

# Mining Chinese Animation Movie Audience Concern Themes Based on BERTopic and UGC --Take "*Chang'an*" as an example

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**Abstracts.** [Objective] To explore how Chinese animated movies can effectively utilize hot topics to feed the box office and improve the competitiveness of the movies by mining hot topics of users' concern through User-Generated Content (UGC). [Methods] Based on the UGC text of Douban reviews of the Chinese animated movie "30,000 Leagues in Chang'an", we adopt the BERTopic algorithm to cluster topics based on the category-based TF-IDF (Word Frequency-Inverse Text Frequency)-weighted clustering, and introduce the semantic fine-tuning of the topics by the ChatGLM2-6B model to excavate the hot topics of users' attention. [Results] Users of the Chinese animated movie "30,000 Leagues in Chang'an" pay attention to five major topic clusters, including Chinese culture, word-of-mouth communication, poetic narrative, production technology, and the controversy of new historical facts. [Limitations] The country differences in the topic concerns of Chinese animated films were not analyzed in comparison with foreign UGC texts. [Conclusion] This study focuses on UGC text analysis to discover the social attention and evolution law of related topics. These findings provide some reference value for future Chinese animated movie production and production, box office prediction and marketing.

**Keywords:** UGC; *Chang'an*; Douban Reviews; Theme Mining; Chinese Culture.

## 1. Introduction

In the new media era, the development of media technology constantly changes and influences the way of information transmission and reception, and it has become common for ordinary netizens to directly create content as content producers and upload it to online platforms, which is known as the User-generated content (User-generated content hereinafter referred to as UGC) scenario, and the user-produced content is known as User-generated content, and the user-produced content under this environment is called User-generated content, and the users play the dual roles of producers and consumers. Users play the dual roles of producers and consumers [1] Douban.com, as a UGC platform for users to share movie information, viewing experience, and express satisfaction, is an important online channel reflecting the word-of-mouth of movies, and UGC on Douban.com is an important indicator for the measurement of word-of-mouth of theatrical movies. After the release of "*Chang'an*", the UGC on social media platforms showed a clear trend of hot discussion. Douban.com UGC both provides potential movie-viewing consumer users and target users with references to their movie-viewing experience, and also contains potential user demand. These review data can also help us better understand the Chinese animated movie market and audience preferences. For movie producers and brand marketing teams, how to effectively utilize these UGC communication hotspots to enhance the influence of brand marketing, dig deeper into the psychology of the audience, accurately grasp the audience's preferences, stimulate the interest of the audience, and continue to win the audience's love is an urgent problem to be solved. At the same time, it is important to understand the audience's

focus and attention on Chinese animated movies, which will provide reference and thinking for the future development of Chinese animated movies.

## 2. Review of relevant studies

UGC was born in the era of Web2.0 and originated abroad. 2005, Mary Meeker first proposed the term User-generated content (UGC), which has gradually gained wide recognition [2]. UGC has received widespread attention since its birth because of its aggregation mode of interconnection and intergeneration with the Internet.

At present, the research on UGC has been explored from different levels, and there are three main research perspectives on UGC in existing studies: the first perspective mainly focuses on the definition and characteristics of the concept of UGC. The World Organization for Economic Cooperation and Development (OECD) proposed in its relevant report that UGC is characterized by the characteristics of openness on the Internet, a certain degree of innovativeness, creation and publication by non-authoritative persons and non-professional means [3], and creation in a non-professional, spontaneous [4], simple, improvisational, and free publication [5] way. These studies lay a certain foundation for the subsequent UGC research. In China, Peng Lan believes that UGC usually refers to is the content created and published in some network community platforms such as communities, communities, ethnic groups, circles [6], etc., in which users exert their subjective initiative and use it to express their opinions. Qin Fen proposes that UGC is the original and various modal texts published on various platforms through the network [7]. Lan Qinhuo emphasizes the personalization, individualization, creativity and weak interest drive of UGC [8]; Zhao Yuxiang puts forward UGC has the functionalized attributes of entertainment, social, commercial, interest and opinion [9]. UGC presents a wide range of forms such as text, audio, video, pictures, emoticon symbols [10], social aggregation [11], apps [12] and so on in a single or multi-modal form, and it is important to achieve a wide range of communication effects in terms of communication. In terms of communication effect, it should achieve wide dissemination [13], meaningful expression, and user interaction [14]. Although scholars have different definitions and interpretations of UGC in different research contexts and research methods, UGC is characterized by the following features: public release, creative efforts and non-professional practices [15].

The second perspective is that , the motivation of UGC generation and the quality of UGC are influenced by social (external), individual (internal), and technological dimensions. Zhao Yuxiang et al. divided the motivation into three dimensions: social-driven, technology-driven, and individual-driven [16]. Liu Yao et al. categorized the motivation into intrinsic demand, social and technical aspects, and she believed that UGC is generated from intrinsic demand, which mainly stems from the self-knowledge and needs of individual users that "there is no production without demand", such as the expression of online opinions, spiritual pleasure, and interest drive. Through empirical analysis, altruism and reciprocity are also important factors influencing the generation of UGC, and perceived ease of use and perceived usefulness are the most significant variables in the perception of opportunities in the external environment [17]. Zhang Shiyong believes that there is a logical correlation between UGC motivation and UGC quality evaluation [18], according to which UGC motivation strategies can be formulated in a targeted manner to achieve a balance and unity between "quantity" and "quality".

