

A study of emotion setting based on event evolutionary graph-Take microblog users' expression of emotions on news reports related to the Beijing Winter Olympics as an example

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Abstract. With the prominence of the "emotion setting" function in media agenda setting, the sentiment bias of netizens has gradually become a noteworthy part of the communication of public opinion events. In this paper, we use the BERT model to analyze the sentiment of news headlines and netizens' comments from January 2021 to July 2021, and extract news headlines and their relationships with the help of LTP to construct a theory map of news and comments for each month in Neo4j, and then explore the deep logic of netizens' sentiment changes. The research results show that there is a correlation and lag between the emotional direction of Internet users and the emotional direction of media news reports in online public opinion dissemination. In addition, the public's attention to information on international current affairs needs to be strengthened.

Keywords: Agenda setting, Emotion setting, LTP, Event evolutionary graph.

1 Introduction

On July 31, 2015, IOC President Thomas Bach officially announced at the 128th session of the IOC that Beijing, China, would be awarded the right to host the 2022 Winter Olympic Games. Since then, the Chinese media has reported on many aspects of the Winter Olympics and the public has widely discussed the various reports. As one of the most important discussion platforms for Internet users, Microblog is a highly effective and interactive platform for media to disseminate information and gain attention. In recent years, some studies have shown that emotions play an important role in information dissemination on Microblog, and there is even a phenomenon that the media influences the communication effect through emotional settings. Therefore, it is worthwhile to study whether there is emotion setting in the reports of the Winter Olympics and whether it is possible to guide public opinion through emotion setting.

In this paper, the relationship between media reports and netizens' sentiment is analyzed by means of event evolutionary graph, and the relationship of "a_title" is added by combining

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the characteristics of news headlines, so as to effectively avoid the premise that the graph is too scattered and achieve the construction of different time period graphs, and the results are visualized in a visual way. Through the analysis of event logic and emotion setting, the study aims to provide a reference for media coverage and netizens' emotion guidance during the Beijing Winter Olympic Games.

2 Literature review

2.1 Event evolutionary graph

"Event Evolutionary Graph" refers to the causal and cascading relationships between events, where nodes represent events and directed edges represent relationships between events. It is based on "Knowledge-graph", which is proposed by Google according to the user's search demand for many years, and it adds the relationship property to the entity, which helps to promote the intelligent and humanized development of the search engine. Based on the existing knowledge graph, Liu Ting, a scholar from Harbin Institute of Technology, has proposed "Event Evolutionary Graph" by focusing on events and the relationship between events. The event evolutionary graph can analyze and process complex information by computer, and is widely used in many disciplines with this core function.

At present, the research and application of event evolutionary graph in academia and industry are mainly in event analysis and public opinion monitoring. Firstly, in event analysis, event evolutionary graph can analyze the causal relationship of a single event on the one hand, and describe the sequential and transitive relationship between events on the other hand. The cause-effect relationship of the event evolutionary graph can extract core information to get the cause of the development of events. By analyzing the aviation safety accidents, Zhu Han divided the cause-effect relationship in the event evolutionary graph into explicit cause-effect relationship and implicit cause-effect relationship, and generated the event evolutionary graph of aviation safety accidents.^[1] In the field of intelligence, Zhou Jing-Yan et al. conducted a study on the role of event evolutionary graph and considered its important value in intelligence theory, intelligence interpretation and intelligence prediction in intelligence.^[2] In the field of political science, Bai Lu et al. developed a classification standard for events in the political field with the help of event evolutionary graph, which solved the problem of lack of corpus and missing standard for political event extraction.^[3] Secondly, in terms of public opinion monitoring, event evolutionary graph also plays an important role in public opinion management and prediction; Sayyadi et al. analyze the co-occurring content of online public opinion and cluster the co-occurring networks by means of weighting, so as to achieve effective monitoring after streamlining the information of online public opinion.^[4] Ma Zhekun et al. use event evolutionary graph for the identification of breaking words, construction of breaking topic graphs as well as semantic supplementation and refinement, cleaning of data for monitoring public opinion on breaking events and predicting the development trend of online public opinion with respect to the features of public opinion on breaking events.^[5] Wang Lancheng et al. demonstrate the feasibility and importance of applying event evolutionary graph to public opinion management. He believes that the use of event evolutionary graphs can simplify the discovery process of hot events and improve the trend analysis and management of hot events.^[6]

2.2 Emotion setting

In 1972, Donald Shaw and Maxwell McCombs proposed agenda-setting theory after conducting a survey of presidential elections. The theory argues that mass communication

may not determine how people think, but it can influence what people think. Since then, agenda-setting theory has been widely applied in communication, political science, sociology, and many other fields.

