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Article

Data-driven Study on the Evolution of Cultural Communication Paths in Chinese Language and Literature

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Abstract: In recent years, short videos have jumped to become one of the highly influential communication media. It not only provides a brand-new vision idea for cultural communication, but also gives the possibility of wide dissemination of Chinese language and literature culture. This paper analyzes the types of short video communication modes and communication power mechanism, and draws the technical route of short video production and processing. The communication advantages of Chinese language and literature culture in short videos are divided into three parts: platform advantages, content advantages and technical advantages. Combined with the video recommendation algorithm, a multimodal graph convolutional network algorithm for short video recommendation is proposed. Select experimental datasets, performance indicators, and comparison algorithms for recommendation performance evaluation of multimodal graph convolutional neural network algorithm. Survey questions containing cognitive, value, and behavioral dimensions are designed to capture users' attitudes and perceptions of Chinese language, literature, and cultural communication in short video platforms. Chinese language and literature cultural communication for short video users can deepen users' language and literature cognition. Among them, "I realize the responsibility of inheriting and promoting the culture of Chinese language and literature" has a mean score of 3.98. And "I have learned a lot of cultural knowledge" and "I have revisited Chinese and Chinese Chinese literature" have been highly recognized.

Keywords: communication dynamics mechanism; communication model; video recommendation algorithm; graph convolutional network; Chinese language and literature

1. Introduction

Cultural communication is the process of transmitting a particular cultural message to the general public through various forms and channels. It is one of the ways in which people acquire, receive and exchange cultural knowledge. With the continuous development and progress of society, the ways of cultural dissemination are also changing. In the early days, the forms of merchant trade, silk road, stone carvings, etc. were used as the ways of cultural transmission such as literary works and language [1-2]. In modern times, cultural dissemination mainly relies on traditional media, such as television, radio, newspapers, etc., through the regular release of cultural content, cultural information is conveyed to the audience [3]. In modern times, with the rapid development of the Internet and big data, new media have gradually emerged as an important means of cultural communication. New media platforms, such as social media, online video, music streaming, etc., make cultural communication more convenient and free, and at the same time optimize other cultural communication paths by comparing the communication paths between different cultures [4-7]. In addition, due to the rise of data research, the paths of cultural dissemination are constantly updated under the application of various technologies and algorithms, which makes the dissemination of culture more diversified and fidelity [8-11]. Different

cultural communication paths have different characteristics and influence. The traditional cultural communication path focuses on the transmission and delivery of information, and the audience usually receives the cultural content passively. Modern cultural communication paths, on the other hand, pay more attention to audience participation and interaction, and individuals can share and create their own cultural content on new media platforms, which not only enriches the form of cultural expression, but also brings the distance of cultural dissemination closer, enhances the connection between the audience and culture, and makes the international dissemination of culture become the norm [12-13].

Chinese language and literature, such as poetry, prose, novels and other forms of literature, have a deep traditional heritage and are full of innovative spirit, which reflect the spirit of the Chinese nation and become the treasure of human civilization. As a bridge of cultural exchange and dissemination, Chinese language and literature has promoted the spread of Chinese culture overseas and the exchange and mutual understanding between Chinese and foreign civilizations. In the cultivation of humanistic qualities, Chinese language and literature plays an important role. Understanding the process of cultural transmission of Chinese language and literature can make people understand history, inherit culture, improve aesthetic taste and cultivate moral quality.

This paper analyzes the role of Chinese language and literature cultural dissemination in the transmission of Chinese outstanding culture, and summarizes the characteristics of Chinese language and literature dissemination in the network environment. It analyzes the advantages of short video platforms for the dissemination of Chinese language and literature, which are summarized as platform support, in-depth literary content mining, and technology application. The architecture of short video information collection and processing means is depicted, and the common communication modes in short videos are pointed out. Based on graph convolutional neural network, propose a multimodal graph convolutional network recommendation algorithm for short videos. Establish an experimental environment for short video recommendation algorithms and select classical recommendation algorithms for algorithm performance comparison. Combined with the survey data, the effect of language, literature and culture communication in short videos is analyzed from the three levels of cognition, values and behavior.

2. The role of cultural communication and evolutionary strategies

Chinese language and literature is one of the earliest majors offered by universities in China. Chinese language and literature refers to the language and literature of the Chinese nation, which includes the language and literature of the Han Chinese as well as the languages and literatures of various ethnic minorities in China.

2.1. Development of Language and Literature and its Connection with Traditional Chinese Culture

First of all, the Chinese language represents the national culture. As a distinctive cultural wealth formed over many years, the Chinese language is a symbol with representative significance. It can be seen that the Chinese language is the most typical feature of the national culture and is closely related to the traditional Chinese culture.

Secondly, Chinese language and literature record the development process of national history. The Chinese nation has a long history, and the whole development process is recorded in detail by the language and gradually evolved into cultural symbols accepted by modern people. As a result, to a certain extent, Chinese language and literature present and reflect the face of history, such as Song lyrics and Tang poems, which have their own cultural characteristics, so that people can accurately understand the contemporary culture, experience social thinking and grasp the specific content of historical events when they read them. Only through the effective inheritance of Chinese language and literature can the traditional Chinese culture be guaranteed to endure and be understood and inherited by the world.