The third perspective takes the text of UGC as a research object and uses different research methods and models to explore it at different levels. Zhao Jinghua et al. proposed that RF-BERT model and Bi-LSTM model are used to extract UGC text features and predict users' emotional bias, attention fluctuation, and potential demand [19], respectively. Yang Deqing et al. used K-means clustering algorithm and dynamic kano model as well as user comment analysis metrics to identify users' expected demands. Xu Linhong et al. used Support Vector Machine (( Support Vector Machine, SVM) to perform classification operations on feature words (words with obvious emotional tendencies) to determine the overall tendency of UGC [20]. Yang J et al. proposed an improved MapReduce-based

content mining Apriori algorithm to mine movie preference-related information of Douban UGC users, conduct sentiment analysis, and predict user information, perform sentiment analysis, and predict the trend of users' movie watching demand [21]. Ji Xue [22] et al. calculated the average user satisfaction of product attributes to predict the next generation product development needs. Zhang Zhengang et al. used Kano model to identify user needs using satisfaction and attention as indicators. [23] Some scholars used big data analytics [24], machine learning [25] and other methods in online consumer review (OCR) to predict demand and determine the market potential of new products. Shen Chao et al. used Mann-kendall time series prediction model to predict the fluctuation of attention and sentiment per unit of time to predict the trend of consumer demand. [26]

It can be seen that scholars have comprehensively analyzed and researched the text mining generation, classification and user behavior of UGC [27], analyzed and adopted the impact study [28], identified the user demand in different fields, and predicted the future trend in different fields from different perspectives, using different methods or models and in different fields. Existing research mainly focuses on different modeling algorithms and prediction methods to analyze, validate and evaluate mining UGC for user demand and predicting trends, etc., which is of great significance for identifying hotspots of users' concerns, predicting users' demand, and judging market trends. In the real world, a large number of real users cannot provide structured data for direct analysis. Few studies have discussed the potential semantically similar information attributes contained in user comments as important influencing factors.

In this paper, the deep learning-based BERTopic [29] technique is adopted from the user perspective in order to extract the UGC topics of the movie "*Chang'an*" and analyze the hotspots of users' concerns. By applying topic modeling techniques, UGC is obtained from open communities to extract potential information and identify semantically similar groups in the corpus. Using the current popular large-scale language model, these topics are clustered from a semantic perspective, and the characteristics of UGC communication hotspots are analyzed. This study provides powerful tools and methods for marketing and promotion in the Chinese animated film industry, helping producers to better interact with audiences and enhance the market performance and word-of-mouth effect of their films.

### **3. Study design and process**

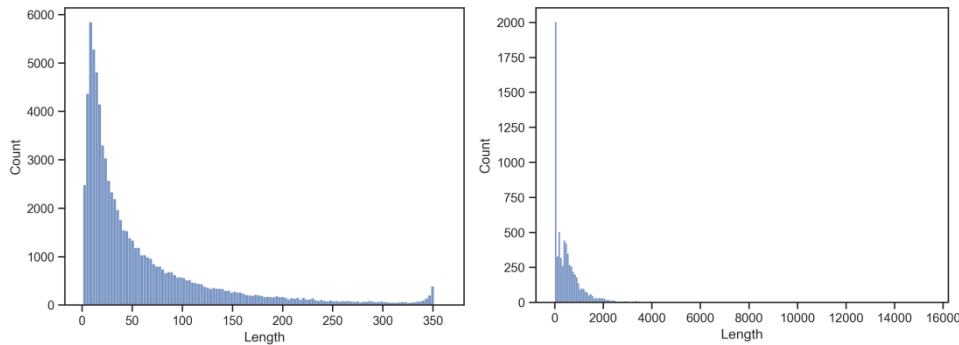
#### **3.1. Description of data sources**

Douban.com is one of the largest movie social networking sites in China, which faithfully expresses the most direct responses of the majority of users, and this data can help us better understand the movie market and audience preferences. In this paper, we take Douban.com as the data source and obtain a large amount of movie review data from Douban.com by using an automated crawler program. These data contain a wide range of views and opinions, including both short reviews from the general public and movie reviews from professionals and senior movie fans. By cleaning and organizing these data, we finally obtained first-hand user review information, totaling about 100,000 valid user reviews.

In terms of data processing, the captured raw data were subjected to merging and de-duplication operations to ensure the integrity and uniqueness of the data. At the same time, it is important to note the difference between short reviews and movie reviews. Short reviews are usually written by popular users with fewer words and represent the direct feelings and opinions of the audience. Movie reviews, on the other hand, are written by professionals or senior movie fans, are more professional and comprehensive, have more words, and provide in-depth analysis and evaluation. In order to better analyze and understand the content of the reviews, the text was compressed and de-lexicalized to remove a large amount of meaningless content, such as repetitive comments and some common stop words. At the same time, a subsumption word list and a custom word list were built for unifying similar words in different expressions and identifying specific words related to movies. Eventually,

we obtained 78,050 short user reviews and 4,440 movie reviews and the corresponding 2,486 replies totaling 6,926. This information was organized and saved to construct the dataset.

Finally, the data is subjected to a lexicalization process, which cuts the review text into independent words for subsequent text analysis and mining. Such a processing makes the dataset more standardized and easy to analyze, providing a reliable basis for Chinese movie review analysis. Through the above data acquisition and processing, a movie review dataset containing 84976 samples was finally obtained, and the text length of these review data was statistically analyzed, as shown in Figure 1. The maximum user short review length is 363, the shortest is 1, and the average user review length is 59.99.



