International Journal for Housing Science and Its Applications
Publish August 6, 2025. Volume 46, Issue 3 Pages 4985-4995

https://doi.org/10.70517/ijhsa463427

Research on the Construction of Intangible Cultural Heritage Brands Driven by Intelligent Computing Models: Taking the Spring Festival Gala Mascot as an Example

Liuxun Zhang[1,2], Rulan Yang[3], Zihan Ma[4] and Qiang Yi[5,6,*]

[1] School of International Journalism & Communication, Beijing Foreign Studies University, Beijing, 100089, China
[2] School of Literature and Communication, Guangxi Science & Technology Normal University, Laibin, Guangxi, 546199, China
[3] School of Information Science and Technology, Beijing Foreign Studies University, Beijing, 100089, China
[4] International Business School, Tianjin Foreign Student University, Tianjin, 300270, China
[5] School of Literature and Communication, Quanzhou Normal University, Quanzhou, Fujian, 362000, China
[6] School of Communication, National Chengchi University, Taibei, 116011, China

Corresponding authors: (e-mail: zlx7161234@163.com).

Abstract The design of Spring Festival Gala mascot integrates the national spirit and other connotations, and has significant cultural symbolism. This paper integrates the cultural elements of the Spring Festival Gala mascot with multi-source heterogeneous data through co-word analysis and knowledge mapping technology, and establishes a cultural resource association network. Introducing the theory of GIS field model, the paper proposes the spatio-temporal dynamic expression method of intangible cultural field and quantitatively analyzes its propagation intensity and scope. Based on the multimodal data, the cultural communication study of the Spring Festival Gala mascot is conducted. The results show that the skewness of the questionnaire sample data is less than 3, and the peak value is less than 10. Meanwhile, the AVE square root of the five variables is greater than the correlation coefficient between variables, and the data quality is good. The communication model is constructed by combining the sample data, and with $P < 0.01$, all five variables positively and significantly affect the cultural communication effect of the Spring Festival Gala mascot.

Index Terms knowledge graph, co-word analysis, intangible culture field, GIS field model, Spring Festival Gala mascot culture

I. Introduction

The history of more than five thousand years of civilization has left a splendid and rich intangible cultural heritage for China [1]. These intangible cultural heritages are the bond that maintains the unity of the nation and the concentrated expression of the national spirit [2]. Innovating the transmission path of intangible cultural heritage is a need for the inheritance of intangible cultural heritage and an inevitable requirement for the sustainable development of human society [3], [4]. However, the narrow scope of dissemination, lagging mode of dissemination, formalization of dissemination, insufficient attention, and insufficient inheritance are the dilemmas of the dissemination of Chinese intangible cultural heritage, and new paths of dissemination of intangible cultural heritage are explored through the exploration of three-dimensional dissemination of new media, protection of digital technology, internal and external inheritance strategies, and increased policy support, in order to contribute to the inheritance and dissemination of intangible cultural heritage [5]-[8].

In this context, the construction of Spring Festival mascot culture is of great significance for the innovation and dissemination of Chinese ICH brand [9], [10]. In China, every year during the Spring Festival, Chinese people will usher in a grand Spring Festival Gala, of which the most popular is the CCTV Spring Festival Gala [11], [12]. And in every Spring Festival Gala, a special character appears, which is the mascot of the Spring Festival Gala [13]. The mascot of Spring Festival Gala is the image representative of Spring Festival Gala and a kind of cultural symbol [14]. The design concepts of mascots usually incorporate traditional Chinese cultural elements, such as the Chinese zodiac and traditional folk art [15], [16]. At the same time, the image of the mascot will be mainly characterized by cute, lively and cheerful to cater for the atmosphere and theme of the Spring Festival Gala [17], [18]. In addition to their performance in the Spring Festival Gala program, mascots will also be used in all aspects of the Spring Festival Gala such as promotional posters, stage sets, and so on, becoming a highlight of the Spring Festival Gala [19]-[21]. Their appearance not only adds a celebration and joy to the Spring Festival Gala, but also becomes a kind of dissemination and inheritance of Chinese culture [22], [23].

This paper centers on the cultural value mining and dissemination of Spring Festival Gala mascots. The automated extraction of cultural entities is realized through the theory of literature coupling, and the semantic association network is constructed by combining the analysis of co-words to form a structured cultural knowledge map of the Spring Festival Gala mascot. Drawing on the theory of GIS field model, the model is established through the dynamic expression of intangible cultural field to solve the problem of spatio-temporal modeling of multi-source heterogeneous data. Utilize the questionnaire survey to collect data on the target audience's demand for Spring Festival Gala mascot cultural products. Analyze the degree of influence of each design dimension on the cultural communication effect of the Spring Festival Gala mascot, and construct a communication model to optimize the communication effectiveness.

II. Technical support for the analysis of the cultural construction of mascots for the Spring Festival gala

This chapter analyzes the national cultural value of the Spring Festival Gala mascot, the construction of the knowledge map of related cultural materials, and the modeling of the intangible cultural field in a systematic way.