Finally, Chinese language integrates national culture. China is a multi-ethnic country with a wide variety of language types. One of the most widely used and influential languages is the Chinese language, which is highly compatible. In history, some ethnic minorities have entered the Central Plains and intermarried with the Han people, which has accelerated the intermingling of the Han language and culture with other ethnic cultures.

2.2. The Role of Language and Literature in Inheriting Excellent Chinese Culture

First of all, it can improve people's literary literacy and writing level. Everyone's understanding of Chinese language and literature is different, and the author's literary literacy and writing ability directly

determine whether he or she can flexibly use language to express his or her thoughts. Learning Chinese language and literature can improve students' writing application level, enhance their literary appreciation and language expression ability, so as to better understand ancient and modern Chinese and foreign excellent literary works, and accelerate the inheritance and development of Chinese excellent culture.

Secondly, it can fully grasp the charm of excellent Chinese culture. The complete system of Chinese language and literature includes such disciplines as philology, language logic, etc., which also contains works of historical changes such as the history of the development of writing and the history of literature. Through systematic study of these works, one can recognize the excellent Chinese culture in an all-round way and deeply feel its charm. For example, when appreciating the tea culture, its representative works include “The Tea Classic”, “Tea Ware Pictorial Praise”, etc., and its excellent poems include “Pan-fried Tea in Mountain Springs with Wistfulness”, “The First Mist of Spring Rain in Lin'an”, etc., etc., which all depict the characteristics and charms of the Chinese tea culture, enabling people to deeply realize the tea culture when reading the works.

Finally, it can shape the modern Chinese civilization with special characteristics. The process of learning Chinese language and literature is also the process of recognizing and appreciating traditional culture. The process not only strengthens self-knowledge, perceives the tenacious spirit of the Chinese nation, establishes correct national sentiment, and understands the connotation of the “Four Confidences”, but also promotes the modern transformation of Chinese civilization.

2.3. Communication Characteristics of Language and Literature in the Network Environment

(1) Diversity

Under the network environment, the speed of information transmission has been greatly improved, and the public can obtain cultural information quickly, so it is possible to take this advantage to promote Chinese language and literature more quickly.

Besides, since people spend a lot of time on the Internet every day, the Internet can be used as a carrier to shorten the distance between Chinese language and literature and the people. And with the help of the Internet, the public can also quickly retrieve the knowledge related to Chinese language and literature, so as to complete the absorption of Chinese language and literature knowledge more quickly.

In addition, with the help of the Internet, Chinese language and literature can be creatively adapted and disseminated on the Internet in the form of cartoons or videos, so as to attract more people's attention. Even people with a relatively low level of education can easily complete the study of Chinese language and literature.

(2) Convenience

With the help of the Internet, the learning cost of Chinese language and literature can be greatly reduced. Among them, most of the traditional language and literature learning is done in the classroom. But with the accelerated pace of life, people can realize the learning of Chinese language and literature in the network by using fragmented time, and time is no longer an obstacle to learning Chinese language and literature.

(3) Reorganization

In the network environment, due to the lack of uniform standards for the storage of language and literature resources, language and literature are loosely and messily distributed in the network environment. Therefore, in order to properly organize the scattered information, it is necessary to collect and organize the scattered information in the network and reorganize it into a systematic Chinese language and literature system.

(4) Interactivity

As we all know, the existence of the network has shortened the distance between people, and the daily communication between people has become easier. Therefore, for Chinese language and literature, people can interact with language and literature in the network and have targeted discussions on Chinese language and literature, so interactivity has become the most significant communication feature of Chinese language and literature culture in the network environment.

2.4. Short Video Enabling Cultural Communication of Chinese Language and Literature

2.4.1. Platform support

Communication Empowerment 1: Platform support to create a suitable communication environment.

It is clearly pointed out in the plan to promote the prosperity and development of culture, and the release of national policies has pointed out the direction for culture to follow the trend of the times and accelerate its transformation and development. As an important channel, short video platforms should actively promote the dissemination of Chinese language and literature culture and create a suitable dissemination environment for the emerging language and literature culture.

In recent years, short video platforms have greatly increased their support for the inheritance and protection of intangible cultural heritage, which involves many folk cultures. For example, in 2019, it launched the "non-heritage partner program", "remarkable non-heritage", and "shaking the new heritage". The video number launched the topic of "non-legacy records for the new era", inviting non-legacy people to use short videos to spread non-legacy culture.

2.4.2. Deep content mining

Communication Empowerment 2: Digging deeply to provide high-quality communication content.

First of all, the excavation of Chinese language and literature culture should focus on the breadth of culture. The culture of Chinese language and literature covers a wide range of topics, from clothing, food, housing and transportation, leisure and entertainment, handicrafts and architecture to festivals and customs.

Secondly, the excavation of Chinese language and literature culture should focus on the comprehensiveness of culture. We should not only highlight the characteristics of language and literature culture, but also ensure the integrity of language and literature culture, so as to avoid the cultural loss of focus in the communication process of short videos.

Once again, the excavation of Chinese language and literature culture should pay attention to the pro-people nature of culture.

2.4.3. Technology applications

Communication Empowerment 3: Technology application to explore novel forms of communication.

