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# Research on the Copyright Value Evaluation Model of Online Movies Based on the Fuzzy Evaluation Method and Analytic Hierarchy Process

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**Abstract:** With the rapid development of video websites, copyright management and the protection of online movies are facing severe challenges. With the strengthening of intellectual property protection, copyright value management has become necessary for the transformation of copyright value, which is of great significance for the healthy development of the industry. Based on the current development status of China's online movie offerings, online movies were collected from China's three major video platforms between 2016 and 2018 as research objects, and a set of scientific and effective online movie copyright value assessment methods and systems are proposed through the fuzzy comprehensive evaluation method, analytic hierarchy process, Delphi method, and empirical research. In this study, using data collected through a questionnaire survey, a fuzzy evaluation method is applied to establish the evaluation index of the copyright value of online movies. Moreover, according to the Delphi method, expert suggestions are collected, the indexes are scientifically corrected in the market, and the weights of the copyright value evaluation index of online movies both before and after broadcasting are calculated using the analytic hierarchy process. On this basis, by applying big data analysis, the communication effect index, prebroadcast value score evaluation index, and postbroadcast value evaluation index are deeply analyzed, and the copyright value evaluation model of online movies both before and after broadcasting is established. Finally, based on market feedback data, the evaluation models are revised and empirically tested to verify the scientificity and rationality of the copyright evaluation method proposed in this study. The results show that the proposed methods and systems for evaluating the copyright value of online movies are scientific and effective. This study provides new insights for all types of movie and television production organizations and video playback platforms on how to design effective copyright value evaluation models and practice methods for online movies.

**Keywords:** copyright value evaluation; online movie; fuzzy evaluation method; analytic hierarchy process



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## 1. Introduction

Since they first emerged, online movies have attracted the attention of the country, society, and academia due to their rapid development and innovative content. In recent years, with the development and implementation of a series of control measures by relevant authorities in China, the creation, production, marketing, promotion, and other market actions of online movies have gradually become standardized, and because of its broad market space and the convenience with which commercial value can be realized, the online movie sector has attracted a number of market players, including internet video websites, online content production companies, and traditional movie and television production agencies.

As an important type of online video, online movies have become a critical means for iQIYI, Tencent Video, Youku, and other head internet video websites to build brands,

expand traffic, attract funds, and develop membership. In addition, the diversified subject matter, rich content composition, and convenient viewing forms of online videos have become strategic resources with which major video platforms can carry out differentiated competition. The copyright of an online movie is owned by the producer and creator of that movie, and its copyright value mainly refers to the economic value that is generated by the licensing and transfer of copyright rights such as the broadcast rights, projection rights, and information online transmission rights of an online movie.

Currently, with the rapid development of online movies, China is paying increasing attention to copyright infringement and is continuously strengthening the protection of intellectual property rights. Copyright value management, protection, and development have become necessary in the transformation of copyright value, which is of great significance to the formation and healthy development of the market. Online movies have a high return on investment, but to attract sufficient investors, producers must enter the industry as an important driving force. Evaluating the communication effect and accurately assessing the return on investment has become important for many investors and production companies as a way to solve this problem.

Therefore, it is of great importance to study the copyright value evaluation of online movies. During the 2014 first Summit Forum on Online Movies, iQIYI put forward the concept and model of online movies. This study uses iQIYI's definition of the concept of an "online movie" for reference. The term online movie refers to a movie with a duration of more than 60 min, an excellent production level, a complete movie structure and capacity, and content that is in line with relevant policies and regulations of China and is originally released over the internet. With the rapid development of video websites, the forms taken by online copyright infringement are becoming more hidden, more varied, more reliant on strong technology, and more difficult to demonstrate through evidence. Efforts to ensure the copyright management and protection of online movies are facing severe challenges [1]. At the same time, due to a lack of a scientific and effective copyright value evaluation system, the difficulty involved in the copyright development and operation management of online movies has increased for head video platforms and online movie production institutions, and the transaction pricing of online movies, the advertising investment promotion of online movies, the derivative development of online movies, and the preservation and appreciation of online movie content assets have become urgent industry problems to be solved.

The broadcast mode and profit model of online movies are different from the business model of traditional movies. The publicity and distribution of movies completely depend on the internet video platform distributing the movie. The profit model describes the method of sharing accounts with the video platform, and revenue settlement is carried out based on the number of views of the movie. Therefore, the research methods regarding online movie copyright evaluation are different from the cost method, income method, and market method that is used in traditional movie copyright evaluation [2]. This is the context in which the method of copyright value evaluation for online movies is mainly discussed. The aim of this study is to form a set of scientific and effective online movie copyright value evaluation methods and systems through theoretical exploration and empirical research and to provide a set of scientific and effective online movie copyright value evaluation models and practical methods for predicting and assessing business opportunities that can be applied by various movie and television production organizations and video playback platforms. The research objective can be divided into three aspects: the first aspect is establishing a copyright value evaluation system of online movies to determine the copyright value of an online movie both before and after it is broadcasted; the second aspect is to establish the copyright value evaluation model of an online movie after it has been broadcasting by applying big data analysis; and the third aspect is to revise and empirically test the evaluation model based on market feedback data. Based on this, the value of the work, publicity ability, broadcast strategy, communication effect and other aspects of online movies are explored in this study. First, through a literature

review, we identify the important factors that affect the copyright value evaluation of online movies. Second, the two rounds of expert questionnaires conducted to assess the relevant influencing factors of online movies are described, and a fuzzy evaluation method is used to establish the evaluation indexes of online movie copyright value; the necessary objective data collection and subjective data judgment are conducted according to the index interpretation, and the analytic hierarchy process is used to standardize the data. Finally, the data are imported into the analytic hierarchy model to calculate the copyright value of online movies, and then the model is revised and tested to ensure a scientific and reasonable copyright evaluation method.

## 2. Literature Review

### *2.1. Copyright Management Policies and Copyright Value Evaluation*

A copyright is an important type of intangible asset. Research shows that the most influential right involved in copyright is the right to copy. The right to reproduce represents the right to provide public goods to private individuals, from which a certain percentage of revenue can be obtained [3]. With the popularization of the Internet, copyright management is facing a complicated situation. The Internet makes the dissemination of works more extensive and the difficulty of copyright protection more prominent. Various countries have formulated relevant laws and regulations to cope with this challenge, such as the Digital Market Act in Europe. China is constantly improving the relevant laws, regulations, policies, and industry guidelines. The Chinese government has established an online video censorship mechanism to manage and strictly supervise pirated film and television works. Since 2016, the competent authorities of China have issued a series of policies and regulations to strengthen the supervision of online audiovisual content creation, production, and online audiovisual platforms. According to a series of laws and regulations, such as the Copyright Law of the People's Republic of China and Film Industry Promotion Law of the People's Republic of China, the copyright, distribution right, and other kinds of rights of film and television works have been systematically defined, offering the powerful institutional guarantees for the film industry to combat piracy and protect intellectual property rights. However, the value chain of the media content industry has changed with the digital transformation of media organizations, and those organizations are facing challenges in copyright management, content product value evaluation, management mode, and other aspects [4]. In terms of copyright management, media organizations face difficulties both in copyright disputes and in the copyright payment of digital assets; thus, the copyright management and protection of movie and television content need to be further strengthened. In terms of content product pricing, there is no universal evaluation system for the value evaluation and pricing of content assets in academic research, which is a lack that restricts industry development. Therefore, it is particularly important to accelerate the formulation of industry evaluation standards [5]. Scholars have studied copyright management and copyright value evaluation from different angles, providing relevant reference materials and judgment angles for the copyright pricing of intangible assets such as online movies.

Research on the copyright value evaluation method forms the basis of the copyright value of online movies. Studying copyright value is the preferred path of many scholars seeking to develop a method of copyright value evaluation from the existing method of intangible asset value evaluation [6]. Scholars have explored the applicability of various evaluation methods to the task of copyright evaluation. Gordon V. Smith (1989) was the first person to conduct in-depth research on intangible assets and made important contributions to the development of intangible asset evaluation. He discussed the applicability of the relevant methods of copyright evaluation and believed that among the three traditional methods involving the income method, cost method, and market method, income method is the most suitable metric for copyright evaluation [7]. However, there are still certain limitations in the application of the income method, and scholars have carried out many forms of innovation. In terms of the appreciation of copyright value, the analytic hierarchy

process has been applied to the evaluation of cultural copyright value [8]. Based on the copyright law of the United States, some scholars have evaluated the "market effect" factor of copyright value and considered the complex fuzziness of the fair use principle [9].