II. A.Analysis of the national cultural value of the mascot of the Spring Festival Gala

"What is national, is global" The Spring Festival Gala mascot is developing in the direction of nationalization, which is especially prominent in the design of the Spring Festival Gala mascot. The mascot brings a significant role to the sensory image, while the cultural content it carries also has a profound meaning. The image and cultural connotation of the mascot of the Spring Festival Gala are not presented separately, but the external and internal integration, the combination of the two, is based on the image to highlight the cultural connotation it contains and the spirit of the Spring Festival Gala and the concept of mutual integration. The mascots of the Spring Festival Gala are divided into four parts; national culture, the theme of the event, as well as regional culture and blessings. According to the mascots of the Spring Festival Gala, the focus of the spirit and culture that each mascot wants to express will be influenced by the differences in the environment at that time and the historical period. The mascots of the Spring Festival Gala mainly express the following aspects: the culture of the Spring Festival, the spirit of reunion, the symbolism of saying goodbye to the old and welcoming the new, the symbolism of the integration of national cultures, and the relationship between life and time. The connotations and symbols of the Spring Festival Gala mascots usually need to be displayed and expressed in their extended characteristics as symbolic attributes, so as to establish the cultural impression of the mascots by bringing visual and sensory impacts to the audience, and the fundamental purpose is to convey the impression that each Spring Festival Gala expects to be shown to the world according to the image of the mascots. The connotation of the mascot of the Spring Festival Gala is displayed by "giving it a certain storyline and bringing in the desired cultural meaning in the narration of this storyline", so that more people can accept and subconsciously agree with and practice the behaviors and morals advocated by the cultural meaning.

II. B.Knowledge map construction

II. B. 1) Theory of Knowledge Graph Construction

The theory of constructing the knowledge graph of the Spring Festival mascot cultural material relies on the theory of literature coupling and the theory of co-occurrence analysis. Through the system to retrieve all the paper clusters (GA: coupling) that have a coupling relationship with a paper (P0: ontology), the relationship is recorded as GA (P0). For the analysis of Spring Festival mascot cultural resource materials, the retrieval system can retrieve all Spring Festival mascot cultural materials that have a coupling relationship with one or one type of cultural ontology. This kind of retrieval tool does not rely on any manual search language and vocabulary, and all the processing is done by computer automatic matching calculation, which can improve the efficiency and accuracy of retrieval. Figure 1 shows the principle of literature coupling theory. The coupling theory reveals the relationship between two or more different subjects and the same object. In this paper, with the help of this literature coupling theory, the retrieval system is utilized to automatically retrieve from the text corpus all the different Spring Festival mascot cultural materials that are connected with the same Spring Festival mascot cultural material for entity extraction.

In the theory of co-occurrence analysis, if a large number of keywords appear in a particular piece of literature, it is possible to study the associations between these words, to explore the meanings between these words, and to build up a description of the knowledge structure. Generally speaking, the more keywords appear, the more relevant they are to the subject matter. The frequency of the occurrence of different keywords pointing to the same cultural entity in the text corpus can form a co-word network composed of these word pairs, and the proximity of the nodes within the network can reflect the closeness of the connection between the subject matter. For the co-occurrence analysis of N high-frequency words, a $N \times N$ co-occurrence matrix can be formed, as shown in Equation (1).

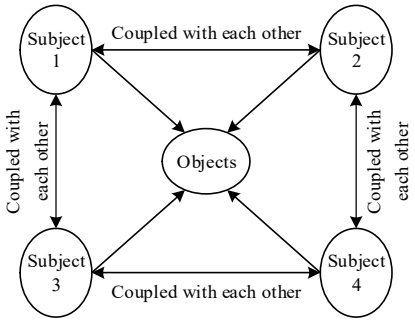

Figure 1: Principle of Literature Coupling Theory

$$\begin{bmatrix} N_{11} & \cdots & N_{1N} \\ \vdots & \ddots & \vdots \\ N_{N1} & \cdots & N_{NN} \end{bmatrix} \tag{1}$$

Most of the theories of copula analysis are applied in literature research, and this paper extends its theories and applies them to the construction of the mapping of the cultural materials of the Spring Festival Gala mascot. The cultural materials of Spring Festival Gala mascots can be categorized in many ways according to their attributes. From the perspective of cultural and creative product development, cultural resources can be divided into four aspects: shape, appearance, attitude and meaning. Shape refers to the external attributes, such as appearance size, color, texture, texture, craftsmanship, etc.; appearance refers to the overall view, such as style, contour; posture refers to the gesture, state; meaning refers to the content of the resources, embodying the cultural ideology, characterizing the symbols of the metaphors, or even the elemental association with other things. It will use clustering analysis to visualize the intricate co-word mesh relationship that many Spring Festival Gala mascot cultural materials have with each other in a graphical or numerical way.

On the basis of the coupling theory, the specific Spring Festival Gala mascot cultural material and its associated Spring Festival Gala mascot cultural material are all searched and collected by using the search tool to realize the cultural entity extraction; using the co-word analysis method to find out the relationship between these words and their meanings to identify the relationship between the cultural entities extracted; and the obtained co-word matrix contains the entire knowledge structure of the entire Spring Festival Gala mascot cultural material. Figure 2 shows the network structure, in which E_i denotes the specific cultural entity; R_{ij} denotes the relationship corresponding to the cultural entity E_i and E_j; and E_{Ti} denotes the intrinsic attribute set of the cultural entity E_i.