In the era of short videos, various cultures and contents are rapidly pouring into short video platforms. Disseminators should dig deep into the core of language and literature culture, continuously innovate the forms of language and literature culture dissemination, and win with novelty and interestingness.

Media technology is the best breakthrough for the innovation of Chinese language and literature culture, as well as the link between language and literature culture and the new era. Communicators should explore new modes of creation, presentation and distribution with the help of media technology to open up a new era of Chinese language and literature culture communication.

With the help of media technologies such as AIGC, VR, AR and 3D, they can create an audio-visual feast of language and literature culture, or restore the original appearance of Chinese language and literature culture in the traditional media era. Or to visualize and artistically express the abstract cultural contents of language and literature culture, or to enhance the immersion and visual impact of Chinese language and literature culture.

3. Technologies related to the cultural dissemination of language and literature in short videos

3.1. Short video technology empowerment

Since the birth and development of new media technology, it has provided the general public with channels for information dissemination. Around technological empowerment, the re-evolution of topics such as citizen journalists, opinion leaders, and the public sphere, the public's social rights such as the right to discourse and the right to disseminate, as well as the social hierarchy have also been reconfigured by the media, ultimately leading to social empowerment.

The Internet is an important source of power for the general public, social groups, interest groups and even national governments. As McLuhan said, "the medium is the message", the importance of the medium lies not only in the medium itself, but also in the possibilities of change and social impacts brought about by the medium, such as power, discourse structure and social organization.

Short video production is divided into two stages. The architecture of short video information collection and processing means is shown in Figure 1. The first stage is the stage of information collection. The second stage is the transformation stage of information, and the corresponding production means are collection means and transformation means respectively. Capture means refers to

the use of media technology to collect raw data and information, such as using a camera to directly shoot photos or videos. The means of transformation refers to the use of media technology to edit and process the collected data and information.

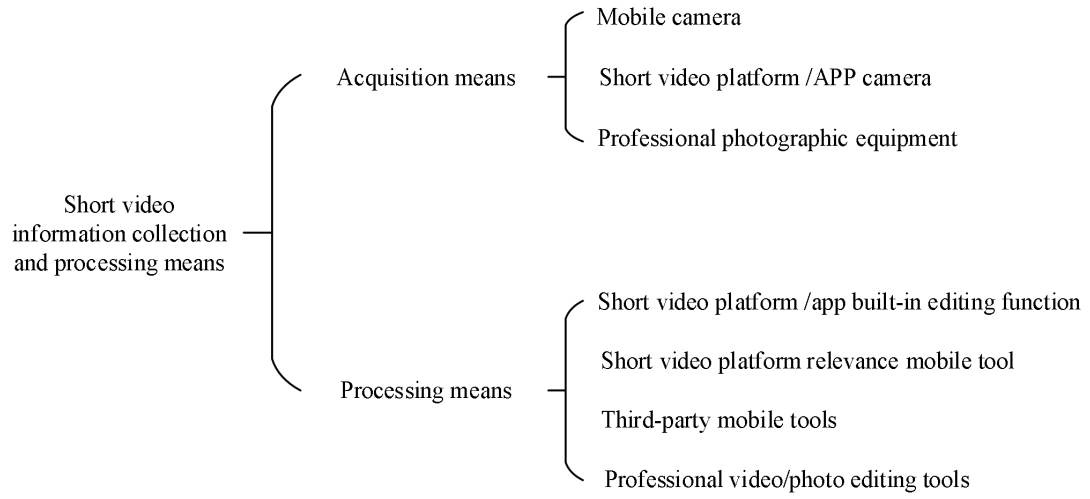

Figure 1. Collection and processing methods of short video information

3.2. Analysis of Short Video Distribution Modes

3.2.1. Types of Short Video Distribution Modes

(1) Interpersonal communication model

Interpersonal communication is the basic form of interaction and communication between people. It plays an important role in establishing user relationships, mobilizing the enthusiasm of users to create short videos, and increasing the stickiness of users to short video platforms. The characteristics of mobile short video diversity, reproducibility, hierarchy, and "re-centered" interpersonal relationships determine the content and direction of interpersonal communication in short video social networking.

(2) Mass communication mode

Mass communication refers to the non-directional dissemination of the content produced by media organizations to the general public through mass communication channels, which is the dissemination of information content without directionality. In the traditional era, mass communication is extremely obvious, and its communication channels are also divided into clear-cut distinctions. With the arrival of the Internet era, the role of Internet users has become a fuzzy conclusion, and mass communication has appeared in a new form of characterization.

(3) Group communication mode

The essential characteristic of a group lies in the fact that the members of a group are a collection of people with the same interests and interests. At the same time, the group is relatively equal and has no management center. Communication behavior is anonymous, spontaneous, and therefore easy to follow blindly. The flow of information in the process of connecting individuals with a willingness to collaborate and achieve a common goal is group communication.

(4) Fission propagation model

In a general sense, fission communication can also be called viral communication. Its characteristics include four main points, an attractive source of communication, a geometrically multiplied rate of dissemination, a high rate of arrival and acceptance of the message, and a media quality that can be easily replicated.

3.2.2. Mechanisms of short-video communication dynamics

The short video dissemination power mechanism includes: social relationship-driven, ecological matrix-driven, and recommendation algorithm-driven.