In recent years, some scholars have recognized that media agenda setting is related to the emotions contained in their stories, and a Microblog-based study showed that tweets with a clear emotional bias and in line with users' cognitive patterns are more likely to attract retweeting behavior.^[7] In addition, through the study of sudden mass events, Chunlei Li believes that people tend to observe the dominant emotion, and similar to the "spiral of silence" in which the public relies on the dominant opinion, the "spiral of emotion" in the event development process also shows that the public relies on the dominant emotion. In the process of emotion transmission, the one-way emotion transmission and the formation and expansion of the emotion chain are gradually accelerated.^[8]

On this basis, some scholars suggest that the media's bias toward a certain emotion will produce better dissemination and diffusion effects, and argue that the emotion can be guided based on this feature. First, in terms of diffusion of emotions, a study on Twitter showed that the expression of emotions by opinion leaders in social media can significantly influence users' retweeting and commenting behavior.^[9] In addition, there is also emotional homogeneity of user groups and social relationships in social networks, and people tend to communicate with people who are similar to them. Bollen et al. analyzed the users in twitter and found that users tend to close with users who have similar characteristics to themselves.^[10]

Secondly, in terms of emotion bias transmission, we also need to pay attention to the "priming effect" in emotion, which is commonly known as "priming". By analyzing emoticon images, Qin Minhui et al. found that users with positive emotion priming tended to identify neutral stimuli as positive, while users with negative emotion priming tended to identify neutral stimuli as negative.^[11]

At the same time, for media communication specific types of emotions show higher growth rates in specific media, American scholars Hansen et al. found through sentiment retweeting in Twitter that positive emotions promote social type messages, while negative emotions promote news content retweeting.^[12] Similarly, Chinese scholars Liu Cong and Xie Yungeng found through their research on Microblog that anger and questioning dominate the expression of emotions among ordinary users, and the more extreme the negative emotion, the more it triggers interaction among Internet users.^[13] Based on the existing theories, scholar Xu Xiang proposed the concept of "emotional setting", believing that the media can influence people to think and understand certain emotions, and can design in turn what kind of emotional communication can play a better role and effect.^[14]

To sum up, the media can, to a certain extent, realize the communication of views and positions through emotion setting, and the effect of emotion setting can also be regarded as an important indicator for the evaluation of communication effects. However, there is not enough research on the relationship between media sentiment and public sentiment, and whether and to what extent public sentiment is related to media sentiment setting deserves further study.

3 Data sources and research methods

3.1 Data sources

The content of Microblog is refined due to the strict word limit of posting, which is equivalent to the independent cleaning of data by users, and the "emoji" in the comments also has a specific meaning in the data crawling, which is convenient for emotional analysis, e.g., grimace, the crawled data is " haha". Therefore, it is ideal to use the comments of Microblog

users as the corpus for sentiment analysis. The researcher used the microblog data from January 2021 to July 2021 with "Beijing Winter Olympics" as the topic, and the fields included user name, time, comment content, and whether it was original. We also extracted all news headlines from mainstream media and online media from January 2021 to July 2021, with fields including time, headline, hit word, and original author, with a total of 26,855 data items. Through data cleaning, 6,229 data were obtained after removing duplicate titles, titles with missing fields, crawling errors and garbled titles.

3.2 Research methodology

3.2.1 Research framework

The framework of this study consists of three main parts: Bert sentiment analysis model, LTP construction of triples, and Neo4j graph visualization. In the sentiment analysis, the virtual environment is activated first, and then the data used for the experiment is imported into the model using "git bash" to run the code. When building the triples, the data output from LTP is artificially cleaned twice. The corresponding relationships are added according to the experimental requirements to increase the event correlation of the triples and to facilitate the valuable information from the next generated graph. The mapping visualization mainly uses the Neo4j database, and the data from the previous step is imported by entering Neo4j database statements in the jupyter notebook input box.

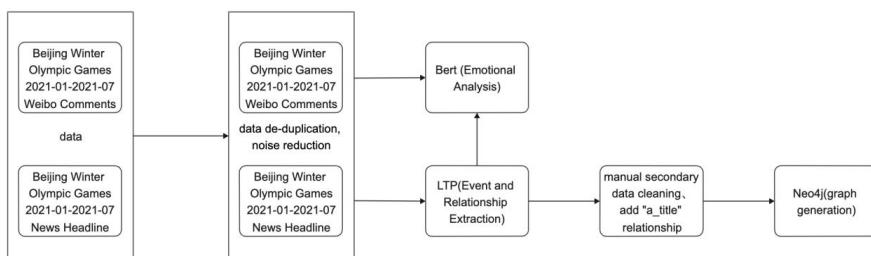


Fig. 1. Research framework.