Some scholars have systematically described the intellectual property evaluation system, describing the specific application of the income method, cost method, and market method in detail while introducing the applicable conditions and limitations of each method [10]. Since intellectual property rights such as copyright are generally confidential, the detailed transaction process that occurs between the two parties cannot be known, and appropriate comparison cases cannot be found for assessing the adoption of the market method. Therefore, in terms of the evaluation of special intangible assets such as intellectual property, the evaluation method of tangible assets is not completely suitable, and the most appropriate method in this regard is the income method [11]. Internationally, there are two ways to determine the rate of revenue sharing. One is empirical analysis, and the other is the factor contribution method. The "quartering method" in the factor contribution treats intangible assets as if they are composed of four elements, namely, capital, organization, labor, and technology, and each element makes an equal contribution. Therefore, the revenue-sharing rate of each of these elements should be set as 25% [12]. Other scholars have studied the combined effects of intellectual property and economic development on innovation and found a series of curves between intellectual property and innovation that depend on GDP per capita [13]. In addition, real options represent a useful tool for evaluating investments under conditions of uncertainty. Therefore, applying real options to intellectual property evaluation should also be widely accepted [14]. Digital rights management (DRM) protection is primarily used to protect digital intellectual property and control its distribution and use on mobile devices. Since attackers attempt to bypass DRM control to gain unauthorized access to copyrighted content, an adversary model has been proposed to evaluate the protection capability of DRM regarding video content on iOS devices [15]. Patents also represent an important aspect of intangible assets. Scholars have conducted in-depth research on the influencing factors and evaluation systems of patent value and believe that the composition of patent value is affected by many factors [16]. The influencing factors recognized in patent transactions across different industries and periods are themselves different, and the value evaluation system is complex and changeable when used to assess the value of specific patents [17]. The factors that affect the value of intangible assets are mainly divided into two categories, namely, the inherent factors of technology and application factors [18]. Among them, the inherent factors refer to the factors related to the inherent characteristics of the technology itself, such as the level of technology development, the life cycle of the technology, and the standardization of technology. Application factors refer to the factors related to the use of technology, such as the type of technology, the proportion of technological contribution to the product, and the scope of the technology application. If the influence of important factors, such as the patent strategy of an enterprise, is considered, the main influencing factors can be divided into four categories: technical factors, market status, legal factors, and technology transfer factors [19]. Patents and copyrights have multiple effects on the industrial structure. On the one hand, patents and copyrights facilitate the entry of new companies into an industry; on the other hand, in any given industry, patents and copyrights can effectively facilitate the entry of upstream creative functions, such as movie production, while often facilitating the concentration of downstream commercial functions, such as movie distribution [20].

### *2.2. Movie and Television Copyright Value Assessment*

In the relevant research on movie and television copyright evaluation, the evaluation methods differ according to the different evaluation objects. Movie and television copyright evaluation have the characteristics of high unit value, and it is difficult to determine income in this context, so it is difficult to use the traditional income method for evaluation. Therefore, in terms of movie and television copyright evaluation, scholars have further

explored the copyright value evaluation method and analyzed the influencing factors of the copyright value of movie and television works.

The income method is an especially important method in the general research on copyright value evaluation and the research on movie and television copyright value evaluation. Among the many methods of copyright value assessment, some scholars believe that the income method is the most applicable to copyright value assessment, and thus the discounted cash flow is discussed [21]. In the practical application of the income method, the forecasting of revenue is the most important aspect. Scholars have carried out various explorations of the influencing factors on the realized revenue of a TV series copyright. The amount of copyright income is closely related to the value system inherent in movie copyrights. The sum of the box office revenue and the income generated after the release of the movie constitutes the copyright revenue [22]. However, some scholars believe that movie and television works are special products, so it is necessary to integrate the balanced score method into the value evaluation of movie and television works [2,23].

### 2.3. Online Movie Copyright Value Assessment

Scholars have conducted extensive research on the value of movie copyright. According to one study, the revenue source of the entire movie industry chain is the box office during the screening process and the derivative products marketed after the movie is released. From the early stage of production to the final screening, a movie goes through many links, including financing and investment, the early stages of creative conception and production, the middle stage, distribution, and theatrical screening. Core creativity is the driving force behind the earning of maximum revenue [24,25]. There are many factors that affect the box office. The box office of a movie is affected by other movies that are released in the same period, and the market in each period has a certain saturation point. When some popular movies compete with each other during the same period, the audience becomes diverted, and some movies fail to meet their original expectations due to insufficient competitiveness [26]. A movie's box office is related to audience evaluation on the internet [27,28]. A movie's score on douban.com can be used to study the influence of word-of-mouth on the box office earnings of a movie [29]. From a movie's promotion to its next screening, reviews exert a significant impact on the box office of a movie, and the influence of the movie score on the box office of a movie continues beginning with its screening process prior to release [30]. In the application of the income method, the combination of the income method and box office forecasting model is widely used. In terms of designing box office data prediction models, some scholars have proposed a new method based on SNS data and deep learning. The novelty of this method is that social media is used to realize the effective combination of SNS data and deep learning, and the results show that this method can effectively increase the accuracy of box office prediction [31]. In addition, movie types can also be incorporated into the box office prediction model as variables. An empirical study shows that a movie box office differs across different movie types [32]. Some scholars have extracted influencing factors from the movie rating websites Douban and Youku, focused on the prediction of online movie popularity, and proposed a prediction framework named DeepFusion, which has improved the accuracy of online movie popularity prediction [33].

In movie copyright evaluation, copyright protection has been widely considered. In terms of copyright protection for movie and television works, digitization has affected many copyrighted media industries, such as radio, television, and movies. Once information is converted into digital form, media content can be copied and distributed at a near-zero marginal cost. This change has encouraged piracy in some industries. This, in turn, makes it difficult for commercial sellers to continue bringing their products to market through traditional means and thus generate the same level of revenue as before the advent of digitization [34]. The mechanism behind online piracy is the spread of information about product features among consumers who have different valuations of the product [35]. Taking Bollywood as an example, some scholars conducted a case study on how piracy

and digital technology affect the supply of new products and investigated the copyright protection policy in Indian movie production during the period of technological change [36]. Some scholars have proposed blockchain copyright exchange (BCE), which can improve the efficiency and accuracy of copyright transactions by encoding copyright rules and license terms in blockchain-based smart contracts, which can effectively eliminate piracy [37].

In summary, research on the copyright value evaluation of online movies is of great significance. At present, scholars have conducted much research on the movie and television industry and established a relatively complete theoretical system on this basis. However, this study argues that there are at least two shortcomings in the existing research: (1) Existing studies pay little attention to issues related to movie copyright value and copyright value evaluation, and research on the theory and method of the copyright value evaluation of online movies has not yet been shaped into a system. Compared with the research on TV dramas, online dramas, and traditional movies, there have been fewer academic research results published about online movies as a whole, and the research content related to the movie industry is mostly related to the value of the movie industry chain and the box office value of movies. (2) The research on copyright value evaluation does not distinguish between online movies before and after their initial broadcast. This study believes that the index system of online movie copyright evaluation should be subdivided on this basis, and the copyright value evaluation system both before and after the initial broadcast of online movies should be established to make the establishment of the evaluation model forward-facing. Compared with TV dramas, online dramas, and traditional movies, online movies have a shorter development time, and there are fewer academic research results that can be used for reference. Based on this, a comprehensive data collection and value assessment of online movies is conducted in this study. Taking online movies collected from China's three major video platforms from 2016 to 2018 as the research object, the fuzzy comprehensive evaluation method, analytic hierarchy process, and Delphi method are applied through theoretical exploration and empirical research. This study proposes a set of scientific and effective methods and systems for online movie copyright value evaluation and revises the evaluation model on the basis of empirical evidence, which can provide a set of effective online movie copyright value evaluation models and practical methods for various movie and television production institutions and video playback platforms to promote the orderly development of online movie copyright content marketization and improve copyright management capabilities.

The rest of the article is organized as follows: Section 3 describes the research methods. After constructing the evaluation index system of online movie copyright value based on the analytic hierarchy process, the data are standardized, and the weights of each index of online movie copyright value evaluation are calculated. The results and discussion are presented in Section 4. According to the composite weights of the obtained indexes, a case study of the value evaluation of online movies is carried out. We then make further use of big data to build an evaluation model of online movie copyright value and revise and empirically test it. Conclusions are outlined in Section 5.

## 3. Research Methods

### *3.1. Construction of an Evaluation Index System of the Copyright Value of Online Movies*

#### 3.1.1. Copyright Value Evaluation Index for Online Movies Both before and after Broadcasting

Unlike traditional movies, the production team for online movies mostly comprises the exclusive production team of online content, and the online movie's promotion, distribution, and revenue methods are mainly determined by the online video platform. There is no single correct way to evaluate copyright, and the characteristics of the assets to be evaluated should be considered comprehensively in multiple intellectual property evaluation methods. Movie and television works are special products with humanistic value and economic value [38,39], and therefore neither the income method, cost method, market method, or other basic evaluation methods are applicable, so it is necessary to integrate more methods

into the value evaluation of movie and television works. In this study, a fuzzy evaluation method is used to establish an evaluation index of online movie copyright value. Then, select a variety of evaluation methods, according to the applicability of different weights assigned to indexes, weighted to find the copyright value of online movies. With the gradual penetration of traditional cinema movie companies and professional teams into the field of online movies, the quality of online movies has continued to improve, and there has been a precedent set for substituting cinema output with high-quality online movies. Therefore, in the future trend of online movies, there are hidden development opportunities for secondary sales and copyright derivatives, and the copyright value evaluation needs to be divided into prebroadcast indexes and postbroadcast indexes so that the establishment of an evaluation model is forward-facing. The first-level index meant to capture a movie's value before the initial broadcast includes the value of the work and other factors, and the first-level index meant to capture a movie's value after the initial broadcast includes the value of the work, broadcast strategy, and communication effect. The first version of this index was initially established by combining relevant literature, various reports issued by authoritative agencies, the latest relevant industry policies, and video platform cooperation methods for online movies. The index system is divided into two parts, the first to capture a movie's value before broadcast and the second to capture it post-broadcast, both of which use three-level structures.