Social relationship chain is the relationship of friends and relatives made between people because of geography, work, life and study.

Matrix is divided into horizontal matrix and vertical matrix. The horizontal matrix of new media refers to the comprehensive layout of users on various communication channels such as APPs, portals,

vertical websites, etc., which is called the outer matrix, and the vertical matrix refers to the deep layout of users based on various product lines of a certain media ecology, which is also called the inner matrix.

Recommendation algorithms commonly used for short videos include content-based recommendation, collaborative filtering recommendation, and social relationship recommendation. In this paper, we propose graph convolutional network algorithm for short video recommendation [14].

(1) Multimodal graph convolutional network

The emergence and development of graph convolutional networks (GCN) was inspired by the application of convolutional neural networks (CNN) in the field of deep learning images [15].

In order to generalize convolutional networks (CNNs) to graph neural networks, methods of convolutional operations on graphs are defined, which are classified into Pu-based and space-based graph convolutional networks. In Pu-based graph convolutional network, the convolution operation in graph convolutional network is defined as the feature decomposition in Fourier transform by computing the graph Laplace operator. This convolution operation is defined as the product of signal feature $x \in R^N$ (scalar at each node) and filter $g_\theta = diag(\theta)$, where $\theta \in R^N$, as shown in equation (1) below:

$$g_\theta * X = U g_\theta(\Lambda) U^T X \tag{1}$$

$$g_\theta * X \approx \sum_{k=0}^{K} \theta_k T_k(\tilde{L}) X \tag{2}$$

where U is the eigenvector matrix in the normalized graph Laplacian $L = I_N - D^{-\frac{1}{2}} A D^{-\frac{1}{2}} = U \Lambda U^{\text{û}}$ (D is the degree matrix and A is the adjacency matrix of the graph). Where A is the diagonal matrix of eigenvalues, $\tilde{L} = \frac{2}{\lambda_{\max}} L - I_N$, $\lambda_{\max}$ denotes the largest eigenvalue of L, and $\theta \in R^K$.

A simplification of Eq. (2), restricting $K = 1$, solves the problem of overfitting the local neighborhood structure of graphs with very wide nodes, as in Eq. (3):

$$g_\theta * X \approx \theta(I_N + D^{-\frac{1}{2}} A D^{-\frac{1}{2}}) X \tag{3}$$

where $I_N + D^{-\frac{1}{2}} A D^{-\frac{1}{2}} \to \tilde{D}^{-\frac{1}{2}} \tilde{A} \tilde{D}^{-\frac{1}{2}}, \tilde{A} = A + I_N, \tilde{D}_{ii} = \sum_j \tilde{A}_{ij}$. Finally, the convolution operation of Eq. (3) is generalized to signals with C input channels and F filters $x \in R^{N \times c}$ the feature mapping is:

$$Z = \tilde{D}^{-\frac{1}{2}} \tilde{A} \tilde{D}^{-\frac{1}{2}} X \Theta \tag{4}$$

Where, $\Theta \in R^C \times F$ is the matrix of filter parameters and $Z \in R^N \times F$ is the matrix of convolutional signal features.

(2) Algorithmic framework of graph convolutional network for short video recommendation

This paper proposes the basic framework of graph convolutional network algorithm for short video recommendation.

The model is mainly composed of two-part graph, aggregation layer, integration layer, fusion layer and output layer.

STEP1, based on the interactive behavior of the user and the system to understand the user preference, construct the two-part graph.

STEP2, adopt graph convolution to extract the information of the two-part graph.

STEP3, realize higher-order information interaction in the aggregation layer to further understand the higher-order vector expression.

STEP4, integrate various high-order vector and low-order vector information, and combine different modal vector information to transform them into the representation vector of the target vertex.

STEP5, through the fusion algorithm finally output the personalized recommendation information for the target user.

(3) Multimodal graph convolutional network for short video recommendation algorithm

Combining the above algorithmic framework of graph convolutional network for short video recommendation, it can be seen that the main purpose of the function of the aggregation layer

algorithm is to derive the higher-order information of the target vertices, which can be characterized by the attribute information of the target vertices and their neighboring vertices, so as to realize the propagation of feature information in the topology graph from the neighborhood to the individual. The prerequisite for the implementation of the aggregation layer algorithm is the construction of the modal level "user-video" bipartite graph.

In this paper, on the basis of "user interaction behavior", we construct a "heterogeneous graph" of "user-video", and use different modalities as information channels to segment the multimodal information of short videos, so as to realize the simultaneous characterization and learning of users and short videos, in order to better study the influence of different modalities on user preferences. In order to realize the simultaneous characterization and learning of users and short videos, so as to better study the influence of different modalities on user preferences.

The construction is based on the interaction behaviors between users and short videos, such as users commenting on short videos, users liking short videos, and users playing short videos completely and incompletely. The mathematical expressions (5) and (6) are as follows:

$$G = \{(u,i) \mid u \in U, i \in I\} \tag{5}$$

$$e(u,i) = 1 \tag{6}$$

In the above equations (5) and (6) G denotes the interaction behavior between the user and the short video. u and i denote the user and short video vertices, respectively. U and I denote the set of user and short video vertices, respectively. e denotes the edge connecting the user and the short video vertices.