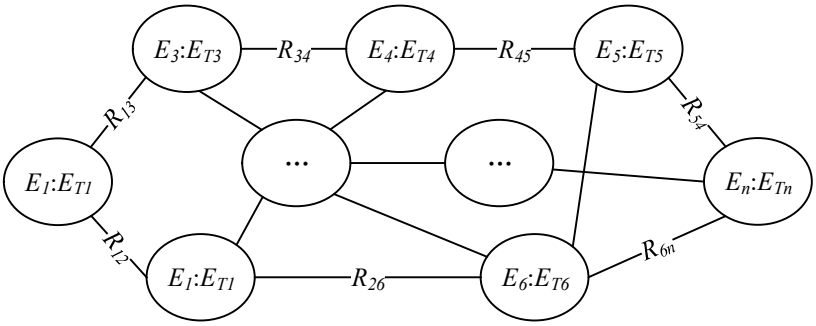

Figure 2: Network structure of the knowledge graph

II. B. 2) Knowledge Graph Example Applications

The "Spring Festival Gala mascot" is a typical representative of the Spring Festival Gala culture. Its design appearance (style) refers to the Spring Festival Gala mascot. The phrase "festive and harmonious, with profound implications" refers to the Spring Festival Gala mascot. The meaning of the verse is that the Spring Festival Gala mascot has a profound cultural connotation and showcases the intrinsic connections among China's multi-ethnic cultures. The design and development of the Spring Festival Gala mascot require the participation of a large number of outstanding artists and performers from society. It highly praises the Spring Festival Gala mascot as a cultural project that gathers talents, which reflects from the side the promoting effect of the Spring Festival Gala mascot on cultural development. "Cultural inheritance" and "innovation and change" that set requirements for the daily behavior

and attitude towards life of the participants. The integration of the Spring Festival Gala mascots and national culture has once again brought to mind the famous programs left by the Spring Festival Gala at that time, such as "Spring Festival Gala classics" and "cultural inheritance". With the education of the Spring Festival Gala mascot, there will also be systems for the Spring Festival Gala mascot, such as the system for selecting mascot styles and the design management system, etc. The existence of the Spring Festival Gala mascot naturally leads to the preservation of various cultural and creative products of the Spring Festival Gala mascot, as well as their unique shapes, materials, and special patterns, etc. These typical cultural elements constitute the cultural resource correlation model diagram of the Spring Festival Gala mascot and have also become the typical representatives of the Spring Festival Gala mascot.

Associating these elements of cultural knowledge of Spring Festival Gala mascots in the form of knowledge mapping is a way of resource sharing, which not only can provide creative materials for cultural and creative designers, but also is a kind of sorting and categorization of cultural knowledge of Spring Festival Gala mascots, which is conducive to the promotion and dissemination of the intangible culture of Spring Festival Gala mascots.

II. C.Intangible Culture Field Model

II. C. 1) Intangible cultural sites

In order to intuitively describe the scope of intangible culture dissemination and the intensity of influence, combined with the GIS field model, an intangible culture field concept is proposed: an ordered numerical array describing the distribution of the surface morphology location and attributes of intangible culture information with intangible culture as the object, spatial coordinates as the reference, and multiple factors affecting intangible culture dissemination as the variables.

$$C_i = (x_i, y_i, z_i), i = 1, 2, 3, \cdots, n \tag{2}$$

where, x_i, y_i are the plane coordinates; z_i is the attribute value corresponding to (x_i, y_i) at the moment of t_i. Changes in the spatial location and attributes of cultural carriers over time lead to spatio-temporal changes in the morphology of the intangible cultural field.

To the scalar GIS field model theory, combined with the concept of intangible cultural field, proposed intangible cultural field characteristics.

1) Scalar field and field intensity

Intangible culture is a scalar field, the scalar only has size and no direction, each cultural carrier in the field can be represented by a scalar, representing the influence of the element. The concept that describes the size of the influence is the field strength, which indicates the strength of the overall or local influence of intangible culture. A high field strength represents a well-developed intangible culture that exerts a strong outward cultural influence; a low field strength represents a poorly developed intangible culture that exerts a weak outward cultural influence. The size of the intensity of each place in the field ultimately determines the undulating pattern of the surface of the field.

2) Temporality

Temporal and spatial is the fundamental attribute of the immaterial cultural field, time and space are the independent variables of the immaterial cultural field, and the form of the immaterial cultural field changes with the change of time and space. Time and space can be changed separately, when time is determined and space changes, the form of intangible culture field reflects the change of intangible culture in space under a certain time snapshot, i.e., reflecting the spatial heterogeneity of intangible culture; when the time changes, it can reveal the temporal characteristics of intangible culture and the mechanism of development and evolution.

3) Complexity

The form of intangible culture field is complex and variable. Firstly, the data of intangible culture is heterogeneous and huge, and the design of intangible culture field needs to consider a variety of data forms; secondly, the participants of intangible culture activities are complex, they have different status, different social capital, different functional roles in the intangible culture field, and produce different impacts; lastly, the expression of intangible culture field is complex, and the intangible culture field can be further classified into multiple subfields, and there are differences in the expression of different subfields using visualization methods.

4) Wave packet-like nature and occasions into

Wave packet is a special case of wave, the wave in the space bulge part is called wave packet, the spatial visualization form of intangible culture field is similar to wave packet. The wave packet will spread around after the wave packet is generated, the wave packet outward diffusion is actually the diffusion of particles, that is, “wave-particle duality” in physics, the immaterial cultural field outward diffusion is essentially the diffusion of cultural carriers, similar to the wave packet, known as the wave packet-like nature of the immaterial cultural field. Waves are formed

by the superposition of multiple harmonics, and after the superposition, the waves form a continuous undulating surface in space. Similarly, the immaterial cultural field is formed by multiple subfields that express a certain aspect individually. In the face of complex and massive intangible culture data, it is difficult to accurately describe one aspect of the data alone, so these data are categorized in GIS to form different subfields, and then synthesized into a complete intangible culture field by using mathematical and GIS methods.