The fuzzy evaluation method is a comprehensive evaluation method based on fuzzy mathematics. According to the membership degree theory of fuzzy mathematics, the method is used to transform a qualitative evaluation into a quantitative evaluation; that is, the fuzzy mathematics method is used to evaluate targets that are restricted by various factors [40]. By using the fuzzy evaluation method, the factors affecting the copyright value of online movies in this study are divided into three levels of indexes with hierarchical relationships, and data are directly collected and assigned to the objective data indexes in the third level. The subjective data are divided into two or three value levels according to the literature research results and market feedback. The evaluation index system of the copyright value of online movies both before and after broadcasting includes 24 and 25 third-level indexes [41–49], respectively, as shown in Tables 1 and 2.

In the prebroadcast index, the copyright value of online movies is mainly affected by the value of the work and other factors. The value of the work refers to the inherent value generated in the process of script selection and production, including the quality of the script, the main creative team, the characteristics of the work, and other second-level indexes. The quality of the work includes the source of the work, the theme type, uniqueness, and other indexes. The main creative team includes the influence of the leading actor, the influence of the producer, the influence of the writer, the influence of the director, the production team, and the production cost. The characteristics of the works include social topics, online sense, artistry, thought, entertainment, narrative, professionalism, and other indexes. Other factors are the strength of the production, publicity, and the level of distribution prior to broadcast, and they include second-level indexes such as publicity plans and financing methods. The publicity plan includes the type of distribution company, the capabilities of the distribution company, the method of publicity, the user profile, and other indexes. Financing methods include crowdfunding, video website self-production, movie and television enterprise production, grassroots self-production, and other indexes.

**Table 1.** Indexes of the copyright value evaluation of online movies before broadcasting.

| First-Level Indexes | Second-Level Indexes | Third-Level Indexes | The Description of Indexes |
|---|---|---|---|
| The value of the work | The quality of the script | The source of the work | Original; adaptation (including IP adaptations and derivative content, true story adaptations, and masterpiece adaptations); series (multiple episodes) |
| | | The theme type | Thriller, love, drama, comedy, fantasy, etc. |
| | | Uniqueness | Whether the subject matter is innovative and groundbreaking |
| | The main creative team | The influence of the leading actor | The industry evaluation of the leading actors' influence |
| | | The influence of the producer | The industry evaluation of the main works of the producer's influence |
| | | The influence of the writer | The influence of the main works of the writer; industry evaluation |
| | | The influence of the director | The influence of the main works of the director; industry evaluation |
| | | The production team | The influence of the main works of the Production team; industry evaluation |
| | | The production cost | Online movie production investment |
| | The characteristics of the work | Social topics | The current hot topics of social concern that can trigger social awareness or collective thinking |
| | | Online sense | The degree of online culture that is contained in the content, the degree of fit with the online platform's mode of communication (mass communication), and the degree of public interest |
| | | Artistry | Does the movie reflect social life and express thoughts and feelings through good performance |
| | | Thought | Is the topic positive and conveys positive energy that is aligned with the mainstream values of society |
| | | Entertainment | Does the movie bring pleasure to the audience |
| | | Narrative | Narrative technique, development mode, rhythm, plot, dramatic conflict, and so on |
| | | Professionalism | Picture quality, service, lighting and sound, packaging, shooting techniques, editing skills |
| Other factors | Publicity plans | The type of the distribution company | Traditional movie distribution company, online video platform, or pure online content company |
| | | The capabilities of the distribution company | Industry reputation and influence, including the proportion of published works and market presence |
| | | The method of publicity | Traffic import, microblog and WeChat self-media distribution, APP launch, navigation website launch, offline hard wide, etc. |
| | | The user profile | Targeted user gender, age, education, occupation, etc. |
| | Financing methods | Crowdfunding | Has money been raised from a general audience |
| | | Video website self-production | Has the video site paid for the production |
| | | Movie and television enterprise production | Have the movie and television enterprises invested in the production |
| | | Grassroots self-production | Have ordinary grass roots methods been used to pay for the movie's own production |

**Table 2.** Indexes of the copyright value evaluation of online movies after broadcasting.

| First-Level Indexes | Second-Level Indexes | Third-Level Indexes | The Description of Indexes |
|---|---|---|---|
| The value of the work | The quality of the script | The theme type | Thriller, love, drama, comedy, fantasy, etc. |
| | The main creative team | The influence of the leading actor | The influence of the main characters; industry evaluation |
| | The characteristics of the work | Social topics | The current hot topics of social concern that can trigger social awareness or collective thinking |
| | | Online sense | The degree of online culture that is contained in the content, the degree of fit with the online platform's mode of communication (mass communication), and the degree of public interest |
| | | Artistry | Does the movie reflect social life and express thoughts and feelings through good performance |
| | | Thought | Is the topic positive and conveys positive energy that is aligned with the mainstream values of society |
| | | Entertainment | Does the movie bring pleasure to the audience |
| | | Narrative | Narrative technique, development mode, rhythm, plot, dramatic conflict, and so on |
| | | Professionalism | Picture quality, service, lighting and sound, packaging, shooting techniques, editing skills |
| Broadcast strategy | The broadcast schedule | The release schedule | Summer holiday, Spring Festival, etc. |
| | | Release date | What day is the movie released on? |
| | Broadcast channels | The influence of the broadcast platform | The online move platform's reputation, traffic, and fan scale |
| | | The number of broadcast platforms offering the movie | The number of platforms over which online movies are broadcast |
| | Broadcast content | The golden six-minute metric | Is the online movie free to watch, does it have six minutes of quality, and does it have the ability to attract fans |
| Communication effect | The communication effect of the broadcasting platform | Number of plays | Number of online movie views |
| | | Playing time | The cumulative playback time of a member user watching a movie during the movie payment cycle |
| | | Number of bullet screens | The number of critical subtitles that pop up while watching the movie |
| | | User rating of the broadcast platform | The comprehensive score of the movie given by the users of the broadcast platform |
| | | Amount of paid movie purchases | The number of people who watched the movie in a single pay-per-view on the video site during the movie pay period |
| | | The possibility of purchasing membership | The number of people who purchased a video site membership during the movie payment period because they wanted to watch the movie |
| | The influence of other important platforms | The Baidu index | The Baidu index during the initial broadcast of the movie |
| | | Weibo popularity | The popularity of the movie's official Weibo: The number of fans, retweets, comments, and likes on the movie's official Sina Weibo |
| | | | The number of comments on Weibo topics: The number of comments appearing on Sina Weibo's movie super topics during the movie's broadcast |
| | | Douban rating | The movie's rating on douban.com (accessed on 26 June 2019) |
| | Star-making ability | Platform's star-making ability | Are there new actors, directors, and screenwriters, and has the online heat and attention increased after the initial broadcast |

Among the postbroadcast indexes, the copyright value of online movies is mainly affected by the value of the work, its broadcast strategy, and its communication effect. The value of the work refers to the inherent value that is generated in the process of script selection and production, and it includes the quality of the script, the main creative team, the characteristics of the work, and other second-level indexes. The quality of a script is affected by the theme type. The influence index of the leading actor determines the main creative team. The characteristics of the work include social topics, online sense, artistry, thought, entertainment, narrative, professionalism, and other indexes. Broadcast strategy refers to the broadcast strategy adopted by the online movie when offered over the platform, and it includes the broadcast schedule, broadcast channels and broadcast content, and other indexes. The broadcast schedule includes indexes such as the release schedule and release date, and the broadcast channel includes indexes such as the influence of the broadcast platform and the number of broadcast platforms offering the movie. Broadcast content is influenced by the golden six-minute metric. The communication effect refers to the effect of online movies on the broadcasting platform, search platform, social platform, and other media, including the communication effect of the broadcasting platform, the influence of other important platforms, and the platform's star-making ability. The communication effect of the broadcast platform includes the number of plays, playing time, number of bullet screens, user rating of the broadcast platform, amount of paid movie purchases, the possibility to purchase membership, and various other indexes. Other important platform influence indexes include the Baidu index, Weibo popularity, and Douban rating. Star-making ability is affected by the platform's star-making ability.

To ensure the validity of the index system, two rounds of expert questionnaires regarding the evaluation index were conducted to ensure the scientific and comprehensive results of the research. The Delphi method is used to construct the index system to determine the degree of influence of each factor affecting the copyright value of online movies. The Delphi method is a kind of anonymous correspondence method for obtaining expert feedback. In its operation step, the problems to be predicted are summarized, and relevant statistics are collected after obtaining the opinions of experts. The expert opinions are anonymously fed back to those experts, and they are then asked for their opinions again. This process is repeated until a unanimous opinion is obtained [50]. By conducting multiple rounds of questionnaire surveys directed at experts, the opinions regarding the indexes and weights were repeatedly consulted and summarized, which ensured the scientificity and effectiveness of the evaluation index system of online movie copyright and the weight design of each index to a certain extent. An expert questionnaire was designed for this study based on the above index system, and a survey was conducted with 106 experts from the movie and television industry in the form of a paper questionnaire. Respondents were asked to score the impact degree of each of the third-level indexes to report which indexes they thought were influential. The responses used a scoring mechanism ranging from 0 to 10 points to determine the impact of each index on the value of online movie copyright. A score of 10 indicates the greatest effect, and a score of 0 indicates no effect.

