ultramicroscopy*, vol. 159, no. 1, pp. 324–337, 2020.
- [16] G. Han and W. Fu, “The lateral tracking control for the intelligent vehicle based on adaptive PID neural network,” *Sensors*, vol. 17, no. 6, pp. 25–33, 2017.
- [17] L. Ye and T. Yamamoto, “Modeling connected and autonomous vehicles in heterogeneous traffic flow,” *Physica A: Statistical Mechanics and Its Applications*, vol. 490, no. 40, pp. 78–81, 2018.
- [18] H. B. Gao and X. Y. Zhang, “Longitudinal control for Mengshi autonomous vehicle via cloud model,” *IOP Conference Series: Materials Science and Engineering*, vol. 320, no. 1, pp. 324–340, 2018.
- [19] C. M. Kang, S.-H. Lee, and C. C. Chung, “Multirate lane-keeping system with kinematic vehicle model,” *IEEE Transactions on Vehicular Technology*, vol. 67, no. 10, pp. 9211–9222, 2018.
- [20] S. Banerjee and S. Venaik, “The effect of corporate political activity on MNC subsidiary legitimacy: an institutional perspective,” *Management International Review*, vol. 58, no. 5, pp. 813–844, 2018.
- [21] A. Edrees, H. Abdelhamed, S. W. Nho et al., “Construction and evaluation of type III secretion system mutants of the catfish pathogen *Edwardsiella piscicida*,” *Journal of Fish Diseases*, vol. 41, no. 5, pp. 805–816, 2018.
- [22] Z. Wang, H. Ren, Q. Shen, W. Sui, and X. Zhang, “Seismic performance evaluation of a steel tubular bridge pier in a five-span continuous girder bridge system,” *Structures*, vol. 31, no. 1, pp. 909–920, 2021.
- [23] H. Shao, W. H. K. Lam, and M. L. Tam, “A reliability-based stochastic traffic assignment model for network with multiple user classes under uncertainty in demand,” *Networks and Spatial Economics*, vol. 6, no. 3, pp. 173–204, 2019.
- [24] H. Chen, Y. Chen, and L. Yang, “Intelligent early structural health prognosis with nonlinear system identification for RFID signal analysis,” *Computer Communications*, vol. 157, pp. 150–161, 2020.
- [25] S. Kumar Dwivedi, R. Amin, V. Satyanarayana, and R. Chaudhry, “Blockchain-based secured event-information sharing protocol in internet of vehicles for smart cities,” *Computers & Electrical Engineering*, vol. 86, no. 1, pp. 1–9, 2020.
- [26] J. Liang, “Design and realization of animation composition and tone space conversion algorithm,” *Complexity*, vol. 2021, Article ID 5579547, 2021.
- [27] N. Wang, L. I. Changqing, and T. Chen, “A study on Japanese animation spread and its subculture influence after animation restrictions in China,” *Journal of Ocean University of China*, vol. 131, 2018.
- [28] P. Braga and I. F. Silveira, “SLAP: storyboard language for animation programming,” *IEEE Latin America Transactions*, vol. 14, no. 12, pp. 4821–4826, 2017.
- [29] Y. Kuang, “The innovation of development path of animation industry from the perspective of cultural industry policy evolution-observations of relevant policy texts from 1996 to 2017,” *Journal of Ocean University of China*, vol. 73, 2017.
- [30] T. Jiang, “Evolution of art form of video animation design under the background of computer graphics system development,” *International Journal of Technology*, vol. 125, 2017.
- [31] M. Atiqzaman, *International Conference on Big Data Analytics for Cyber-physical System in Smart City*, Vol. 1, Springer, Singapore, 2022.