II. C. 2) Raster data model for intangible cultural sites

Intangible cultural data records the spatial location information and attribute information of cultural carriers and cultural activities, including traditional paper and virtual electronic. Traditional carriers include books, newspapers, etc., while virtual carriers are categorized into websites, web pages and social media. Intangible cultural data are diversified and heterogeneous, with the characteristics of multiple sources, multiple types, multiple granularities, multiple modalities, complex semantics, etc. There are difficulties in unified organization and collaborative expression, which are manifested in the following: 1) Multiple types of data and miscellaneous data types, and the reliability of some of the data is low, which makes it difficult to accurately describe and analyze the generation mechanism; 2) large differences in attribute descriptions, fuzzy information, and chaotic clustering after classification; 3) complex data types, which are difficult to realize orderly storage in the computer. Aiming at the problems and difficulties in data information, combined with the characteristics of intangible culture, we propose the data fusion process of “quality evaluation-feature extraction-feature aggregation” through experimental research to realize the construction of intangible culture data model. Figure 3 is the conceptual model of intangible culture field.

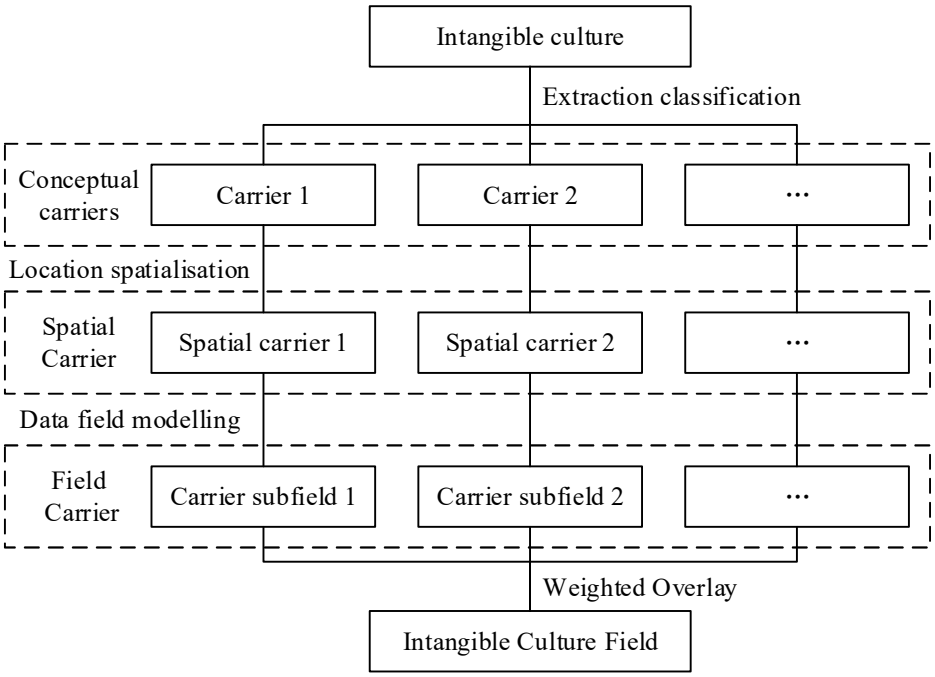

Figure 3: Conceptual Model of Intangible Cultural Field

Figure 4 shows the multi-source data fusion process. Quality evaluation is the basis of data specification processing, which realizes high-quality evaluation of data of the same object by eliminating data with low reliability. The realization process is to analyze the corroboration relationship between multi-source data, find out the data with missing position, fuzzy description, ambiguous expression, and insufficient precision to be eliminated, according to which the quaternary model of quality evaluation of intangible cultural data is proposed, as shown below:

$$P = CK\left(Data\_Id, W, M, B, J\right) \tag{3}$$

where, P is the conclusion of data evaluation; $Data\_Id$ represents the data number; W is the spatial location missing ratio; M is the accuracy of data description; B is the consistency index of data expression; and J is the precision value of data recording. The data after quality evaluation are transformed into word vector sequences by extracting feature words and transforming the features of intangible cultural entities, objects and attributes into

word vector sequences, and the correlation between different data in terms of semantics, scale, time and location is obtained through vector matching and similarity computation, thus realizing the in-depth aggregation of categorical information.

The raster data model is a superposition of different types of spatial data layers, which reduces the complexity of data computation and modeling processing. Meanwhile, the data structure that uses data to record attribute values and row and column numbers to record locations can effectively shield detailed information and specific coordinates, adapt to the confidentiality requirements of specific scenarios, and have high security, which is used in the fields of Digital Elevation Model (DEM) products and cultural distribution products, etc. It is widely used in the fields of digital elevation model (DEM) products and cultural distribution products. The raster data model is suitable for the spatial object expression of field model abstraction. Aligning with the GIS field model, the cleaned and fused intangible cultural data are abstracted to digital matrix representation, and the spatial coordinates are implied in the matrix rows and columns, which can realize the spatial expression of the intangible cultural field model.