The above bipartite graph of user-video interaction is then transformed into a bipartite graph in specific modal contexts by combining the three modal features of short videos, i.e., textual, visual and auditory. The attribute information of the vertices on the bipartite graph in different modalities is the corresponding modal information, and the distance between the vertices indicates the information difference in different modalities. Then there is expression (7) as follows:

$$G_m, m \in M = \{T, V, A\} \tag{7}$$

In the above equation (7), G_m represents the interaction behavior in the context of a particular modality. m denotes one of the three modalities: textual, visual and auditory. M denotes the set of the above three modalities, and T is the abbreviation of Textual, which denotes the textual modality. V is an abbreviation for Visual, which denotes the visual modality. A is an abbreviation for Acoustic, which denotes the auditory modality.

In summary, the two-part "user-video" graph constructed in this paper can characterize the attribute information of vertices in different modes. As an input to the aggregation layer, it can not only realize the propagation of feature information in the topological graph from neighbors to individuals. It can also reflect the influence of different modal information on users' interests and preferences under the interaction behavior between users and short videos.

Combined with the principle of graph convolutional network algorithm, it can be seen that the main purpose of the integration layer algorithm function implementation is to integrate the attribute information of the target vertex and its higher-order neighborhood information under specific modality. It is clearly pointed out in the above integration layer that the "homogeneous graph" constructed by traditional graph convolutional network algorithms ignores the differences in the influence of vertex attribute information and structural information on the user's preference, and inputs both as homogeneous information into the algorithmic model, which, to a certain extent, will lead to distortion of the computation results of the recommendation algorithm. For this reason, this paper designs the integration layer algorithm (8) based on the algorithm idea of "user-video" two-part graph construction as follows:

$$H_{m,v} = f_{merge}(h_{m,v}, x_{m,v}, h_{v,id}), m \in M, v \in V \tag{8}$$

In the above equation, $H_{m,v}$ denotes the characterization vector of vertex v in the "user-video" bipartite graph in a specific m mode. $f_{merge}(\cdot)$ denotes the integration function, h_{m-v} denotes the higher order feature information of the vertex, which is the output of the aggregation layer of vertex v in a particular m modality. $x_{m,v}$ denotes the zero-order information, which is the raw information of the vertex in a particular m modality. $h_{v,id}$ is the representation vector of the vertex structure information and is the embedding vector of the vertex v.

After integrating the user-short video representation information in different modalities, the fusion layer inputs it into the fusion layer for fusion and output. The mathematical expression (9) is as follows:

$$z_u = \left[H_{V,u}, H_{T,u}, H_{A,u} \right] u \in U \tag{9}$$

$$z_i = \left[H_{V,i}, H_{T,i}, H_{A,i} \right] i \in I \tag{10}$$

In the above equation, z_u and z_i denote the output vectors of the integration layer for user vertex u and short video vertex i in textual, visual and auditory modalities, respectively. U and I represent the sets of user vertices and video vertices in the "user-video" bipartite graph.

4. Effectiveness of cultural dissemination through short videos

4.1. Experimental dataset, experimental metrics and comparative algorithmic models

4.1.1. Experimental data set

The dataset parameters for movies/short videos are shown in Table 1.

Kuaishou: the short video dataset of Racer is provided by the short video platform Racer, which contains desensitized interactive behavioral information of users with short videos, visual information of short videos, and textual information of short videos in a 3-month time period.

TikTok: the overseas version of the domestic short video platform Jieyin, whose short video dataset consists of desensitized interaction behavior information between users and short videos, visual, textual and auditory information of short videos.

MovieLens-10M: a movie dataset commonly used for performance evaluation of recommendation algorithms. The dataset consists of user interaction behavior data on movies and movie labeling information.

Table 1. Data set parameter for movie/short frequency

Dataset	Users	Videos	Interactions	Visual	Textual	Acoustic
Kuaishou	38625	121342	1759962	2135	152	/
TIKTOK	65399	775427	4256331	152	152	152
MovieLens	72126	11556	12441368	152	152	152

4.1.2. Experimental indicators

Precision: In personalized recommendation system, it is used to evaluate the accuracy of the recommendation to the user, i.e., the proportion of users clicking to watch the video in the recommendation list. Precision rate is defined as:

$$Precision = \frac{\sum_{u \in U} | R(u) \cap T(u) |}{\sum_{u \in U} | R(u) |} \tag{11}$$

Where U is the set of all users, $R(u)$ is the recommended list output by the algorithm to user u, and $T(u)$ is the set of videos actually watched by user u.

Recall: also known as the check-all rate, is the ratio of retrieved relevant instances to all relevant instances. Recall is defined as:

$$Precision = \frac{\sum_{u \in U} | R(u) \cap T(u) |}{\sum_{u \in U} | T(u) |} \tag{12}$$

NDCG: NDCG is used in personalized recommendation to measure the accuracy of the recommendation result with the score of the correlation between the order of the recommended position and the actual video sequence watched by the user. That is to say, the video of the recommendation list is compared with the video watched by the user, and the more advanced the position of the shared video in the recommendation list is, the higher its NDCG score is, and the better the recommendation effect is. Defined as:

$$NDCG@K = \frac{DCG@K}{IDCG@K} = \frac{\sum_{i=1}^{K} \frac{2^{rel_i} - 1}{\log_2(i+1)}}{\sum_{i=1}^{|REL_n|} \frac{2^{rel_i} - 1}{\log_2(i+1)}}, rel \in \{0,1\} \quad (13)$$

Where DCG is the degree of relevance of the added location factor, and IDCG is the theoretical maximum of DCG, i.e., the distribution of videos in the recommended list in the ideal case REL_K is sorted by the degree of relevance rel descending order. In the experiments of this paper, when the user completes the interactive behavior of the short video, $rel = 1$, and vice versa $rel = 0$. Relative precision rate and recall rate, NDCG measures the performance of the recommendation algorithm from the two factors of recommendation accuracy and recommendation location, which is a more comprehensive judgment of the recommendation results.