**Fig. 1** Character Length Statistics of Film Review Data

For movie review data, the longest user review reached 15444 characters and the average length was 543.88 characters. Obviously movie review data is more detailed compared to short reviews. As shown in Table 1:

**Table 1.** Character Statistics for Film Review Data

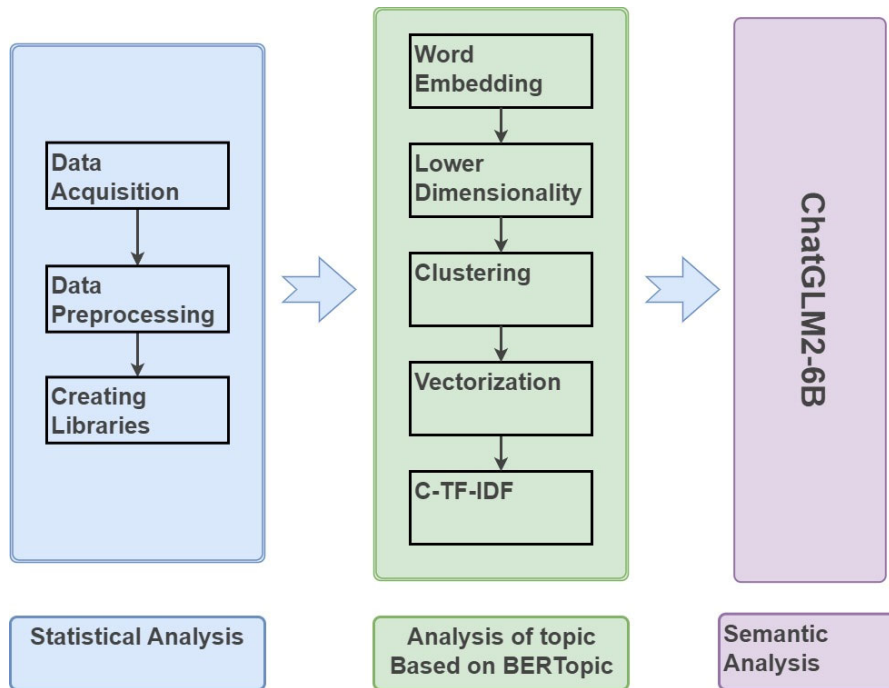
| statistic | movie review | short comment |
|-----------|--------------|---------------|
| count     | 6918         | 78050         |
| mean      | 544.5108     | 59.9898       |
| std       | 751.7349     | 71.05993      |
| min       | 1            | 1             |
| 25%       | 49           | 14            |
| 50%       | 370          | 32            |
| 75%       | 737          | 78            |
| max       | 15444        | 363           |

### 3.2. BERTopic Theme Model

Since Douban review data is usually unstructured text data and may contain a lot of noise and useless information, it poses a challenge for analytical models. Therefore, text analysis and processing are needed. Traditional topic modeling approaches (e.g. Latent Dirichlet Allocation) create sparsity problems when processing large-scale text data. Since text data is usually high-dimensional and many words appear in only a few documents, it makes it difficult for topic models to accurately capture the semantic information of these words. BERTopic is a topic modeling technique that utilizes Transformers [30] self-attention technique to create dense clusters, which results in easy-to-interpret topics and preserves the important words in the topic descriptions. A highly customizable Bert [31] language model can be used in BERTopic, which makes it possible to process large amounts of textual data and generate topics in seconds. BERTopic first creates document embeddings using a pre-trained language model to obtain document-level information. Then, by reducing the dimensionality of the document embeddings, semantically similar document clusters are created, each representing a

different topic. Finally, to extract topic representations and overcome the center-of-mass-based perspective, a class-based approach is used.

Through these three independent steps, BERTopic provides a flexible topic model that can be used for a variety of use cases, including dynamic topic modeling. It aims to effectively mine effective information from audience movie reviews, enhance information exchange with the audience, sort out internal mechanisms, rapidly iterate movies, and form recommendations, inferences, and decisions based on audience review data. The research framework is designed as follows: figure 2



**Fig. 2** Analysis Framework for Mining Hot Topics of Users' Concern

First, keywords are extracted using Sentence Transformers (Sentence Transformers) to transform documents into numerical representations. Word embeddings are implemented in BERTopic using the Sentence-BERT (SBERT) model [32], which was proposed by Nils Reimers and Iryna Gurevych as a modified version of the pre-trained BERT network. SBERT uses the Siamese and Triplet network structure [33] to generate semantically meaningful sentence embeddings that can be compared using cosine similarity for sentence comparison. SBERT performs excellently in common Semantic Textual Similarity (STS) tasks and transfer learning tasks, outperforming other state-of-the-art models. performs well and outperforms other state-of-the-art sentence embedding methods. In this paper, pre-trained models weighted as paraphrase-multilingual-mpnet-base-v2, which is a multilingual version of paraphrase-mpnet-base-v2, are selected and trained on parallel data in more than 50 languages [34]. These models are optimized for semantic similarity and are very helpful for clustering tasks.

After creating a numerical representation of a document, it is downsampled using Uniform Manifold Approximation and Projection (UMAP) [35]. UMAP is a nonlinear downscaling technique to preserve the local and global structure of a dataset, providing the information needed for clustering semantically similar documents. It is used for visualization of data and also for general nonlinear dimensionality reduction tasks. In this paper the minimum number of topics is chosen as 30 and 10 keywords are extracted from it.

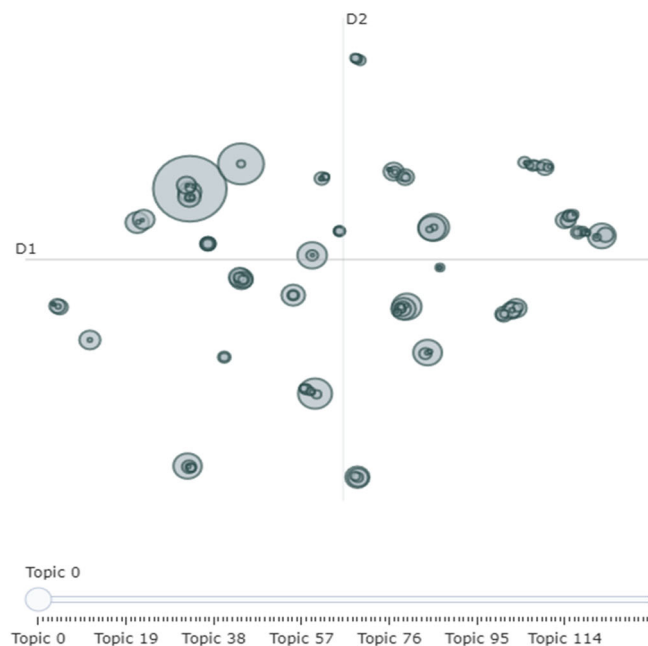
After reducing the embedding vectors, the data is clustered. We have used a density based clustering technique, Hierarchical Density-Based Spatial Clustering of Applications with Noise (HDBSCAN) [36]. This technique finds clusters of different shapes and has the good property of recognizing outliers. As a result, documents are not forced into clusters to which they may not belong, which improves the generated topic representation by reducing the interference of noise.