Through data sorting and index screening, 74 valid questionnaires were finally recovered. After the statistics were calculated for the mean value, standard deviation, and median of the retrieved valid questionnaires, the outliers that fell outside the range of "mean value one standard deviation" were marked as outliers. The number of outliers in each questionnaire was calculated, and those questionnaires with more than half of their responses determined to be outliers were removed. Questionnaires with relatively stable data were retained, and the mean value, standard deviation, and median of the questionnaires were calculated again. Finally, 62 questionnaires were retained. The survey results show that the average value of most of the indexes falls above 7 points. Therefore, the first version of the indexes is considered to have strong persuasion and can basically cover all the relevant indexes. Thus, it is combined with the results of the second round of questionnaires and used as a means of data collection for comprehensive analysis.

On the basis of the first round of expert questionnaires, the second round of expert questionnaires was conducted through an online medium, and 31 valid questionnaires were collected. For the statistical analysis of the two rounds of expert questionnaires, the prebroadcast and postbroadcast evaluation of the copyright value of online movies and shows that are in the prebroadcast evaluation system, there are nine indexes that fall below 7 points, and the scores of five of the indexes, namely, the influence of the producer, artistry, the type of the distribution company, crowdfunding and grassroots self-production, are the same as in the first round of expert questionnaires, and they still fall below 7 points. In addition, four new indexes that fall below 7 points were added, including the source of the work, the influence of the writer, thought, and movie and television enterprise production. To simplify the research, the influence of the producer, the influence of the writer, and the type of the distribution company were deleted, and the index for the financing method was changed to the type of production company to make the indexes more concise and accurate. In the postbroadcast index system, there are eight indexes that fall below 7 points, among which the release date, the number of broadcast platforms offering the movie, and star-making ability are consistent with the results of the first round, and they still fall below 7 points. In addition, five new indexes that each fall below 7 points are the theme type, the influence of the leading actor, artistry, thought, and the Baidu index. To simplify the study, the three indexes of the release schedule, the release date, and the star-making ability were deleted. In addition, considering data availability, this study excludes those indexes for which objective data could not be obtained and subjective values could not be assigned, such as the production team and the method of publicity in the prebroadcast index, the amount of paid movie purchases, the possibility to purchase a membership, and the popularity of the movie's official Weibo in the postbroadcast index.

#### 3.1.2. Data Collection and Analysis

With the rapid development of big data technology, the mining of commercial value or scientific research value from massive data has become the mainstream method by which industry and academia conduct market or academic exploration [51]. The period from 2016 to 2018 is important as it is characterized by exponential growth for online movies, exhibiting a maturing market and diverse content types. Based on this, the sample data used in this study come from 2808 online movie works collected from Tencent Video, iQIYI Video and Youku Video, and 246 of these works have been selected as the key research objects to be analyzed in this study to form a set of scientific and effective online movie copyright value assessment methods and systems based on theoretical exploration and empirical research. The aim of this study is to provide a set of scientific and effective online movie copyright value assessment models and practice methods for all kinds of movie production institutions and video playback platforms.

Through data extraction, screening, and analysis, a wealth of data information has been collected for this research, causing the online movie copyright value evaluation system to be well aligned with the actual context of the industry. According to the statistical results, in the above time frame, iQIYI Video offered a total of 1579 online movies, Tencent Video offered 633, and Youku video offered 596. According to the distinct broadcast data of the various video platforms, a stratified sampling of the above movies has been conducted, with a sampling ratio of 20%. A total of 575 movies were selected from 322 iQIYI online movies, 130 Tencent online movies, and 123 Youku online movies, which is basically a representative set that reflects the overall situation of China's online movie industry. In the process of data collection, in addition to ensuring the truth and effectiveness of the objective data collected, it is also important to establish the evaluation criteria for subjective data. After completing objective data collection, repeated movies and movies with seriously missing data were excluded, and subjective indexes were assigned to the remaining 246 valid sample movies, using a maximum value of 3 and a minimum value of 1, to ensure the objectivity of the subjective index assignment as much as possible. The evaluation methods, judgment, standard basis, grading standard, and assignment standard for all of

the index data of the online movie copyright value evaluation system both before and after the broadcast are shown in Tables 3 and 4.

**Table 3.** Online movie copyright value evaluation of the prebroadcast index system and assignment method.

| Third-Level Indexes | Index Classification Method | Subjective Assignment |
|---|---|---|
| The source of the work | series | 3 |
| | IP adaptation | 2 |
| | completely original | 1 |
| The theme type | action, suspense, love | 3 |
| | fantasy, comedy | 2 |
| | other types | 1 |
| Uniqueness | other types | 3 |
| | comedy, drama | 2 |
| | love, suspense, action | 1 |
| The influence of the leading actor | high number and ratings of past works | 3 |
| | low number of past works and high past work ratings; high number of past works and low past work ratings | 2 |
| | low number of past works and low past work ratings | 1 |
| The influence of the director | high number of past works and scores for past works | 3 |
| | low number of past works and high scores for past works; high number of past work and low scores for past works | 2 |
| | low number of past works and scores for past works | 1 |
| The production cost | six million and more | 3 |
| | two to six million | 2 |
| | two million and below | 1 |
| Social topics | social topics | 2.5 |
| | no social topics | 1.5 |
| Online sense | Strong display of net generation thinking mode. Emphasis is placed on the audience first. Ancients showed signs of obvious modernization. Online language is used to a greater extent. The camera language is exaggerated. Ridicule culture is embodied. Closely matches the consumption habits of online video users. Subverts tradition. The movie content contains any two of the above points and has a strong online sense | 2.5 |
| | In contrast, the movie content has a weak net sense | 1.5 |
| Artistry | the structure is clever, the plot is compact, the characters are bright and full, the scenes are rich, and the camera changes vividly and flexibly | 3 |
| | the structure is clear, the plot is logical, the characters are distinct, and the scenes and shots vary according to the plot | 2 |
| | the structure is unclear, the plot illogical, the characters obtrusive, and the scenes and shots are monotonous | 1 |
| Thought | the theme is profound and grand, the theme conveys advanced and noble values, and the hero's interpretation of the theme is profound and vivid | 3 |
| | the theme is profound, the value orientation is traditional, and the hero's interpretation of the theme is clear and vivid | 2 |
| | the subject is superficial, and the value orientation is unclear | 1 |
| Entertainment | the rhythm is clear and bright, the plot is intuitive and clever, the characters are bright and full, and the interactive design is exquisite and vivid | 3 |
| | the rhythm and plot are clear, and the characters and interactions are vivid | 2 |
| | the rhythm is slow, the plot is obscure, and the characters and interactions are rigid | 1 |
| Narrative | the story is fascinating and full of twists and turns | 3 |
| | the plot is clear, and the narrative is smooth | 2 |
| | the plot is obscure, and the narrative blunt | 1 |

**Table 3.** *Cont.*

| Third-Level Indexes | Index Classification Method | Subjective Assignment |
| --- | --- | --- |
| Professionalism | The actors in the TV series perform skillfully, which can arouse the audience's emotional resonance. The shooting techniques are diverse, the camera is expressive, the editing is vivid and flexible, the costumes are exquisite and beautiful, and the soundtrack is excellent and suitable for the plot development | 3 |
| | The actors in the TV series are generally acting, the shooting techniques are normal, and the costumes are acceptable | 2 |
| | the TV drama actors perform poorly, the scenes and shots are monotonous, the costumes are poor | 1 |
| The capabilities of the distribution company | 330,000 and above | 3 |
| | 20,001 to 32,9999 | 2 |
| | 20,000 and below 20,000 | 1 |
| The user profile | Score of 1.8 | 3 |
| | Score of 1.2 | 2 |
| | Other score | 1 |
| Type of production company | presence of a video platform | 3 |
| | absence of a video platform, relying on traditional movie and television enterprises (whether there have been theatrical movies or TV dramas before) | 2 |
| | In the absence of the above two types of companies, any other types of movie and television enterprises or units | 1 |

There are detailed standards and methods for evaluating prebroadcast index data. In terms of script quality, the source of movie scripts is established according to the audience's viewing preferences and feelings as expressed in the previous audience survey, and the theme type and theme uniqueness are graded according to the relevant data contained in the 2018 Online Audiovisual Program Report. In terms of the main creative team, the influence of leading actors is graded according to the combination of the number and scores of their past works. Director influence is graded according to a combination of the number of the director's past works and the highest score among them. Production costs are divided according to the data contained in major reports, and the production costs of other movies are estimated according to the production costs obtained for a few movies. In terms of the features of works, the degree of social interest is graded according to whether the theme, topic, etc., is related to current hot topics and actual events. The online perception is graded according to the amount of online culture contained in the content, the degree of matching to the mode of communication used on the online platform, and the degree of public interest. Artistry is graded according to the artistry of the narrative structure, plot, characters, scenes, shot design, and other movie aspects. The ideological nature of the characters is graded according to the depth of thought contained in the theme, as well as the presentation of advanced thoughts and noble sentiments through vivid and touching artistic images that enable people to enjoy and edify the art of beauty to continuously improve ideological and spiritual development. Entertainment is graded according to the rhythm, plot, characters, and interactive design, enabling an audience perception of a positive, healthy, pleasant, and happy life, an emotional experience, and a psychological compensation through popular, intuitive, life-oriented, and interesting narrative techniques. The story is rated according to the degree of "drama", including the storyline and narrative techniques. The level of professionalism is graded according to the performance level of the actors, the shooting techniques, editing skills, clothing, lighting and sound effects, and other professional aspects. In terms of production and promotion, the capabilities of a distribution company are graded according to the name of the distribution company and the number of fans of the movie on the video platform. The user portrait rating is established according to the relevant data contained in the "2018 Online Audiovisual Program Report". The types of production companies are categorized according to reports related to online movies.