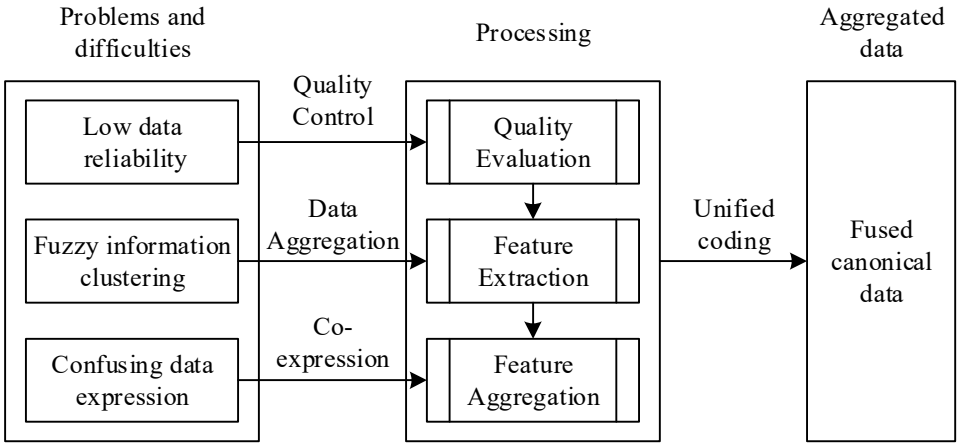

Figure 4: Fusion Process of Multi-source Data

III. Practice and analysis of cultural communication of mascots for the Spring Festival Gala

This part collects multimodal data related to the cultural communication of the Spring Festival Gala mascot and establishes a communication model to analyze its specific impact.

III. A. Cultural Communication Field of Spring Festival Mascots

III. A. 1) Statistics on the number of news items

With the rapid development of the Internet, news and information on online platforms are characterized by fast timeliness, multiple connotations and attractive forms. Users are able to keep abreast of current events in various fields around the world and grasp the latest news on topics of interest. At the same time, the news can reflect the public's attention to a certain matter, usually in chronological order to record the major meetings or activities, such as the Spring Festival Gala mascot design call.

Taking microblogging as an example, which is an immaterial cultural carrier that exists in the virtual information space, users can express their views and voices on microblogging anytime and anywhere. Microblogging is characterized by universal participation, information fragmentation, and fast dissemination. The Spring Festival Gala mascot designers and other related self-media and discussion forums such as Spring Festival Gala mascot topics give netizens more channels to get first-hand information about the Spring Festival Gala mascot. This paper crawls a total of 900 pieces of information under the topic of microblogging Spring Festival Gala mascot design call. By organizing the relevant news reports on the Spring Festival Gala mascot design call, we extracted the information on the place, time, and publisher in the content of the news text. Figure 5 shows the change in the number of news about the Spring Festival Gala mascot design call between 2014 and 2024. It can be seen that the attention to the Spring Festival Gala mascot by the self media and individual netizens has increased year by year since 2014.

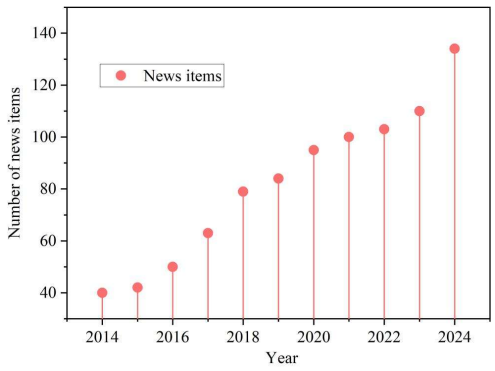

Figure 5: The change in the number of news items

III. A. 2) Semantic Web Analysis of News

The more times the keyword appears in the news text, it means the more important the subject content it reflects. The high-frequency words and co-word matrix of the news related to the Spring Festival mascot were obtained by analyzing the ROSTCM6 software. Table 1 is the result of the obtained high-frequency words. Figure 6 is the result of the obtained co-word matrix. The high-frequency word list shows that people are most concerned about the design of the Spring Festival Gala mascot because of its intrinsic cultural content, and the seven high-frequency words with the highest number of occurrences are national culture (198), far-reaching meaning (155), national tide elements (151), Chinese New Year culture (124), national spirit (120), power of the times (74), and traditional culture (56). From the co-occurrence matrix, the semantic correlation of the seven high-frequency words is very large, indicating that the Spring Festival mascot, as one of the cultural carriers of China's most important festival “Spring Festival”, is valued by people for its ability to reasonably demonstrate the cultural connotation and spiritual core of the country and the nation, and also for its incorporation of Chinese elements.

Table 1: High-frequency words

High-frequency words	Frequency	High-frequency words	Frequency	High-frequency words	Frequency
National culture	198	Spring returns to the earth	38	Good luck and happiness	17
Profounded implication	155	Spring Festival Gala	35	Creative materials	16
Chinese trend elements	151	Mascot	30	Cultural resources	15
Spring Festival culture	124	Creative design	29	Promotion and dissemination	14
National spirit	120	Traditional elements	26	Educational development	13
Era power	74	Artistic beauty	24	Behavior and manners	12
Traditional culture	56	Loved by the audience	23	Attitude towards life	11
Oracle bone script	52	Festive and peaceful	22	Traditional meticulous brushwork	10
Main color tone	50	Joy and good fortune	20	3D modeling	9
Cloisonne craftsmanship	41	Full of joy and happiness	18	Sense of technology	8

III. B. Quantitative analysis and hypothesis testing of impact mechanisms

III. B. 1) Questionnaire design and questionnaire revision

In order to construct a model related to the Spring Festival Gala mascot culture and better provide data support for designing innovative cultural brands and cultural products, this section collects the target audience's attitudes and needs related to the Spring Festival Gala mascot cultural products by distributing questionnaires. Interviews and discussions were conducted with five Spring Festival Gala mascot designers to address the rationality of the questionnaire's variable dimensions and question item design, as well as the clarity of the language presentation. According to the opinions and feedbacks of the interviewees, some questions in the questionnaire with repetitive meanings, too much jargon or unclear semantics were dealt with.