Next, after reducing the embedding, clustering of the data can begin. The data is clustered using HDBSCAN, an algorithm that finds clusters of different shapes and identifies outliers where possible. In this paper, the output vector dimension is set to 10, the number of nearest neighbor samples is 10, and the minimum distance is 0. To improve the topic representation and to reduce the effect of noise, the minimum number of samples is limited to 40 and a minimum interval tree is generated. All documents in the clusters are merged into one very long document that represents the cluster. Then, the frequency of occurrence of each word in each cluster is calculated, and a bagged word representation is generated in which the frequency of each word in each cluster can be found. This bagged word representation is at the cluster level rather than the document level. By using the bagged word representation, no assumptions are made about the structure of the clusters. Since the BERTopic default lexer CountVectorizer is suitable for Western languages, the jieba lexer is used. Finally, by applying the category-based Term Frequency-Inverse Document Frequency (TF-IDF) algorithm, the importance scores of words within the clusters can be computed. TF-IDF is used as a common weighting technique for information retrieval and data mining. By considering all documents in the same category (i.e., cluster) as a single document. Within the clusters, words with higher importance represent the topic better. In BERTopic, the proposed (class-based TF-IDF, c-TF-IDF)

$$W_{t,c} = tf_{t,c} \cdot \log \left( 1 + \frac{A}{tf_t} \right)$$

where the term frequency is used to model the category  $c$  or in this case to model the frequency of the term  $t$ . Here, the category  $c$  is a single document connected by a collection of documents in each cluster. The inverse document frequency is then replaced with an inverse category frequency, which is used to measure the information contribution of the term to the category. The inverse category frequency is calculated by dividing the category  $A$  by dividing the average number of words in the category by the logarithm of the frequency of terms in all categories  $t$  of all categories is calculated by dividing the logarithm of the frequency of the terms in the category. To ensure a positive output, one is added to the division within the logarithm.

Finally, 114 themes were identified using category-based c-TF-IDF weighted, then generating interactive plots of themes as shown in Figure 3. Each circle in the graph represents a subject, whose size is the frequency of the subject appearing in all documents, and similar subjects are located closer together in the coordinate system. The optimal number of topics was extracted and 28 compact topics were obtained. Figure 3.



**Fig. 3** The cluster distribution map of the themes of reviews of Chang An

### 3.3. Fine-tuning of CHATGLM2-6B Large Model Theme Based

Based on the BERTopic technique, multiple topic representations were finally obtained, as well as the degree of correlation between topics. Though these provide good representation of the themes, for further accurate representation of the themes, advanced Big Predictive Modeling techniques are chosen to fine tune the themes. Tags, summaries, topic poems can be generated for the existing topics based on the semantic perspective and further generalization can be done. For this purpose, a set of keywords and documents that best describe the topic are first generated using BERTopic's c-TF-IDF computation. These candidate keywords and documents are then passed to the text generation model and asked to generate the output that best fits the topic. A huge advantage of this is that only a small number of documents can be used to describe a topic, so there is no need to pass all the documents to the text generation model. This not only significantly speeds up the generation of topic labels, but also does not require significant computational resources when using external APIs such as Cohere or OpenAI.

In this paper, we use the ChatGLM2-6B [37] large pre-trained model to fine-tune the topics and extract topic tags of comments from candidate documents and keywords. ChatGLM2-6B is the second generation of open source Chinese-English bilingual conversation model released by the KEG and Data Mining Group (THUDM) at Tsinghua University. It retains the advantages of the initial generation model such as smooth dialog and lower deployment threshold, and introduces more powerful performance, which makes it more competitive among the open source models of the same size. ChatGLM2-6B has longer context length, based on Flash Attention technology, the model's context length is extended from 2K in ChatGLM2-6B to 32K, and is trained in the dialog phase using a context length of 8K. The selected prompts are as follows:

**Table 2.** Topic-Based Labeling and Clustering Instructions for ChatGLM2-6B

|  |
|--|
| <b>clue</b>  |
| I have a topic which contains the following files. :<br><b>[input: document]</b><br>This topic is expressed by the following keywords.<br><b>[input:keyword]</b><br>Based on the above information, you are asked to generate a representative and accurate label for each document and cluster semantically similar labels.<br><b>[output:]</b> |

## 4. Analysis of the results of the thematic modeling of "Chang An"

### 4.1. The CHATGLM2-6B model

More than 120 sub-themes were first automatically identified using the BERTopic theme model, and 28 themes were generated by manually converging similar sub-themes. Due to the plurality of opinions expressed by the audience, in order to further analyze the views represented by these themes, semantic clustering analysis of movie reviews was performed using the CHATGLM2-6B model. Using an AI-based model for semantic clustering is more reasonable than word frequency analysis, and the method has obvious advantages, especially in the clustering of topics that contain users' emotional evaluations. By summarizing the semantic clustering of keywords and topics appearing in the movie reviews, the following five broad categories of clustered topic results are obtained, as shown in Table 3.