**Table 4.** Online movie copyright value evaluation of the postbroadcast index system and assignment method.

| Third-Level Indexes | Index Classification Method | Subjective Assignment |
| --- | --- | --- |
| The theme type, the influence of the leading actor, social topics, online sense, artistry, thought, entertainment, narrative, professionalism | Methods and assignments are consistent with the prebroadcast index system and assignment method | |
| The influence of the broadcast platform | iQIYI | 3 |
| | Tencent Video | 2 |
| | Youku | 1 |
| The number of broadcast platforms offering the movie | three or more platforms | 3 |
| | Two platforms | 2 |
| | Single platforms | 1 |
| The golden six-minute metric | In the first six minutes, the main character, the story background, and the cause of the incident are all clearly explained; the content is easy to understand, and the theme is clear; the title contains all the necessary elements; The movie has suspense settings and a strong sense of suspense. | 3 |
| | In the first six minutes, the main character, the story background, and the cause of the event are clearly explained; a basic understanding of the content and the presentation of the theme are established; the theme is basically related to the title; and the movie has a suspense setting, but the sense of suspense is average. | 2 |
| | In the first six minutes, the main character, the story background, and the cause of the event are missing or vaguely explained; the content is difficult to understand, and the subject is unclear. The theme has little to do with the title, and there are no suspense settings. | 1 |
| Number of bullet screens | 15,000 and above | 3 |
| | 1001 to 14,999 | 2 |
| | 1000 and below 1000 | 1 |
| User rating of the broadcast platform | 7.6 and above 7.7 | 3 |
| | 6.1 to 7.5 | 2 |
| | 6 and below 6 | 1 |
| The Baidu index | 1001 and above | 3 |
| | 1 to 1500 | 2 |
| | 0 | 1 |
| The number of comments on Weibo topics | setting both the discussion quantity and the reading assignment number to 2 | 3 |
| | offsetting the discussion quantity to 1 and the reading assignment number to 2; setting a readership assignment of 1 and a discussion assignment of 2 | 2 |
| | offsetting the discussion quantity to 1 and the reading assignment number to 1 | 1 |
| Douban rating | 6 and above | 3 |
| | 1 to 5 | 2 |
| | 0 | 1 |

The value of the index data used after the initial broadcast is different from the value of the index data used before the initial broadcast. In terms of broadcast channels and broadcast content, the influence of the broadcast platform is assessed according to the statistics of the daily active number of third-party data platforms and the member data publicly provided by the official. The number of broadcast platforms is assigned according to that number. The golden six minutes of broadcast content is graded according to the literature related to online movies. The rating of play volume is based on Tencent play volume, iQIYI heat peak, and optimal heat degree. The playback duration rating also serves as the maximum value after the three video platforms are graded. The rating of barrage

volume is established according to the data obtained from the video platform and the Guduo movie and television data. The ratings of broadcast platform users are established according to the video platform's data. The Baidu Index, Weibo topic popularity, and Douban rating are established according to relevant platform data.

### *3.2. Analytical Hierarchy Process for Building Index Weights*

#### 3.2.1. Construction of the Hierarchical Model

The analytic hierarchy process (AHP) is a hierarchical weight decision analysis method that was proposed by Saaty [52]. The AHP is used to transform a large number of complex problems into a hierarchical model, to quantify the experience and subjective judgment of experts, and to decompose the decision problem into different hierarchical structures according to the order of the overall goal, the subgoals of each level, the evaluation criteria and specific schemes. Then, by solving the eigenvector of the judgment matrix, the priority weight of each element at each level to an element at the upper level is obtained. Finally, the reweighting method is used to calculate the final weight of each scheme to the overall goal, and the scheme with the greatest final weight is considered to be the optimal scheme. The application of the analytic hierarchy process is very wide, and its biggest advantage is that the process and result are clear and intuitive, allowing for the existence of uncertainty and subjective information [53,54]. Therefore, AHP is a very suitable means of assigning weight to the indexes of the online movie copyright value evaluation system.

In this study, the analytic hierarchy process, which can determine the weights of all levels of indexes in the evaluation of the copyright value of online movies, was used to standardize the data, establish the analytic hierarchy model on this basis, and then calculate the copyright value of online movies, which provides the basis for the subsequent revision and testing of the model to ensure a scientific and reasonable copyright evaluation method.

In this study, each index was divided into first-level, second-level, and third-level indexes, and then those indexes at the same level were compared pairwise. Experts were asked to score the indexes, and the expert results were calculated to assign weights to indexes at all levels and directly obtain the relative importance of each level and index for the development of an online movie copyright value evaluation system.

#### 3.2.2. Constructing the Judgment Matrix

To determine the weight of copyright value indexes for online movies, the 1–9 scale method is used in this study to establish responses for the questionnaire survey, and the importance of the pair-to-pair index comparison is divided into nine levels. The advantage of using the 1–9 scale method is that it can be used to quantify the subjective experience judgment of experts, clearly and intuitively reflect the relative importance of indexes, and subsequently calculate the corresponding weight of indexes by establishing a judgment matrix.

The questionnaire respondents are movie and television professionals who have experience in production, planning, screenwriting, and directing in the field of online movies. A total of 39 questionnaires were distributed, and 32 were eventually recovered. This questionnaire compares the first-level indexes pairwise, then compares the second-level indexes with the same first-level indexes pairwise, and finally compares the third-level indexes with the same second-level indexes pairwise. According to the comparison results, a judgment matrix $X$ is constructed. To form this numerical judgment matrix, the 1–9 scale method was used to set response options.

#### 3.2.3. Judgment Matrix Consistency Test

After constructing the judgment matrix, conducting a consistency test of the judgment matrix is also necessary. Since relative importance is transitive, ideally, the judgment matrix $X$ should satisfy $X_{ik} \cdot X_{kj} = X_{ij}$ for any $i$, $k$, or $j$. However, in dealing with practical problems, because of the complexity of the judgment object and the limitations of human judgment, problems of inconsistent factor ordering or inconsistent overall ordering

may occur. Therefore, to ensure that the conclusion obtained by the analytic hierarchy process is in line with common sense, it is necessary to carry out a consistency test of the judgment matrix.

First, we calculate the index *CI* to determine the level of deviation from the consistency of the judgment matrix. The calculation formula is as follows:

$$CI = \frac{\lambda_{\max} - n}{n - 1} \tag{1}$$

The smaller the value of *CI* is, the better the consistency of the judgment matrix.

Second, the average random consistency index *RI* value of the judgment matrix is introduced, and the formula for calculating the relative consistency index is as follows:

$$CR = \frac{CI}{RI} \tag{2}$$

When $CR \leq 0.1$, the judgment matrix has a good consistency.

According to the basic formula of the consistency test, Python software was used to write the code for the consistency test to quickly and accurately test the results of 32 experts' questionnaires. We optimized the inspection process as follows:

First, a complete consistency matrix $\overline{X}$ was constructed for the judgment matrix that failed to pass the test. The calculation formula is as follows:

$$\overline{X}_{ij} = \sqrt[n]{\prod_{k=1}^{n} X_{ik} X_{kj}} i,\ j \in N \tag{3}$$

Second, according to the original judgment matrix and the complete consistency matrix, an adjustment matrix *P* is constructed. The calculation formula is as follows:

$$P_{ij} = \left(X_{ij}\right)^{1-t} \times \left(X_{ij}\right)^{t} i,\ j \in N,\ t \in [0,1] \tag{4}$$

where *t* is the harmonic factor, which is the parameter that controls what the original judgment matrix contains. The smaller that *t* is, the more original information it contains, and the closer the adjustment matrix is to the original matrix. The value of *t* is artificially set. To make the value of *t* more reasonable, these steps are generally followed:

In step 1, the acceptable range of *t* is determined according to the actual problem. The range is $[a, b] \in [0, 1]$, and *t* is taken as the two endpoint values of $[a, b]$ to adjust the matrix *P* for satisfactory consistency. If the test matrix of both endpoints fails to meet the requirements of the consistency test, the experts need to readdress the questionnaire to improve the logical rationality of the questionnaire results.

In step 2, if the test matrix of endpoint *b* meets the requirements of the consistency test, then point *b* can be used to construct an adjustment matrix *P* that meets the requirements of the consistency test, and the adjustment matrix *P* can represent the perspectives of experts to a certain extent.

In step 3, to improve the accuracy of the model and on the basis of meeting the consistency test, the value of *t* is kept as small as possible in this study. For instance, $t = \frac{a+b}{2}$ is used to check whether the matrix *P* meets the consistency test requirements. If it meets the requirements, $\frac{a+b}{2}$ replaces *b*; otherwise, $\frac{a+b}{2}$ replaces *a*. Therefore, the interval is reduced to the range required for higher accuracy. At this time, the adjustment matrix *P* constructed by $\bar{t}$ meets the requirements of the consistency test and represents the views of experts to the greatest extent. After many calculations, this study found that when *t* was set to 0.4, the number of passing tests for each index judgment matrix accounted for more than 80% of the total number.