4.1.3. Comparison Algorithm Model

In order to test the performance of the models in this paper, two kinds of models, graph embedding based approach (DeepWalk, EGES) and graph convolutional network based approach (GraphSAGE, GAT), are selected as baseline models for comparison.

DeepWalk: sequences are obtained by sampling the vertices in the graph by random wandering. Unsupervised learning is performed based on the co-occurrence relationship between vertices in the sequence, and the vertex vector representation is obtained.

EGES: The graph embedding method is improved mainly from the application scenario. The model obtains sequences by constructing an item graph for random wandering, introducing item attribute information as side information.

GraphSAGE: belongs to the inductive graph convolutional network in the null domain convolutional method, which uses the aggregation of the information of the set of vertices in the neighborhood of the target vertex as its own representation.

GAT: Improvement of graph convolutional networks through a self-attentive mechanism with masks. The representation of the vertices is updated based on the attention scores on each vertex in the graph and its neighboring nodes, and the fitting ability of the model is improved by the multi-head attention mechanism.

4.1.4. Experimental analysis

(1) Performance comparison of coping with different datasets

In this paper, two short video datasets, Kuaishou and TikTok, and MovieLens movie dataset are selected. Compared with the movie dataset, the short video dataset has a higher degree of sparse interaction between users and items, and the distribution of the number of interactions shows a more prominent “long-tail effect”, which makes it more difficult for models with the same expressive power to learn effective information from the sparse interaction behavior. Designing different forms of datasets for horizontal recommendation model performance comparison can objectively judge the generalization performance of recommendation models.

The algorithm model performance comparison is shown in Table 2. As can be seen from the table, the model proposed in this paper outperforms the other baseline models in most cases. The highest performance in the three datasets compared to the comparison model is improved by 0.0123~0.044 respectively.Based on the stable performance of this paper's model in the datasets from different sources, it is analyzed that the improvement mainly comes from the model's effective capture of the user's interest preferences at the modal level, which enables the user vertices and short video vertices to get a more fine-grained vector representation through learning.

Table 2. Algorithm model performance contrast

Categories	Models	Kuaishou			TIKTOK			MovieLens		
		P	**R**	**NDCG**	**P**	**R**	**NDCG**	**P**	**R**	**NDCG**
Graph Embedding	DeepWalk	0.2456	0.3215	0.1856	0.1124	0.4694	0.3014	0.1324	0.4624	0.2899
	EGES	0.2378	0.3214	0.1899	0.1268	0.5521	0.3117	0.1275	0.4750	0.3011
GCN	Graph SAGE-GCN	0.2894	0.3627	0.1974	0.1075	0.5696	0.3215	0.1121	0.4769	0.2654
	Graph SAGE-LSTM	0.2878	0.3705	**0.2235**	0.1362	0.5875	0.3269	0.1169	0.4618	0.2869
	GAT	**0.3212**	**0.3969**	0.2124	**0.1454**	**0.5991**	**0.3578**	**0.1377**	**0.4894**	**0.3387**

Ours	**0.3652**	**0.4128**	**0.2589**	**0.1596**	**0.6014**	**0.3906**	**0.1426**	**0.5012**	**0.3514**
Improvement	0.044	0.0159	0.0354	0.0142	0.0023	0.0328	0.0049	0.0118	0.0127

(2) Discussion of hyperparameters

In order to further verify the general effectiveness of the present algorithm among TopK algorithms and to select the K value which is the most favorable for model training among them, the K values of {5,10,20,50} are selected for the experiments. Experiments are conducted on this algorithm and the optimal baseline algorithm GAT respectively, and the performance of this algorithm and the baseline algorithm on different datasets is shown in Table 3.

According to the experimental results in the table, it can be seen that the present algorithm basically achieves better results with K=5, K=10, K=20 and K=50. The results on both TIKTOK and MovieLens are better than the baseline algorithm. On the Kuaishou dataset, the results of this algorithm are better than the baseline algorithm when the value of K is 10 and 20, and slightly lower than the baseline algorithm in the rest of the cases, which represents that this algorithm still lacks the effect in the Top5 and Top50 recommendations of the small-scale dataset.