**Table 3.** Thematic semantic clustering table

| Thematic categories                                      | clarification   |
|--|---|
| Culture, history, tradition                              | This clustering includes keywords related to Chinese culture, history and tradition, such as Chang'an and Datang, and national comic works. |
| Ratings, Viewing, Reviews, Scores, Stars                 | This clustering includes keywords related to ratings and reviews of movies, episodes, or other media works.                                 |
| Falling asleep, bored, slow paced, too long, running gag | This clustering includes keywords related to the viewing experience, such as finding it boring, slow paced or too long.                     |
| Character, role, image, modeling, female, male           | This clustering includes keywords related to characters, roles, and images in the work, as well as those related to gender.                 |
| Dream, Laugh, White Horse, Fly, Sand Gulls               | This clustering includes keywords related to poetic, dreamy, and natural elements.  |

From the semantic clustering results, there are five major categories of users' concerns about the movie "*Chang'an*". Taking the clustering theme of "Culture, History, Tradition" as an example, the related comments are mainly related to keywords related to Chinese culture, history and tradition, such as Chang'an and the Great Tang Dynasty, as well as works of national comics and so on, and the specific theme labels are as follows Specific topic tags such as "culture and tradition, "*Chang'an*", 300 poems of Tang Dynasty, history, historical stories", so the topic is described as "Chinese culture". Based on this method, the five clustered themes are described as Chinese culture, film word-of-mouth communication, film technical production, film poetic narrative, film controversy (critical target) and other aspects of the discussion, showing the richness and diversity of the content of the topic of concern, and the diversity of viewpoints, etc., as shown in Table 4:

**Table 4.** Theme Categories and Theme Labels

| Thematic categories                                      | Topic Tags.   |
|--|---|
| Culture, history, tradition                              | Cultural Traditions, 30,000 Leagues in Chang'an, 300 Poems of the Tang Dynasty, Historical Understanding, Historical Stories            |
| Ratings, Viewing, Reviews, Scores, Stars                 | 4 out of 5 stars for one, 3 out of 5 stars for graphics, 8 out of 5 worth watching, 7.5 out of 5 maybe                                  |
| Falling asleep, bored, slow paced, too long, running gag | Lackluster and boring, too long, a bit slow-paced, running commentary   |
| Character, role, image, modeling, female, male           | Except the modeling is a bit ugly, the image of women in the Tang Dynasty, the language teacher   |
| Dream, Laugh, White Horse, Fly, Sand Gulls               | Dreaming of Chang'an, laughing at the sky and going out the door, silver saddles shining on white horses, soughing like shooting stars. |

#### 4.2. Analysis of the heat degree of users' attention to the theme

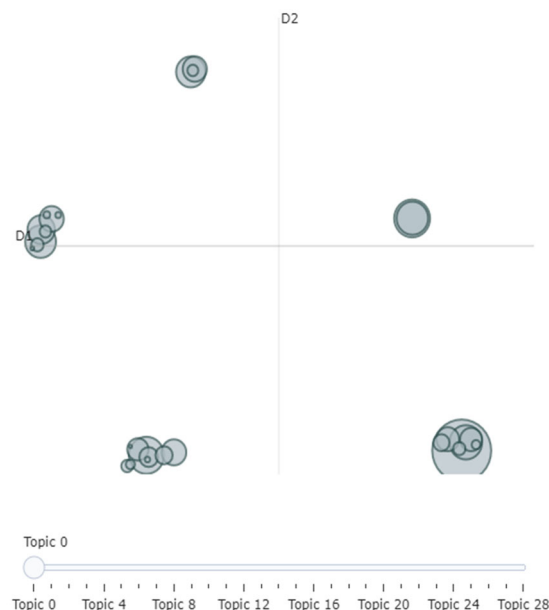
By processing clustering of 28 topics by dimensionality reduction, five large classes of clustered topics are obtained. As shown in Figure 4, according to the topic distribution map, the JSD ( Jensen - Shannon Divergence) distance method is used to show the diameter of bubbles, and the distance of the bubbles between the clustered topics implies the degree of difference between the clustered topics; there is an overlap of the bubbles, which indicates that in the 28 topics, there are eigenvalues that have a cross-community.

As shown in Fig. 4, the five large class clustering topic bubbles in this study do not overlap and the distance is relatively large, which indicates that the topic clustering recognition effect is better, and there is a certain degree of difference between the clustered topics. The diameter size of each clustered topic bubble reflects the probability result of each clustered topic manifested in tensor ( Tokens).

In order to further categorize these topics from a semantic perspective, the topics are inputted into the large language model for categorization, and the final results are shown in Table 3. The percentage of tokens in descending order is as follows: Topic 1 is Chinese culture (25.23%), Topic 2 is word-of-mouth (24.31%), Topic 3 is film production technology (14.74%), Topic 4 is poetic narrative (19.59%), and Topic 5 is controversy (13.92%). According to the labeled probability results, "Topic



1 "Chinese culture" is the biggest Douban review topic of "30,000 Leagues in Chang'an", followed by movie reviews and word-of-mouth.



**Figure 4.** Distribution of topics

Through the above research process, based on the BERTopic algorithm and CHATGLM2-6B model analysis, the semantic clustering analysis of the topics of interest to the users of "Chang'an" is completed, as shown in Table 5, the high-frequency key words and phrases of the clustered topics have a large probability value, which indicates that the words and phrases used by the users of Douban comments in the commenting on a particular topic space tend to have the same language habits. The top 5 high-frequency key words and phrases are selected for each semantic clustering topic, excluding "Chang'an", "Li Bai", "legs" and the proximate words "national comics", "animation", "Chinese cartoon", "Chinese opera", and "Chinese opera", which are the most common words in the poems. Except for the five co-occurring words such as "Chang'an", "Li Bai", "legs" and the near-synonym "national comics" and "animation" in the poem, the rest of the high-frequency key words and phrases do not intersect with each other, which indicates that the semantic clustering of topics in the Douban reviews of "Chang'an" has a better effect of differentiation.