Five variables were finally identified, and each variable was measured by two question items.

Variable 1: Design preference (A1), measured by the following items: (B1) the design of the Spring Festival Gala mascot cultural products has a traditional style; (B2) the design of the Spring Festival Gala mascot cultural products has both artistry and practicality.

Variable 2: Cultural Identity (A2), Measurement items: (B3) The cultural connotation represented by the Spring Festival Gala mascot embodies the national identity; (B4) The Spring Festival Gala mascot cultural products incorporate enough traditional cultural elements.

Variable 3: Types of products (A3), Measurement items: (B5) The types of Spring Festival Gala mascot cultural products are rich and diverse; (B6) The Spring Festival Gala mascot cultural products contain a variety of functions such as decorative function and collection value.

Variable 4: Willingness to buy (A4), Measurement items: (B7) Spring Festival Gala mascot cultural products are able to attract users to buy them; (B8) The price range of Spring Festival Gala mascot cultural products is reasonable.

Variable 5: Promotion methods (A5), Measurement items: (B9) The promotion information of Spring Festival Gala mascot cultural products is diverse, and there are more channels to understand; (B10) The promotion activities such as limited-time discounts of Spring Festival Gala mascot cultural products are good at provoking users' purchase intention.

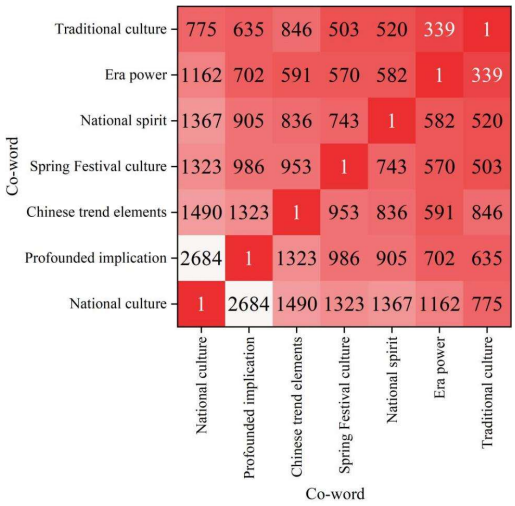

Figure 6: Co-word matrix

A 5-point Likert scale was used to design the questionnaire for each measurement index, and the respondents gave a score of 1 (strongly disagree) to 5 (strongly agree) to the questions of the items according to the actual situation and real feelings.

III. B. 2) Questionnaire testing

A total of 500 questionnaires were distributed to the target users, and 500 questionnaires were finally recovered, excluding invalid samples, the final amount of valid questionnaires was 450, and the questionnaire validity rate was 90%. The questionnaire data were counted, and the sample data were analyzed using Smartples 3.0 software, which is able to solve the problems of non-deterministic matrices, coefficients that are too large, and a large number of indicators of the observed variables, and at the same time, complete the reliability and validity test.

Descriptive statistical analysis is to use a series of numbers to describe the basic characteristics of the sample data, such as mean, skewness and kurtosis. The mean value can describe the centralized trend of the data of each variable in the sample; the skewness and kurtosis can describe the ups and downs of the skewness or normal degree of the distribution of the sample data, reflecting the symmetry of the distribution pattern of the values of each variable in the sample data. This study analyzed all the data with the help of SPSS26.0 statistical analysis software.

Table 2 shows the results of descriptive statistical analysis of each question item. If the absolute value of skewness of the sample observed variables is greater than 3.00 and the absolute value of kurtosis is greater than 10.00, the data may deviate from the normal distribution. According to the results of data analysis, it can be seen that the maximum absolute value of skewness of all the question item variables in this study is 2.56, which is less than 3.00, and the absolute value of kurtosis is less than 10.00, which indicates that the characteristics of the sample data basically obey the normal distribution, and it is suitable for subsequent empirical analysis. The data scale is based on a five-point Likert scale, with a score of 3.00 or more indicating approval and less indicating more disapproval, and according to the mean values of the question items shown in the table, all of them are skewed in favor of approval.

Table 2: Descriptive statistical analysis results of each item

Item	N	Min	Max	Mean	Skewness	Kurtosis
B1	500	1.00	5.00	2.36	-0.27	-0.06
B2	500	1.00	5.00	2.28	-0.20	-0.03
B3	500	1.00	5.00	2.29	-0.23	-0.11
B4	500	1.00	5.00	2.27	-0.25	-0.24
B5	500	1.00	5.00	2.36	-0.23	-0.12
B6	500	1.00	5.00	2.48	-0.31	0.50
B7	500	1.00	5.00	2.47	-0.25	0.44
B8	500	1.00	5.00	2.56	-0.23	0.21
B9	500	1.00	5.00	2.35	-0.44	0.16
B10	500	1.00	5.00	2.38	-0.42	0.14

Validity refers to the degree to which a measurement tool or instrument is able to accurately measure the thing to be measured, and is divided into content validity and construct validity, which is also known as structural validity, including convergent validity and discriminant validity. The analysis of the structural validity of the questionnaire in this study includes both convergent validity and discriminant validity, and the SEM method is used to test the convergent validity and discriminant validity between the measurement of each variable in the research model.