## 4. Results and Discussion

### *4.1. Determination of Index Weights*

#### 4.1.1. Single Layer Weight Determination

First, we calculate the product $M_i$ of the factors in each row of the judgment matrix, and the calculation formula is as follows:

$$M_i = \prod_{i=1}^{n} X_{ij} \ (i = 1,\ 2,\ \cdots,\ n) \tag{5}$$

Second, we calculate the $n$ root $\overline{W}_i$ of $M_i$, and the calculation formula is as follows:

$$\overline{W}_i = \sqrt[n]{M_i} \tag{6}$$

Finally, the vector $\overline{W} = \left[\overline{W}_1,\ \overline{W}_2,\ \cdots,\ \overline{W}_n\right]^{\mathrm{T}}$ is normalized, and the calculation formula is as follows:

$$W_i = \frac{\overline{W}_i}{\sum_{j=1}^{n} \overline{W}_j} \tag{7}$$

The single-level weight does not account for the influence of the upper index on the lower index. The code is written according to the single-layer weight calculation method, in which the weight value of each expert questionnaire result is obtained, the average value is calculated to obtain the single-layer weight, and the weighted sum of the indexes at all levels is set to 1. The single-layer weight calculation results show that for the copyright value of online movies before broadcasting, the weight ratio of the value of the work is 75%, and the weight ratio of production and publicity is 25%. Among the second-level indexes, the weight of the quality of the script is the highest at 52%. Among the third-level indexes, the top three indexes regarding weight ratio are the influence of the leading actor, the source of the work, and the online sense. In terms of the copyright value of online movies after broadcasting, the weight ratio of work value and that of transmission effect are similar. In the second-level index, the weight of the quality of the script is the highest at 43%. Among the third-level indexes, the top three indexes in terms of weight ratio are the influence of the broadcast platform, the influence of the leading actor, and the theme type.

#### 4.1.2. Compound Weight Determination

The composite weight at all levels means that the weight of indexes at the same level is calculated according to the influence of the weight of the upper-level index. The single-layer weight of the first-level index is set as $W = (W_1,\ W_2,\ \cdots,\ W_n)^{\mathrm{T}}$, and the single-layer weight of the second-level index corresponding to the first-level index $W_n$ is $C_n = (C_{n1},\ C_{n2},\ \cdots,\ C_{nm})^{\mathrm{T}}$. Then, the formula for calculating the composite weight of the second-level index is as follows:

$$W_{nm} = W_n \cdot C_{nm} \tag{8}$$

The calculation results of composite weights are shown in Tables 5 and 6. The results show that under the influence of the single-layer weights of first-level indexes, the weights of second-level indexes and third-level indexes change. For the copyright value of online movies before the initial broadcast, the composite weight of the quality of the script under the value of the work index is still the highest, but the weight ratio falls to 39%. Among the third-level indexes, the index with the highest compound weight is the source of the work under the quality of the script index, and the index with the next highest weight is the theme type under the quality of the script index. For the copyright value after the initial broadcast of online movies, the composite weight of the quality of the script under the value of the work index is still the highest, but the weight ratio falls to 22%. Among the third-level indexes, the top three indexes in terms of composite weight are the theme

type under the quality of the script, the influence of the leading actors under the main creative team index, and the influence of the broadcast platform under the broadcasting channel index.

**Table 5.** The composite weight calculation results of all levels of indexes before initial broadcasting.

| First-Level Indexes | Composite Weights | Second-Level Indexes | Composite Weights | Third-Level Indexes | Subjective Assignment | Composite Weights |
|---|---|---|---|---|---|---|
| The value of the work | 0.75 | The quality of the script | 0.39 | The source of the work | $a_1$ | 0.12 |
| | | | | The theme type | $a_2$ | 0.11 |
| | | | | Narrative | $a_3$ | 0.09 |
| | | | | Thought | $a_4$ | 0.07 |
| | | The main creative team | 0.21 | The influence of the leading actor | $a_5$ | 0.09 |
| | | | | The influence of the director | $a_6$ | 0.06 |
| | | | | Professionalism | $a_7$ | 0.06 |
| | | Features of works | 0.15 | Social topics | $a_8$ | 0.04 |
| | | | | Online sense | $a_9$ | 0.04 |
| | | | | Artistry | $a_{10}$ | 0.03 |
| | | | | Entertainment | $a_{11}$ | 0.04 |
| Production and publicity | 0.25 | Production company strength | 0.07 | Production company strength | $a_{12}$ | 0.07 |
| | | Distribution company capacity | 0.08 | Distribution company capacity | $a_{13}$ | 0.08 |
| | | Audience orientation | 0.10 | Audience orientation | $a_{14}$ | 0.10 |

**Table 6.** The composite weight calculation results of all levels of indexes after initial broadcasting.

| First-Level Indexes | Composite Weights | Second-Level Indexes | Composite Weights | Third-Level Indexes | Subjective Assignment | Composite Weights |
|---|---|---|---|---|---|---|
| The value of the work | 0.51 | The quality of the script | 0.22 | The theme type | $b_1$ | 0.11 |
| | | | | Narrative | $b_2$ | 0.07 |
| | | | | Thought | $b_3$ | 0.04 |
| | | The main creative team | 0.14 | The influence of the leading actor | $b_4$ | 0.10 |
| | | | | Professionalism | $b_5$ | 0.05 |
| | | Features of works | 0.15 | Social topics | $b_6$ | 0.04 |
| | | | | Online sense | $b_7$ | 0.04 |
| | | | | Artistry | $b_8$ | 0.02 |
| | | | | Entertainment | $b_9$ | 0.04 |
| Communication effect | 0.49 | Broadcast channels | 0.14 | The influence of the broadcast platform | $b_{10}$ | 0.10 |
| | | | | The number of broadcast platforms offering the movie | $b_{11}$ | 0.03 |
| | | The quality of the golden six minutes content | 0.14 | The quality of the golden six minutes content | $b_{12}$ | 0.14 |
| | | The communication effect of the video platform | 0.12 | Number of plays | $b_{13}$ | 0.05 |
| | | | | Playing time | $b_{14}$ | 0.03 |
| | | | | Number of bullet screens | $b_{15}$ | 0.02 |
| | | | | User rating of the broadcast platform | $b_{16}$ | 0.03 |
| | | The influence of social platforms | 0.09 | The Baidu index | $b_{17}$ | 0.03 |
| | | | | The number of comments on Weibo topics | $b_{18}$ | 0.03 |
| | | | | Douban rating | $b_{19}$ | 0.03 |

As shown in Table 5, we calculate the copyright value evaluation scores before online movie broadcasting $f_1$, and the calculation formula is as follows:

$$f_1 = 0.12a_1 + 0.11a_2 + 0.09a_3 + 0.07a_4 + 0.09a_5 + 0.06a_6 + 0.06a_7 + 0.04a_8 + 0.04a_9 + 0.03a_{10} + 0.04a_{11} + 0.07a_{12} + 0.08a_{13} + 0.10a_{14} \quad (9)$$

As shown in Table 6, we calculate the copyright value evaluation scores after online movie broadcasting $f_2$, and the calculation formula is as follows:

$$f_2 = 0.11b_1 + 0.07b_2 + 0.04b_3 + 0.10b_4 + 0.05b_5 + 0.04b_6 + 0.04b_7 + 0.02b_8 + 0.04b_9 + 0.10b_{10} + 0.03b_{11} + 0.14b_{12} + 0.05b_{13} + 0.03b_{14} + 0.02b_{15} + 0.03b_{16} + 0.03b_{17} + 0.03b_{18} + 0.03b_{19} \quad (10)$$

### *4.2. Using Indexes and Weights to Evaluate the Value of Online Movies*

According to the composite weights of the obtained indexes, the 2018 online movie "The Ferryman · Manjusaka" is taken as an example for evaluating the value of online movies. First, the subjective and objective indexes of "The Ferryman · Manjusaka" are each assigned a value. Second, calculating the evaluation score of each index is calculated. Then, the value evaluation scores of each index were added to obtain the total value evaluation scores for "The Ferryman · Manjusaka" both before and after broadcasting, as shown in Tables 7 and 8, respectively. The full value of the initial evaluation is 3 points, which can be converted into a 10-point scale by multiplying by the coefficient of 3.33. As shown in Table 7, the total value evaluation score of the movie before its initial broadcast was initially 2.67 points, which is equivalent to 8.9 points on a 10-point scale. As shown in Table 8, the total value evaluation score of the movie after the broadcast was initially 2.82 points, which is equivalent to 9.4 points on a 10-point scale. It can be seen that the total value score before and after the broadcast of "The Ferryman · Manjusaka" is high, and the value score increases to a certain extent after the broadcast, indicating that the movie has a good broadcast effect.