**Table 5.** Probability distribution of the five major clustered topics for the review of "Chang'an"

| Clustering Theme 1                           | probability value | Clustering Theme 2                     | probability value | Clustering theme 3   | probability value | Clustering theme 4               | probability value | Cluster theme 5            | probability value |
|--|-------------------|--|-------------------|--|-------------------|----------------------------------|-------------------|----------------------------|-------------------|
| China, romanticism                           | 0.0975            | It's good. It's good.                  | 0.0883            | Shanghai wine  | 0.0624            | Animation, domestic modeling     | 0.056             | latter part good-looking   | 0.0212            |
| cultural self-confidence                     | 0.0285            | lit. chasing light four stars          | 0.0601            | lit. a light boat has already passed a thousand hills                      | 0.0607            | Figures, legs                    | 0.0284            | short legs                 | 0.038             |
| Learn about history legacy                   | 0.0451            | eyes brimming with tears of excitement | 0.0608            | lit. Yellow River flows from the sky                                       | 0.0222            | Li Bai and Gao Shi               | 0.0223            | Boring, Rating 3.5         | 0.0301            |
| "Chang'an" Leagues, Three Hundred Tang Poems | 0.0594            | The Rise of National Comics            | 0.0275            | The silver saddle shines on the white horse. soughing like a shooting star | 0.0203            | Female, male                     | 0.0002            | too long three hours       | 0.0445            |
| Language teachers                            | 0.0218            | Best of the Summer                     | 0.0064            | Chang'an, Dapeng   | 0.0303            | life's journey against the grain | 0.0405            | drop off dream of Chang'an | 0.0054            |

Combined with the statistical analysis of the keywords of each cluster, Cluster Theme 1 (Chinese Culture) focuses on the Chinese narrative and expression of traditional Chinese culture. Cluster theme 2 (movie word-of-mouth communication) is placed in the word-of-mouth evaluation of the movie "Chinese animation school", "'good-looking', 'national comics are getting better and better', 'the best in this year's summer file'. The Internet comment context of 'the best in this year's summer' highlights the traditional cultural factors in the IWOM evaluation of the movie. Cluster Theme 3 (Topic of Poetic Narrative of the Movie) focuses on the historical construction and contemporary consciousness writing of the poetic context of "*Chang'an*". Cluster Topic 4 (Film Production Techniques) focuses on the "technical writability" of Chasing Light Animation, character design, and the "Long Peace" movie, all of which are connected to "*Chang'an*". Cluster Topic 5 (Controversial Topics and Criticism Targets) focuses on the negative comments and controversies arising from the narrative of the film, such as the "writability of the text" and the "short legs" and "too long viewing time". Controversy.

### 4.3. Explanation of Themes in the User Reviews of "*Chang'an*"

#### (1) "Uniquely Chinese Romance": Chinese Innovative Expressions of Traditional Chinese Culture

Cluster Topic 1 "Chinese Culture" is the most popular semantic cluster topic, with high-frequency keywords such as "cultural self-confidence", "30,000 Leagues in Chang'an, 300 Poems of Tang Dynasty", "history", "tradition" and "romanticism" reflecting the success of "30,000 Leagues in Chang'an" in its innovative Chinese expression of traditional Chinese culture. History", "tradition", "romanticism" and other high-frequency keywords reflect the success of "*Chang'an*" in its innovative Chinese expression of traditional Chinese culture.

The movie's innovative expression of Chinese traditional culture has quickly gathered the cultural capital for animated movies to "get out of the circle". For topics such as "the beauty of Tang poetry", the film goes beyond the scope of traditional Chinese culture, pointing to the comprehensive expression of oriental imagery, poets, urban culture, cultural heritage and spiritual quality. Using Chinese characters as the symbols of oriental aesthetic imagery to spread the "unique Chinese romance", using the group portraits of poetic literati to illustrate the sincere friendship and passion for serving the country [38], using the magnificent poetic writing to depict the beautiful scenery of the Great Tang Dynasty, where "when the poem is there, and when the book is there, Changan is there", and using the theater children's words to describe the city of Changan. In the movie, theater children recite Tang poems to awaken the cultural heritage of our time.

The online topics such as "Language Teacher", "The Romance of China" and "Half of the Tang Dynasty" derived from traditional Chinese culture immediately led to the sale of books on Li Bai and Du Fu and the popularity of travel to the ancient capital Xi'an, which in turn led to a nationwide study craze at cultural museums. The offline topics such as Li Bai, Du Fu, etc. immediately led to the sale of books on Tang poetry and the hot trend of cultural tourism in the ancient capital Xi'an, which in turn led to the nationwide hot trend of cultural and museum study. As the first movie of the "New Culture" series of Chasing Light Animation, "*Chang'an*" has become a classic case of innovative expression of traditional culture in film and television. Chinese animation is a history of the expression of Chinese social reality and culture in different times. The Chinese innovative expression of "*Chang'an*" is a new way of saying old things about traditional Chinese culture. The creative strategy of integrating modernity into tradition, i.e., integrating modern concepts and even life into traditional stories, borrowing the shell of traditional culture to express the kernel of modernity, and its style has distinctive postmodern cultural characteristics [39].

#### (2) "Out of Circle" Word of Mouth: The Diverse Topic Labels of "*Chang'an*"

Cluster Topic 2 As a successful animated movie, "*Chang'an*" has received a lot of attention in terms of "out-of-circle" communication. Audience's positive comments on Chasing Light Animation's "*Chang'an*", such as "good-looking", "not bad", "the best summer vacation movie", "this is the Chinese people's High-frequency keywords, such as "good-looking", "not bad", "best of the summer

vacation" and "this is the Chinese people's own animated film", expressed their high recognition of the film, which they regarded as an ideal model for the dissemination of excellent traditional culture.