Table 3. The algorithm performs on different data sets

Data set	**Kuaishou**		**TIKTOK**		**MovieLens**	
Method	Recall@K	NDCG@K	Recall@K	NDCG@K	Recall@K	NDCG@K
GAT(K=5)	0.0857	0.1457	0.0253	0.0452	0.0124	0.0266
Ours(K=5)	0.0836	0.1516	0.0287	0.0479	0.0175	0.0285
GAT(K=10)	0.1352	0.1211	0.0321	0.0421	0.0236	0.0257
Ours(K=10)	0.1411	0.1354	0.0415	0.0466	0.0537	0.0326
GAT(K=20)	0.1799	0.1582	0.0569	0.0557	0.0454	0.0415
Ours(K=20)	0.1805	0.1617	0.0603	0.0611	0.0489	0.0469
GAT(K=50)	0.3014	0.1985	0.1245	0.0798	0.0797	0.0544
Ours(K=50)	0.3011	0.1991	0.1361	0.0822	0.0899	0.0578

4.2. Effectiveness of cultural dissemination of language and literature

4.2.1. Survey design

The study of the communication effect of TIKTOK Chinese language and literature in this paper consists of three levels, namely, the cognitive level effect, the value level effect and the behavioral level effect. Therefore, the design of the questionnaire should include the three levels of communication effect research, the measurement of factors affecting the communication effect and the acquisition of basic information about the respondents.

The first category is the measurement of respondents' basic information.

The second category is the measurement of communication effects on the cognitive level of the respondents.

The third category is the measurement of communication effects at the level of respondents' values.

The fourth category is the measurement of the communication effect on the behavioral level of the respondents.

The fifth category of questions is the measurement of factors affecting communication effectiveness.

The options for each question in the scale are divided into "strongly disagree", "disagree", "general", "agree" and "strongly agree", and are assigned a value of 1-5 respectively.

The sampling method adopted for this study is convenience sampling. This sampling method was chosen because this study was conducted on users of a specific website, and it is difficult to ensure that every individual in the aggregate has the same probability of entering the sample. Whereas convenience sampling is non-probability sampling in a specific area, this study requires random sampling of users in a specific online community, which fits with the convenience sampling method.

The research design of this paper distributed 600 online questionnaires, and 569 questionnaires were recovered, with a recovery rate of 94.83%. After checking the content, 6 of them were invalid questionnaires, so the effective sample size of this questionnaire was 563.

4.2.2. Analysis of communication effects at the cognitive level

Human cognition is a process of information processing. People obtain information from the outside world, process it through the perception and thinking activities of the brain, and form an

objective understanding of the information.

The cognitive level communication effect scale scores are shown in Table 4. From the mean value of the scale scores, the Chinese language and literature cultural communication of this short video website has a better communication effect at the cognitive level. There are good effects on the knowledge of literature and culture, historical memory, national customs, traditional thoughts and traditional culture in general communication.

The most recognizable statement of the respondents was "I am aware of the responsibility of inheriting and promoting Chinese and Chinese literary culture", with an average score of 3.98. The second is "I have learned a lot of cultural knowledge", with an average score of 3.72. "I revisited Chinese Chinese Language and Literature" ranked third, with an average score of 3.67.

The low scores for the options “I realized the splendid and long history of Chinese language and literature” and “I learned about the culture of Chinese language and literature” also show that the communication of Chinese language and literature culture on the platform is insufficient to help the audience to have a deeper understanding of the excellent language and literature culture. This also shows that the communication of Chinese language and literature culture on this platform lacks in helping the audience to have a deeper understanding of excellent language and culture.

Table 4. Cognitive communication effect scale score

Options	Score 1	Score 2	Score 3	Score 4	Score 5	Total	Mean
I learned a lot about knowledge.	65	32	71	121	274	563	3.72
I further understand Chinese language and literature.	45	56	78	168	216	563	3.59
I relived Chinese language and literature.	71	34	68	101	289	563	3.67
I learned the language and literature of different nationalities.	41	65	70	200	187	563	3.61
I know Chinese language and literature.	53	46	82	121	261	563	3.57
I realize the brilliance of Chinese language literature.	62	55	69	183	194	563	3.53
I realize the responsibility of carrying forward the Chinese language and literature culture.	35	60	66	101	301	563	3.98

4.2.3. Analysis of communication effects at the value level

For the measurement of the communication effect at the level of values, the questionnaire asked questions from six aspects: cultural self-confidence, cultural concept, family and country concept, career concept, natural concept and national concept. The scores of the communication effect scale at the value level are shown in Figure 2, and the Q1-Q6 in the figure are "I have established cultural self-confidence and am proud of Chinese Chinese and literary culture", "Cultural Concept: Inheritance and Innovation", "Family and Country Concept: Patriotism", "Career Concept: Inheritance Spirit", "Literary Concept: Harmony and Difference", and "National Concept: Harmonious Coexistence and Diversified Integration".

From the perspective of the scoring options of each question, the "agree" and "strongly agree" of "national concept: harmonious coexistence and pluralistic integration" conveyed by the short video were the most selected, and a total of 434 people recognized the concept of pluralistic integration conveyed by the short video of Chinese and Chinese language and literature and culture, accounting for 77.09%. The identification of values is the core of cultural identity, and its process is to interpret culture and think about the meaning of culture, so as to shape self-understanding and better integrate into culture.