**Table 7.** The value evaluation of "The Ferryman · Manjusaka" before the initial broadcast.

| First-Level Indexes | Second-Level Indexes | Third-Level Indexes | Composite Weights | Index Assignment | Composite Weight × Index Assignment |
|---|---|---|---|---|---|
| The value of the work | The quality of the script | The source of the work | 0.12 | 3 | 0.36 |
| | | The theme type | 0.11 | 3 | 0.33 |
| | | Narrative | 0.09 | 3 | 0.27 |
| | | Thought | 0.07 | 2 | 0.14 |
| | The main creative team | The influence of the leading actor | 0.09 | 3 | 0.27 |
| | | The influence of the director | 0.06 | 3 | 0.18 |
| | | Professionalism | 0.06 | 3 | 0.18 |
| | Features of works | Social topics | 0.04 | 1.5 | 0.06 |
| | | Online sense | 0.04 | 2.5 | 0.1 |
| | | Artistry | 0.03 | 3 | 0.09 |
| | | Entertainment | 0.04 | 3 | 0.12 |
| Production and publicity | Production company strength | Production company strength | 0.07 | 3 | 0.21 |
| | Distribution company capacity | Distribution company capacity | 0.08 | 2 | 0.16 |
| | Audience orientation | Audience orientation | 0.10 | 2 | 0.2 |
| | Total | | 1 | 37 | 2.67 |

### *4.3. Further Analysis: The Use of Big Data to Build an Online Movie Copyright Value Evaluation Model*

#### 4.3.1. Construction of the Value Score Evaluation Index System for a Movie before Its Initial Broadcast

This study further uses factor analysis to optimize the index and directly uses the optimized prebroadcast index to establish the value evaluation scale [55]. In this study, correlation analysis is used to screen out at least one single index that is related to all the indexes of the prebroadcast communication effect. If a prebroadcast evaluation index is irrelevant to any of the indexes used to assess the postbroadcast communication effect, it implies that the evaluation index has an invalid value evaluation. In this study, subject matter types are divided into 11 main categories, such as love, action, suspense, fantasy, comedy, drama, Wuxia, science fiction, crime, adventure, and thriller. The analysis results show that except for the categories of adventure and thriller, all indexes are related to

the communication effect indexes. At this stage, due to the different broadcast data of the various platforms, the difference between the Baidu index and the Douban rating for various online movies is overly obvious. Therefore, the assigned grading data are uniformly adopted for analysis, and the relevant data and index values of the 246 selected online movies are assigned for subsequent analysis.

**Table 8.** The value evaluation of "The Ferryman · Manjusaka" after the initial broadcast.

| First-Level Indexes | Second-Level Indexes | Third-Level Indexes | Composite Weights | Index Assignment | Composite Weight × Index Assignment |
|---|---|---|---|---|---|
| The value of the work | The quality of the script | The theme type | 0.11 | 3 | 0.33 |
| | | Narrative | 0.07 | 3 | 0.21 |
| | | Thought | 0.04 | 2 | 0.08 |
| | The main creative team | The influence of the leading actor | 0.1 | 3 | 0.3 |
| | | Professionalism | 0.05 | 3 | 0.15 |
| | Features of works | Social topics | 0.04 | 1.5 | 0.06 |
| | | Online sense | 0.04 | 2.5 | 0.1 |
| | | Artistry | 0.02 | 3 | 0.06 |
| | | Entertainment | 0.04 | 3 | 0.12 |
| Communication effect | Broadcast channels | The influence of the broadcast platform | 0.1 | 3 | 0.3 |
| | | The number of broadcast platforms offering the movie | 0.03 | 1 | 0.03 |
| | The quality of the golden six minutes content | The quality of the golden six minutes content | 0.14 | 3 | 0.42 |
| | The communication effect of the video platform | Number of plays | 0.05 | 3 | 0.15 |
| | | Playing time | 0.03 | 3 | 0.09 |
| | | Number of bullet screens | 0.02 | 3 | 0.06 |
| | | User rating of the broadcast platform | 0.03 | 3 | 0.09 |
| | The influence of social platforms | The Baidu index | 0.03 | 3 | 0.09 |
| | | The number of comments on Weibo topics | 0.03 | 3 | 0.09 |
| | | Douban rating | 0.03 | 3 | 0.09 |
| **Total** | | | 1 | 52 | 2.82 |

The extraction of common factors is an important link in the construction of index systems. In this study, principal component analysis is used to extract common factors, and nonnegative feature roots are obtained through a correlation coefficient matrix. The factor analysis results show that the eigenvalues of the first 15 factor variables are all greater than 1, so the cumulative variance contribution degree of the first 15 factors extracted is 80.279%, indicating that the first 15 extracted common factors have a good explanation degree for the prebroadcast evaluation. The factor load table is obtained after the variance maximization orthogonal rotation of the factor load matrix, which can better reflect the relationship between the variables of the common factor, is completed. In this study, one of the most appropriate indexes was selected from the original indexes of each factor aggregation, and the prebroadcast value score evaluation scale was constructed using the selected 15 indexes, as shown in Table 9. The values of these 15 indexes range from 6 points to 25 points. These indexes are used to construct the value evaluation scale. If $x$ is used to represent the original value of the evaluation score, then the minimum value is 1, and the maximum value is 10 on the ten-point scale. Then, the linear conversion formula representing the evaluation score on the ten-point scale is as follows:

$$V = (x - 6) \times 9/19 + 1 \tag{11}$$

The value of each index in the prebroadcast value score evaluation scale is shown in the second column of Table 9. Taking "The Ferryman · Manjusaka" as an example, we can see that the value score is calculated, and the score results are shown in the last column of Table 9. The value score of "The Ferryman · Manjusaka" is 21.2 points when the scale method is used for value evaluation and 8.2 points after conversion to a ten-point scale, which is very close to the result obtained by the index weight evaluation method.

**Table 9.** The value score rating scale before the movie broadcast.

| Indexes | Value Range | The Index Value for "The Ferryman · Manjusaka" |
|---|---|---|
| Final classification rating of the influence of the leading actors | 1, 2, 3 | 3 |
| Final classification rating of the influence of the director | 1, 2, 3 | 3 |
| Classification of the user profile | 1, 2, 3 | 2 |
| Professionalism | 1, 2, 3 | 3 |
| Classification of the theme type | 1, 2, 3 | 3 |
| Online sense | 0, 1 | 1 |
| Social topics | 0, 1 | 0 |
| The number of past works by the leading actors | 0–3 | 2.2 |
| Classification of the capabilities of the distribution company | 1, 2, 3 | 2 |
| action | 0, 1 | 1 |
| crime | 0, 1 | 0 |
| Is the movie an IP adaptation | 0, 1 | 1 |
| drama | 0, 1 | 0 |
| science fiction | 0, 1 | 0 |
| Wuxia | 0, 1 | 0 |
| The value score before the movie broadcast | | 21.2 |

#### 4.3.2. Analysis of the Communication Effect Index

The indexes of the communication effect involved in this study include the number of plays, playing time, the number of bullet screens, user rating of the broadcast platform, the Baidu index, the number of Weibo topics read, the number of comments on Weibo topics, and the Douban rating. There is a strong correlation among these indexes, which reveals that the information redundancy dynamic needs to be streamlined.

This study uses factor analysis to analyze the communication effect index. The factor analysis results are shown in Table 10, the load matrix after factor rotation is shown in Table 11, and the eigenvalues of the first five factors are all greater than 1. Therefore, the cumulative variance contribution degree of the first five factors extracted is 90.478%, indicating that the first five common factors extracted can explain more than 90% of the information contained in the original eight indexes, with a good explanation degree. According to the results of factor analysis and the relationships among indexes, five indexes, such as the subjective assignment of the number of plays, the number of comments on Weibo topics, Douban rating, user rating of the broadcast platform, and Baidu index, were finally retained as components of the postbroadcast evaluation index. The evaluation scale of the online movie communication effect is shown in Table 12. These five indexes are important components of the evaluation scale of the online movie communication effect, and these indexes have a minimum value of 5 and a maximum value of 14. Therefore, if $x$ is used to represent the original value of the evaluation score, then the minimum value is 1, and the maximum value is 10 on a ten-point scale, then $V$ is used to represent the linear conversion formula of the evaluation score on a ten-point scale:

$$V = x - 4 \tag{12}$$

#### 4.3.3. Construction of the Evaluation Index System of the Postbroadcast Value Score

After broadcasting, the evaluation method still uses factor analysis to optimize the indexes and subsequently uses the optimized indexes to establish the value evaluation scale. In this study, the broadcast evaluation index and the communication effect index listed in Table 12 were combined for factor analysis. The factor analysis results are shown in Table 13. The eigenvalues of the first 15 factor variables were all greater than 1, and the cumulative variance contribution degree of the extracted first 15 factors was 78.555%, indicating that the extracted first 15 common factors had a good explanatory degree for after-broadcast evaluation. The factor load matrix was obtained by conducting variance maximization orthogonal rotation of the factor load matrix.

**Table 10.** The propagation effect index factor explains the total variance ratio.

| Component | Initial Eigenvalue | | | The Sum of the Squared Loads Extracted | | | The Load Sum of Squares Rotated | | |
|---|---|---|---|---|---|---|---|---|---|
| | Total | Variance % | Accumulate % | Total | Variance % | Accumulate % | Total | Variance % | Accumulate % |
| 1 | 3.627 | 45.337 | 45.337 | 3.627 | 45.337 | 45.337 | 2.209 | 27.611 | 27.611 |
| 2 | 1.338 | 16.725 | 62.063 | 1.338 | 16.725 | 62.063 | 1.832 | 22.904 | 50.515 |
| 3 | 0.881 | 11.016 | 73.079 | 0.881 | 11.016 | 73.079 | 1.158 | 14.473 | 64.988 |
| 4 | 0.852 | 10.650 | 83.729 | 0.852 | 10.650 | 83.729 | 1.068 | 13.350 | 78.338 |
| 5 | 0.540 | 6.749 | 90.478 | 0.540 | 6.749 | 90.478 | 0.971 | 12.140 | 90.478 |
| 6 | 0.452 | 5.646 | 96.124 | | | | | | |
| 7 | 0.200 | 2.496 | 98.620 | | | | | | |
| 8 | 0.110 | 1.380 | 100.000 | | | | | | |