1) Convergent validity. Convergent validity refers to the degree of similarity of measurement results when different measurement methods are used to determine the same feature, using Smartpls 3.0 software to calculate the discriminant value of convergent validity, and judging the convergent validity of each variable by factor loading, combined reliability (CR), and average extracted variance (AVE). Table 3 shows the results of convergent validity analysis. The factor loadings of all variables are above 0.850, meeting the judgment criteria of greater than 0.700. The combined reliability, i.e., CR, of each variable was above 0.850, and some variables reached 0.925, with values all within the standard range. Meanwhile, the measurements of the extracted mean extraction variance, i.e., AVE values, all reached above 0.700. Through the comprehensive analysis of the measurement results, the variables were found to have good convergent validity.

Table 3: Analysis of Convergence Effect

Variable	Factor	Factor loading	CR	AVE
A1	B1	0.891	0.925	0.805
	B2	0.903		
A2	B3	0.904	0.924	0.767
	B4	0.876		
A3	B5	0.853	0.898	0.743
	B6	0.892		
A4	B7	0.893	0.923	0.710
	B8	0.856		
A5	B9	0.873	0.911	0.793
	B10	0.861		

2) Distinguishing Validity. Distinctive validity is mainly concerned with analyzing the correlation relationship between different observed variables, which is examined in terms of the square root value of the average extracted variance (AVE) of each variable and the correlation test between the variables, which is established on the condition that the AVE is greater than the square of the correlation coefficients of the variable with the other variables.The AVE itself is a measure of convergent validity, which can be applied in assessing the distinctive validity as well. Table 4 analyzes the relationship between the correlation coefficients of the variables and the square root of the AVE.The square root of the AVE values for the five variables are 0.897, 0.876, 0.862, 0.843, and 0.891, which are greater than the correlation coefficients of the individual variables, indicating that the data of the variables are both correlated and have a certain degree of differentiation between them. The content of the designed questionnaire has good validity, and it can be used to model the communication model and study how to design and innovate cultural products related to the Spring Festival Gala mascot by means of data analysis, so as to obtain a better cultural communication effect.

Table 4: Variable correlation coefficient and AVE square root

Variable	A1	A2	A3	A4	A5
A1	0.897	0.461	0.724	0.623	0.671
A2	0.461	0.876	0.558	0.589	0.573
A3	0.724	0.558	0.862	0.713	0.622
A4	0.623	0.589	0.713	0.843	0.595
A5	0.671	0.573	0.622	0.595	0.891

III. C. Analysis of the Impact of Communication Models on the Cultural Communication of Spring Festival Mascots

The communication model was utilized to improve the effect of cultural communication of the Spring Festival Gala mascot, after which the regression analysis method was combined to calculate the specific influence relationship of each variable condition on the cultural communication of the Spring Festival Gala mascot. Table 5 shows the results of regression analysis. Judging from the aspect of significance, it is found that the P-values are all less than 0.01, indicating that all five considered variables positively affect the communication effect of the Spring Festival Gala mascot culture. Specifically, in the dimension of design preference, the Spring Festival Gala mascots and related cultural products are designed in traditional styles, taking into account both artistry and practicality; in the dimension of cultural identity, traditional cultural elements that can show national characteristics are incorporated; in the dimension of product type, as many different types of cultural products are designed as possible, such as combining the Spring Festival Gala mascots with clothing/accessories, while considering decorative functions; in the dimension of willingness to buy, a reasonably positioned Spring Festival Gala mascot culture is designed as a traditional style, taking into consideration the function of decoration. In the dimension of willingness to buy, position a reasonable price range for the Spring Festival Gala mascots to mobilize more people's willingness to buy; in the dimension of promotion methods, carry out a variety of activities such as limited-time discounts and free gifts through social media and TV advertisements, so that more people can see and be interested in the related cultural products.

Table 5: Regression analysis results

Var	Meaning	βa	Std-erra	pa	βb	Std-errb	pb
A1	B1	0.3382	0.2221	0.0061	0.0687	0.0165	0.0021
	B2	0.3814	0.2363	0.0072	0.0671	0.0292	0.0024
A2	B3	0.3753	0.2254	0.0022	0.0243	0.0293	0.0011
	B4	0.3401	0.2241	0.0080	0.0355	0.0451	0.0036
A3	B5	0.3765	0.2630	0.0091	0.0193	0.0172	0.0075
	B6	0.3640	0.2539	0.0073	0.0456	0.0222	0.0045
A4	B7	0.3738	0.2991	0.0045	0.0952	0.0545	0.0081
	B8	0.3052	0.2521	0.0087	0.1626	0.0201	0.0021
A5	B9	0.3445	0.2763	0.0001	0.1831	0.0086	0.0031
	B10	0.3925	0.2135	0.0003	0.0612	0.0369	0.0030

IV. Conclusion

This paper synthesizes the use of knowledge mapping and intangible culture field model to systematically analyze the cultural construction and dissemination mechanism of the Spring Festival Gala mascot. The absolute value of skewness of the sample observed variables is less than 3, and the absolute value of kurtosis is less than 10. The AVE square roots of the five variables are 0.897, 0.876, 0.862, 0.843, and 0.891 respectively, which are greater than the correlation coefficients between the variables. The in-depth consideration of the five dimensions of design preference, cultural identity, product type, purchase intention, and promotion method can significantly enhance the public's recognition and acceptance of the Spring Festival Gala mascot culture ($P < 0.01$), and optimize the effect of the Spring Festival Gala mascot culture dissemination. In the future, the dynamic update of the knowledge graph can be optimized with deep learning to further promote the innovative communication and sustainable inheritance and development of the Spring Festival Gala mascot culture.