High-frequency words such as "best of summer vacation" show that "*Chang'an*" has become a widely accepted cultural phenomenon, covering social topics in different fields such as education, culture and tourism, and crossing the boundaries of the film and culture community, integrating into different fields or circles of interest, such as history and culture, education and research, and cultural inheritance and innovation. The topic of "*Chang'an*" has been combined with Xi'an's cultural and exposition fever and education and study, and the Tang poetry culture boom has injected new vitality into the inheritance of traditional Chinese culture. The resonance of contemporary social values based on the dissemination of traditional Chinese culture actively promotes online dialogues, interactions and value co-construction between "*Chang'an*" and the audience, effectively enhancing the "out-of-circle" dissemination influence of the film, and at the same time matching the overall positioning and development direction of Xi Jinping's cultural thought on cultural construction.

Key opinion leaders from various fields have become an important force in pushing the word-of-mouth of "*Chang'an*" out of the circle and expanding its dissemination. In the word-of-mouth conversation, viewers criticized the design problems such as "short legs", and the creative team responded and solved the problems in a timely manner. Academic experts published articles in professional academic journals, recognizing the film's excellent animation design, sophisticated production and novel narrative approach. Netizens, on the other hand, actively supported the creative team and called on them to actively participate in the dissemination and practice of China's outstanding traditional culture. The voices of these opinion leaders have played an important role in promoting the "out-of-circle" dissemination and expansion of the word-of-mouth for "*Chang'an*".

### (3) Poetic Narrative: Contemporary Writing of Poetic Contexts

Cluster 3 focuses on the broader social issues raised by the 48 Tang poems in the movie, placing them in the context of the nation-state as an "imagined community". These Tang poems, through the values of national identity, self-identity, behavior, and common experience, have triggered a discourse that constructs the social awareness, cultural identity, and emotional resonance of the "uniquely Chinese romance".

In the existing research and discussion, the Chinese school of animation is inseparable from the expression of traditional Chinese culture, national sentiment and national spirit. Yin Yan proposes that the characteristics of the "Chinese school" of animation are the educative and entertaining way of teaching, the artistic means of writing and evoking, and the colorful art style. [40] "*Chang'an*" has successfully awakened the audience's awareness of Chinese cultural genes, using the Tang poetry culture that transcends the boundaries of time and space as a carrier, and depicting the oriental aesthetic imagery that connects the ancient and modern worlds. When fictional concepts such as "imagination", "imagination" and "dream" are integrated into the historical narrative, the real meaning hidden under the iceberg can be artfully expressed by the language form. [41] "*Chang'an*" expresses the Tang poem "Wine" by "maximizing" both the emotion and the imagination of the animation, and when Li Bai touches the Milky Way with his hand, the history and the modernity reach a fusion in time and space.

The audience's concerns about the poetic mood narrative in "*Chang'an*" focused on the following aspects: "It satisfied my curiosity and expectation of *Chang'an*, the symbol of that flourishing Tang Dynasty", and the movie demonstrated the beauty of Tang poetry and the beauty of traditional Chinese culture through the form of animation. The audience thought that poetry was a symbol of *Chang'an*, and the poetic narrative in the movie made it possible to recreate *Chang'an* in the audience's mind. They also mentioned the power of words and the heritage of culture, both throughout 5,000 years of history and inadvertently traversed in their personal lives, showing a grand and romantic atmosphere. Thirty Thousand Leagues in *Chang'an* pushes Chinese animated movies to a poetic and historical peak. With a three-hour dual narrative of reality and memories, the movie vividly shows the change from prosperity to decadence in the flourishing Tang Dynasty, as well as the changes in

the literary world and the scholarly circles, the lifelong interactions between Gao Shi and Li Bai, and so on.

Xi Jinping mentioned at a symposium on cultural heritage development that culture is the soul of a country and a nation. Cultural confidence stems from cultural subjectivity, i.e., the historical inheritance of the excellent traditional Chinese culture. Tradition and modernity are mutually transforming concepts, and in the works of Chasing Light Animation, these two elements are intertwined and complex at all levels, including structure, characters, background and connotation. "*Chang'an*" writes national memories with poetic culture, carries out contemporary inheritance and perseverance of traditional Chinese culture and national spirit, demonstrates cultural self-confidence and self-improvement, and casts a firm sense of Chinese national community. This is in line with the characteristic development of contemporary Chinese animation school.

#### (4) Oriental flavor: a feast for the senses with audiovisual wonders

Topic 4 Focuses on the topic of technical writability for "*Chang'an*". The technical aspects of "*Chang'an*" were positively recognized by the audience. High-frequency keywords such as "best modeling" and "modeling" related to the film's technology gave positive recognition to the film's animation technology. The audience thought the modeling technology was excellent, especially the modeling based on the Tang figurines, which made the characters of Chang'an's songstresses, Princess Yuzhen, and Hu dancers come to life, and showed the costumes and patterns of the Tang Dynasty. In addition, the movie also shows the architecture of Chang'an in the full bloom of the Tang Dynasty and the short-legged horses in the style of the six steeds of the Zhaoling Mausoleum, presenting the oriental flavor characteristic of the Tang culture.

"role", "image", "female", "male", "character" and other high-frequency keywords express the audience's strong interest in the characters in the movie. In particular, the modeling of the characters Li Bai and Gao Shi was appreciated by the audience. The audience thought that the movie successfully showed the character traits of Li Bai in different periods, which made the characters come to life. Audiences also mentioned the episode where Li Bai teaches Gao Shi sumo wrestling, which adds interest and vividness to the story and shows the relationship between the two through the rivalry of victory and defeat. In addition, the movie also fictionalized the character Pei XII, a female disguised as a male, to balance the presentation of gender roles.

In terms of technology, "*Chang'an*" creates a visually stunning spectacle through the use of a large number of digital special effects and particle ink, in order to reproduce poetry in the form of words. The audience can feel the Oriental way and the ink imagery that "can only be understood but cannot be conveyed". In terms of sound, the movie uses a lot of traditional Chinese music, bringing the audience a sense of unity between the national painting style and the post-modern, while integrating traditional Chinese art elements. This perfect fusion of cultural core and visual spectacle demonstrates the oriental aesthetic flavor of the time period.