**Table 11.** Load matrix after rotating the propagation effect index factor.

| | Component | | | | |
|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 |
| Subjective assignment of the number of plays | 0.922 | | | | |
| Subjective assignment of playing time | 0.912 | | | | |
| Subjective assignment of the number of bullet screens | 0.596 | | | | |
| Subjective assignment of the number of Weibo topics read | | 0.920 | | | |
| Subjective assignment of the number of comments on Weibo topics | | 0.918 | | | |
| Subjective assignment of Douban rating | | | 0.926 | | |
| Subjective assignment of user rating of the broadcast platform | | | | 0.962 | |
| Subjective assignment of Baidu index | | | | | 0.913 |

**Table 12.** Online movie communication effect evaluation scale.

| Indexes | Index Significance | Index Value Range |
|---|---|---|
| Classification rating of the number of plays | The viewing behavior of the audience | 1, 2, 3 |
| Classification rating of the number of comments on Weibo topics | Audience engagement | 1, 2 |
| Classification rating of Douban rating | Oriented toward large platforms | 1, 2, 3 |
| Classification rating of user rating of the broadcast platform | Audience word-of-mouth | 1, 2, 3 |
| Classification rating of Baidu index | Audience attention | 1, 2, 3 |

In this study, one of the most appropriate indexes was selected from the original indexes for each factor aggregation, and the postbroadcast value score evaluation scale was constructed from the selected 15 indexes, as shown in Table 14. The values of these 15 indexes range from 3 points to 18 points. These indexes are used to construct the postbroadcast value evaluation scale. If $x$ is used to represent the original value of the evaluation score, the minimum value is 1, and the maximum value is 10 on a ten-point scale. Then, $V$ is used to represent the linear conversion formula of the evaluation score:

$$V = (x - 3) \times 9/15 + 1 \tag{13}$$

The value method for each index in the postbroadcast value score evaluation scale is shown in the second column of Table 14. The postbroadcast value score of "The Ferryman · Manjusaka" is still used as an example, and the score results are shown in the last column of Table 14. The value score of "The Ferryman · Manjusaka" is 17 points when the scale method is used for postbroadcast value evaluation, which is 9.4 points after conversion to a 10-point scale, which is consistent with the results obtained when using the index weight

method. This means that the postbroadcast value score of the movie is higher than the prebroadcast value score.

**Table 13.** Postbroadcast evaluation index factors explain the total variance ratio.

| Component | Initial Eigenvalue | | | The Sum of the Squared Loads Extracted | | | The Load Sum of Squares Rotated | | |
|---|---|---|---|---|---|---|---|---|---|
| | Total | Variance % | Accumulate % | Total | Variance % | Accumulate % | Total | Variance % | Accumulate % |
| 1 | 5.279 | 15.998 | 15.998 | 5.279 | 15.998 | 15.998 | 3.403 | 10.314 | 10.314 |
| 2 | 2.758 | 8.359 | 24.356 | 2.758 | 8.359 | 24.356 | 2.889 | 8.754 | 19.067 |
| 3 | 2.509 | 7.603 | 31.960 | 2.509 | 7.603 | 31.960 | 2.228 | 6.752 | 25.820 |
| 4 | 2.087 | 6.324 | 38.284 | 2.087 | 6.324 | 38.284 | 2.112 | 6.399 | 32.219 |
| 5 | 1.631 | 4.942 | 43.226 | 1.631 | 4.942 | 43.226 | 1.790 | 5.425 | 37.644 |
| 6 | 1.615 | 4.893 | 48.119 | 1.615 | 4.893 | 48.119 | 1.786 | 5.411 | 43.055 |
| 7 | 1.548 | 4.691 | 52.810 | 1.548 | 4.691 | 52.810 | 1.545 | 4.682 | 47.737 |
| 8 | 1.330 | 4.030 | 56.840 | 1.330 | 4.030 | 56.840 | 1.452 | 4.399 | 52.136 |
| 9 | 1.210 | 3.665 | 60.505 | 1.210 | 3.665 | 60.505 | 1.447 | 4.384 | 56.520 |
| 10 | 1.152 | 3.491 | 63.996 | 1.152 | 3.491 | 63.996 | 1.258 | 3.811 | 60.331 |
| 11 | 1.036 | 3.139 | 67.135 | 1.036 | 3.139 | 67.135 | 1.257 | 3.810 | 64.141 |
| 12 | 1.013 | 3.070 | 70.205 | 1.013 | 3.070 | 70.205 | 1.216 | 3.686 | 67.827 |
| 13 | 0.980 | 2.971 | 73.176 | 0.980 | 2.971 | 73.176 | 1.194 | 3.618 | 71.445 |
| 14 | 0.904 | 2.741 | 75.917 | 0.904 | 2.741 | 75.917 | 1.175 | 3.560 | 75.006 |
| 15 | 0.870 | 2.638 | 78.555 | 0.870 | 2.638 | 78.555 | 1.171 | 3.549 | 78.555 |
| 16 | 0.787 | 2.384 | 80.938 | | | | | | |
| 17 | 0.747 | 2.263 | 83.201 | | | | | | |
| … | | | | | … | | | | |
| 33 | 0.000 | 0.000 | 100.000 | | | | | | |

**Table 14.** Postbroadcast value score rating scale.

| Indexes | Value Range | The Index Value for "The Ferryman · Manjusaka" |
|---|---|---|
| Classification rating of the influence of the leading actors | 1, 2, 3 | 3 |
| Narrative | 1, 2, 3 | 3 |
| Online sense | 0, 1 | 1 |
| Social topics | 0, 1 | 0 |
| Classification rating of user rating of the broadcast platform | 1, 2, 3 | 3 |
| Classification rating of Baidu index | 1, 2, 3 | 3 |
| Love | 0, 1 | 1 |
| Crime | 0, 1 | 0 |
| Action | 0, 1 | 1 |
| Science fiction | 0, 1 | 0 |
| Comedy | 0, 1 | 0 |
| Wuxia | 0, 1 | 0 |
| Fantasy | 0, 1 | 0 |
| The quality of the golden six minutes content | 1, 2, 3 | 3 |
| Number of playback platforms | Since the factor load coefficient is negative, the values −2, −1, and 0 correspond to the number of platforms 3, 2, and 1, respectively | −1 |
| Value score after initial broadcast | | 17 |

## 5. Conclusions

With the development of the online movie industry, copyright value management, protection, and development have become necessary for the transformation of copyright value, which is of great significance to the formation and healthy development of the industry market. Based on the current development status of China's online movies, an online movie copyright value evaluation system is constructed. First, through a literature search, the important factors affecting the evaluation of the copyright value of online movies are developed. Second, through a questionnaire survey to collect experts' suggestions, the fuzzy evaluation method is used to establish the online movie copyright value evaluation

index and the evaluation index for a scientific market correction. Then, the analytic hierarchy process is used to standardize the data, and the weights of all levels of the copyright value evaluation indexes are calculated. On this basis, combined with big data analysis, the copyright value of online movies is calculated. Finally, based on market feedback data, an empirical test of the online movie copyright valuation model is performed. The research shows that for the copyright value of online movies before the initial broadcast, the composite weight ratio of the quality of the script in the second-level indexes is the highest, the composite weight ratio of the source of the work in the third-level index is the highest, and the second index is the theme type. For the copyright value of online movies after the broadcast, the composite weight of the quality of the script is the highest in the second-level index, and the top three composite weight indexes in the third-level index are the theme type, the influence of the leading actor and the influence of the broadcast platform. According to the composite weight of indexes and the market feedback data obtained, this study takes the online movie "The Ferry-man · Manjusaka" as an example to evaluate the value of online movies. The revised evaluation model and empirical test show that the online movie copyright value evaluation model established in this study has high accuracy and can be used to effectively evaluate the prebroadcast and postbroadcast value of online movies.

At present, there is no model or method for the evaluation of online movie copyright value in China. Based on previous academic research, this study uses completely independent and innovative research to construct an online movie copyright value evaluation system, value evaluation method, and evaluation model based on the feedback of industry experts, thereby providing a set of scientific and effective basic methods for the development of the online movie industry.

The online movie copyright value evaluation system constructed in this study is forward-facing and innovative and has made certain contributions to the promotion of the orderly development of online movie copyright content marketization, the enhancement of the scientific allocation of copyright management, and the improvement of the fair sale of copyright transactions. In terms of academic innovation, an online movie copyright value evaluation system is constructed in this study. Compared with TV dramas, online dramas, and traditional movies, online movies have a shorter development time and fewer academic research results that can be used for reference. Therefore, a comprehensive data collection and value evaluation of online movies is conducted in this study, and a set of scientific and effective copyright value evaluation methods and systems for online movies are proposed. This set of methods and systems can provide effective modeling and practice methods for the evaluation of online movie copyright value for all kinds of movie and television production organizations and video playback platforms. In terms of application innovation, the evaluation method and evaluation model of online movie copyright value constructed in this study combines quantitative analysis with qualitative analysis, and the results are highly readable, easy to implement and operate, and easy to apply. At the same time, the model is fundamental, the research content is relatively comprehensive, and the evaluation method and the evaluation model exhibit strong growth and can be immediately updated with the development of the times. According to the latest industry trends and better-detailed data, the model can be further modified and tested to conform to the characteristics of the online movie market mechanism and to improve its accuracy.

There are still some limitations in this study. On the one hand, because a section of the selected index data was not obtained in the process of research, the current version of the evaluation system and evaluation model has some room for optimization. On the other hand, the online movie market system and industry form have not yet reached a more mature and stable degree, so the development of the entire industry is always contingent and changeable, and this study is highly applicable to the form currently taken by the industry. If the development of the industry market changes greatly in the future, the system and model will still need to be revised. Future researchers can further explore this aspect.

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