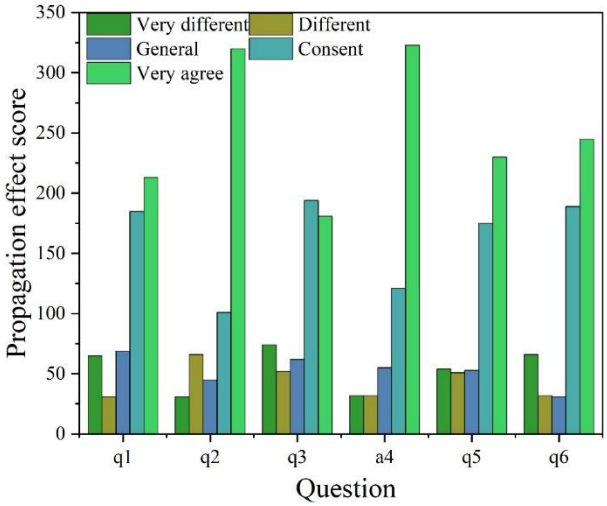

Figure 2. The value level of communication effect scale score

4.2.4. Behavioral level communication effectiveness analysis

Behavioral level communication effect questionnaire scores are shown in Table 5. From the mean value of the scale scores, the most common behavior performed by the respondents was posting comments, with a mean score of 4.13. The second most common behavior was watching other traditional culture videos, with a mean score of 4.05.

Table 5. Behavioral communication results

Options	Score 1	Score 2	Score 3	Score 4	Score 5	Total	Mean
I'll plan to visit the library.	85	56	86	98	238	563	3.65
I will watch the Chinese language and literature culture spread related video.	62	32	65	125	279	563	4.00
I'll play the curtain.	25	75	102	153	208	563	3.74
I'll comment.	32	45	62	185	239	563	4.13
I will vote for the excellent language and literature culture.	65	52	121	101	224	563	3.52
I'll share the program in app.	52	65	75	132	239	563	3.95
I'll share the program outside of app.	57	52	89	152	213	563	3.78
I will watch video related to Chinese language and literature.	55	50	45	152	261	563	4.05

The scores of the Behavioral Level Communication Effect Scale are shown in Figure 3. The questionnaire measured eight main behaviors during and after viewing. Q1-Q8 in the picture are "I will plan to visit the library and check in", "I will watch videos related to the dissemination of Chinese and Chinese language and literature", "I will post barrages", "I will send comments", "I will participate in the selection and voting of excellent language, literature and culture", "I will share programs in the app", "I will share programs outside the app", "I will watch videos related to Chinese and Chinese language and literature and culture".

As shown by the scores of the questions, the dissemination is good at the behavioral level. The most common behavior performed by respondents was posting comments, followed by watching other traditional culture videos. The options “I will post pop-ups” and “I will plan to visit the library” scored low. The former suggests that audiences do not post pop-ups very often when watching Chinese language and literature, and prefer to pay attention to the content of the program. The latter indicates that the cultural communication of Chinese language and literature has a certain role in driving the audience to visit libraries in reality.

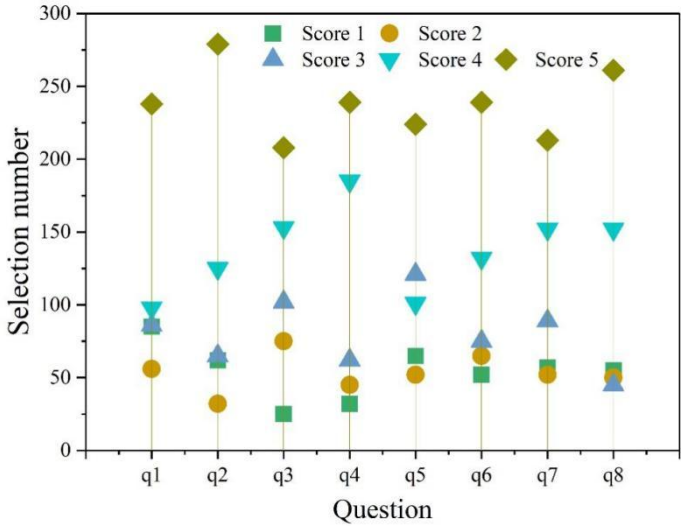

Figure 3. Behavioral level of propagation effect scale score

5. Conclusion

This paper analyzes the influence of Chinese language and literature cultural communication in short video communication channels. It analyzes the propagation mode of short videos as well as the power mechanism, and proposes a multimodal graph convolutional neural network algorithm for short video recommendation.

Three classic datasets, Kuaishou, TIKTOK, and MovieLens, are selected as the experimental data for the performance of short video recommendation algorithms, and the precision rate, recall rate, and NDCG are used as the evaluation indexes of each comparative algorithm. The multimodal graph convolutional neural network algorithm proposed in this paper obtains stable performance in all three datasets, and is able to effectively capture users' interests and recommend video content that matches users' interest values.

Analyzing the influence effect of Chinese language and literature cultural dissemination in TIKTOK platform, this paper summarizes that at the cognitive level, users firstly recognize their own subjective awareness of inheriting Chinese language and literature. At the value level, most users recognize the concept of “nationalism: harmonious coexistence and diversified integration” conveyed by TIKTOK short videos. At the behavioral level, some users recognize that they go to libraries to read and clock in, and participate in voting for outstanding language and culture. Together, the users' cognition and behavior show the influence of Chinese language and literature culture, which is of great significance in promoting the dissemination of Chinese culture.

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