References

[1] Baicui, X. U., & Jinghu, P. A. N. (2018). Spatial distribution characteristics of the intangible cultural heritage in China. Economic geography, 38(5), 188-196.

[2] Hu, Q., Yang, P., Ma, J., Wang, M., & He, X. (2024). The spatial differentiation characteristics and influencing mechanisms of intangible cultural heritage in China. Heliyon, 10(22).
[3] Kai, K. (2024). An Exploration of Cultural Programs Contributing to the Digital Conservation of Intangible Cultural Heritage. Front Art Res, 6(8), 12-17.
[4] Feng, Y. (2023). The Dissemination Methods and Significance of Intangible Cultural Heritage in The New Media Environment: The Example of Whisking Tea in Song Dynasty. Lecture Notes in Education Psychology and Public Media, 4, 347-353.
[5] Skounti, A. (2017). The intangible cultural heritage system: Many challenges, few proposals. Santander Art and Culture Law Review, 3(2), 61-76.
[6] Zhao, Z., & Liu, R. (2024). REALISTIC PROBLEMS AND RESPONSE STRATEGIES OF PROTECTING INTANGIBLE CULTURAL HERITAGE OF WUSHU IN ANHUI PROVINCE. Social Science and Management, 24.
[7] Li, T., & Chen, Q. (2020). Transmission path of intangible cultural heritage under digital technology. In International Conference on Applications and Techniques in Cyber Intelligence ATCI 2019: Applications and Techniques in Cyber Intelligence 7 (pp. 366-371). Springer International Publishing.
[8] Zhou, Y., Sun, J., & Huang, Y. (2019). The digital preservation of intangible cultural heritage in China: a survey. Preservation, Digital Technology & Culture, 48(2), 95-103.
[9] Xie, H. (2023). Research on the Innovation and Development of Chinese Intangible Cultural Heritage Branding. Culture, 1(2), 10-23977.
[10] Li, X., & Li, Z. (2021, July). Design innovation of intangible cultural heritage: Challenges on the basis of mobile phone culture. In International Conference on Human-Computer Interaction (pp. 37-46). Cham: Springer International Publishing.
[11] Liu, C., An, N., & Zhu, H. (2015). A geopolitical analysis of popular songs in the CCTV Spring Festival Gala, 1983–2013. Geopolitics, 20(3), 606-625.
[12] Zhou, S. (2017). From online BL fandom to the CCTV spring festival gala. Boys' love, cosplay, and androgynous idols: Queer fan cultures in Mainland China, Hong Kong, and Taiwan, 91-110.
[13] Zhang, L., Yang, R., & Ma, Z. (2025). Research on Cultural Construction of Spring Festival Gala Mascot Using Intelligent Computing Model-Brand Innovation and Communication Path of Chinese Intangible Cultural Heritage. J. COMBIN. MATH. COMBIN. COMPUT, 127, 5029-5048
[14] Mingyu, M. (2023). Ritual and Empathy: On Cross-border Spring Festival Galas Jointly Held by China and Southeast Asian Countries——Taking 2023 China-Vietnam Cross-border Spring Festival Gala themed "Establishing A Deep Friendship and Working Together for Common Development" as an Example. Journal of Interdisciplinary Insights, 1(1), 69-73.
[15] Sookkaew, J., Chaikaew, N., & Saephoo, P. (2023). Phuket mascot design from based on cultural value. Indonesian Journal of Electrical Engineering and Computer Science, 29(2), 788-796.
[16] Fathoni, A. F. C. A. (2023). Design Thinking for Sustainable Mascot Character Design. In E3S Web of Conferences (Vol. 388, p. 01025). EDP Sciences.
[17] Asif, M., & Ali, M. (2019). Chinese traditions folk Art, festivals and symbolism. International Journal of Research, 6(1), 1-20.
[18] Wang, F., Chow, C. S. W., Zheng, Q., Ke, Y., Yang, B., Zheng, X., ... & Zhou, H. (2019). On the use of personal cooling suits to mitigate heat strain of mascot actors in a hot and humid environment. Energy and Buildings, 205, 109561.
[19] Yuanqin, P. E. N. G. (2012). A brief introduction to Chinese mascot. Canadian Social Science, 8(6), 54.
[20] Ning, P. (2022). Reflections on the Cultural Connotation and Spiritual Core of Traditional Festivals. World Scientific Research Journal, 8(11), 95-101.
[21] Li, H. (2024). Mascot explosive works and branding operation based on the popularity of sports events-on the integration and reform of China's animation industry. J. COMBIN. MATH. COMBIN. COMPUT, 123(21), 31.
[22] Sedigh, F., Kumleh, M. H., & Masoumi, S. (2025). Study the Role of Culture in the Design of World Cup Mascots with Emphasis on the Mascots from 2006 to 2022. International Journal of Applied Arts Studies (IJAPAS), 10(1), 101-120.
[23] Yuqing, Z., & Yueming, Y. (2022). The dissemination and inheritance of the local culture under the new media environment. Academic Journal of Humanities & Social Sciences, 5(3), 84-86.