Overall, "*Chang'an*" presents an audio-visual spectacle in terms of technology. Through superb modeling techniques and visual special effects, the movie reproduces the culture and history of the Shengtang period in front of the audience, displaying a unique oriental flavor. At the same time, the movie succeeds in characterization and sound performance, giving the audience a comprehensive sensory experience. This combination of technical writability and cultural writability makes the movie a unique and fascinating work.

Visually, as Baudrillard said, "simulacrum" fills the world. The visual imaginary spectacle constructed with a large number of digital special effects and particle ink and other technologies to express those poems that have appeared in the form of words for thousands of years, let the audience feel the "Tao" of the East and the ink and wash "imagery" that can only be understood but not conveyed. "Imagery". In terms of sound performance, "*Chang'an*" utilizes a large amount of traditional Chinese music, bringing the audience a sense of unity between the national painting style and post-modernity, and integrating traditional Chinese artistic elements in a form that conforms to

global trends. [42] "*Chang'an*" continues the visual spectacle of "technical writability", and "cultural writability" is also perfectly expressed in the film, with a perfect fusion of cultural kernel and the sensory experience of the visual spectacle, showing the oriental aesthetics of the time period. The film is a perfect blend of cultural core and sensory experience of visual spectacle.

#### (5) Topics of Controversy: "New Tales" of Historical Facts, Narrative and Characterization

Convergent Topic 5 focuses on the fact that "*Chang'an*" has sparked some controversy in terms of historical truth and character modeling. Audience members discussed the new claims of historical truth and character modeling in the film, which reflected the extent to which the film was aggregated in terms of new claims of historical truth and character modeling. The Luoyang Sui and Tang Historical Association publicly demanded a formal apology from the producers and director for the historical factual errors in the film, which further fueled the heat on the topic of the historical factual controversy of "*Chang'an*". The viewpoint of New Historicism is that the writing of history is not a restoration and recording of real historical events, but a reconstruction of the logic of historical events based on the ideology and social trends at the time of compilation, in order to help people understand the past and assess the future. [43] In the face of numerous criticisms about the film's inaccuracies, the controversy mainly focuses on whether Gao Shi really saved Li Bai and whether the place where the history took place was really in Chang'an. Since historical events are only isolated events in the long river of history, and the interconnecting island chains have been mostly lost, it is sometimes impossible to restore specific details and characters' motives even when reviewing the historical events themselves after the fact. Therefore, the process from fact to history often requires historians to make reasonable speculations based on historical logic.

Imagination and fiction are indispensable in the process of transforming historical events into literary dramatizations and theatrical adaptations. These imaginings and fictions are partly in line with what Guo Moruo called "the spirit of history", and although reconstruction cannot be divorced from concrete historical facts, it is not the same as historical facts themselves. The construction of truth can make history more moving. Marcel Mardin points out in *The Language of Cinema* that cinema, as an art form, provides the audience with a time-space complex that can be deformed in terms of time-space and plot. [44] "*Chang'an*", many inaccurate historical constructed plots, such as the sumo wrestling art that shows the friendship between Li Bai and Gao Shi, can be regarded as connecting points of temporal and spatial transformations. For these constructed plots and stories, most of the viewers take an approving or tolerant attitude.

Audiences have questioned the aesthetics of the character designs of Li Bai and Gao Shi in "*Chang'an*", which have manifested themselves as targets for criticism, with high-frequency words such as "short legs". Although the movie has received high acclaim in terms of word-of-mouth, some viewers have reflected that the narrative style of the movie is monotonous and boring, making people feel sleepy and like a running narrative. High-frequency keywords such as "the second half is good", "too long", "falling asleep", "running account", etc. indicate that viewers are not satisfied with the movie's duration control and narrative. The high-frequency keywords "too long", "fall asleep" and "running account" indicate that the audience needs to further consider the movie's length control and narrative style.

These criticisms point to problems with the film's narrative, which viewers felt was unengaging and could lead to a loss of interest on the part of viewers. In addition, some viewers considered that the duration of the movie was too long, which might lead to viewers feeling tired or unable to concentrate. These issues may require the producers to reflect on and improve the subsequent creation of the movie in order to enhance the narrative appeal of the movie and to better control the length of the movie in order to maintain the interest and engagement of the audience.

It is worth noting that these criticisms do not represent the views of all viewers, but rather the views of some viewers. Movies have diverse audience groups, and different audiences will have different evaluations and preferences for movies. Therefore, producers need to synthesize various feedbacks

and create and adjust their films according to the market demand and preferences of the target audience in order to provide a better movie experience.

## 5. Conclusions

Based on the movie review data of "*Chang'an*" in the Douban community, the BERTopic algorithm and CHATGLM2-6B model analysis method, as well as the LSTM-LDA algorithm and the IPA analysis method, were used to explore the exchange of community users' comments on the topic clusters of "*Chang'an*". The study aims to depict the distribution characteristics and time-series development trend of the hot topics of concern, and to clarify the development trend of the current hot topics by fine-tuning the topics through the CHATGLM2-6B model. From the perspective of theme clustering, the exchange of information on the viewing experience of the movie "*Chang'an*" by users in the Douban community is characterized by a wide range of themes and diverse types. These themes cover a wide range of semantic clustering topics, such as Chinese culture, film word-of-mouth, production techniques, and cinematic poetic narrative, as well as explorations of controversial topics, such as the film's narrative structure, character modeling, and old history and new narratives. These findings provide valuable information for understanding the discussion of "*Chang'an*" by users in the Douban community, demonstrating the diversity of topics that users focus on and the exchange of different viewpoints. These findings can serve as a reference for producers and related researchers to better understand audience needs and feedback, and further improve movie production and promotion strategies. Due to the limitation of data extraction, we failed to pay attention to the foreign online community comments of the film, and did not comparatively analyze the differences in the topic concerns of the film at home and abroad.

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