3.2.2 Emotional analysis

Pre-training models in sentiment analysis is a very important technique. In this study, the sentiment analysis model of HIT LTP is added to bert, which well overcomes the problem of not considering the Chinese sub-word situation in the bert model released by Google. In this experiment, the author imported Microblog users' Microblog comment data and news headlines from different months into this model for sentiment analysis.

3.2.3 Graph generation

The extraction of events and their relationship analysis are two core tasks in the process of constructing the event evolutionary graph of the headlines of the Winter Olympic Games. Among them, the events mainly consist of country names, place names, person names and institution names, such as "China", "Beijing", "Wang Yi", "Ministry of Foreign Affairs", "Olympic Organizing Committee", etc. The relationship is obtained by detecting the trigger word of the title. The common relationships are: causal, conditional, transitive, etc. In this

paper, we mainly use LTP for this work. Firstly, the news headlines are divided by month, and the processed data are extracted from the events and their relations using Bert model.

The triples usually expresses the relationship between two entities by "entity" "relationship" "entity", but it is slightly stretched when the news headline traces the communication path, and sometimes a headline has more than two entities. In order to facilitate the retracing of news content in the graph and restore the deeper reasons for the direction of emotions, I added "a_title (same title)".

For example, "Hebei Province in-depth promotion of the Beijing Winter Olympic Games Paralympic Games preparation for the decisive mobilization and deployment conference" and "Langfang City concentrated on listening and watching the mobilization and deployment conference of Hebei Province in-depth promotion of the Beijing Winter Olympic Games Paralympic Games preparation for the decisive mobilization and deployment conference". When analyzing the latter, LTP will generate two triples, one causal relationship between Langfang City and the mobilization and deployment conference, and the other one between Hebei Province and the mobilization and deployment conference. If the above data is visualized directly using Neo4j, the result is not very satisfactory. We can connect Langfang city with Hebei province by using this relationship. Similarly, the Beijing Winter Olympics mascot and the Beijing Winter Olympics torch will form a "silo phenomenon". It is generally believed that there is a connection between "Beijing Winter Olympics mascot" and "Beijing Winter Olympics", so in order to facilitate the processing, the researcher applied the attributes to "both sides" and "U.S.", "U.S." and "Nancy Patricia D'Alesandro Pelosi".

The graph visualization uses neo4j, importing data after introducing the corresponding required packages in jupyter notebook, followed by inputting node and relationship generation statements. The generated nodes are mainly event entities that have been manually secondary data cleaning. The graph of events can be obtained by typing "create (n:point{name:\$name})" in jupyter notebook. To create a relationship between nodes, you first need to match the existing nodes "MATCH (n:point{name:\$name}), (m:point{name:\$name})" and then create the relationship "MERGE(n)-[:causal]->(m)".

4 Results and analysis

4.1 Affective analysis

In this paper, we analyze the sentiment of news headlines and Microblog users' comments on the theme of Beijing Winter Olympic Games monthly, and the sentiment evolution direction obtained is shown in Figure 2 and Figure 3.

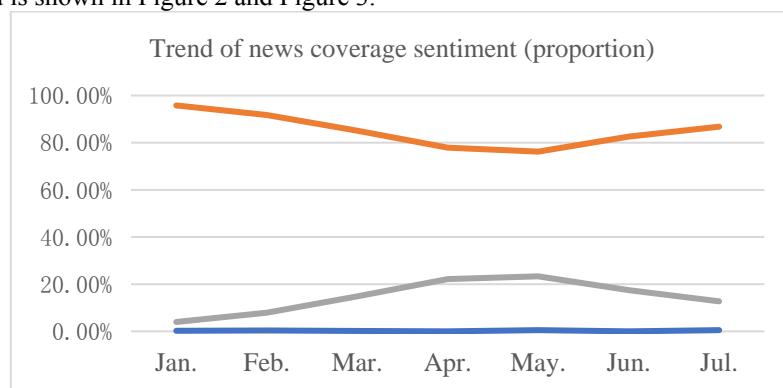


Fig. 2. Trend of news coverage sentiment (proportion).

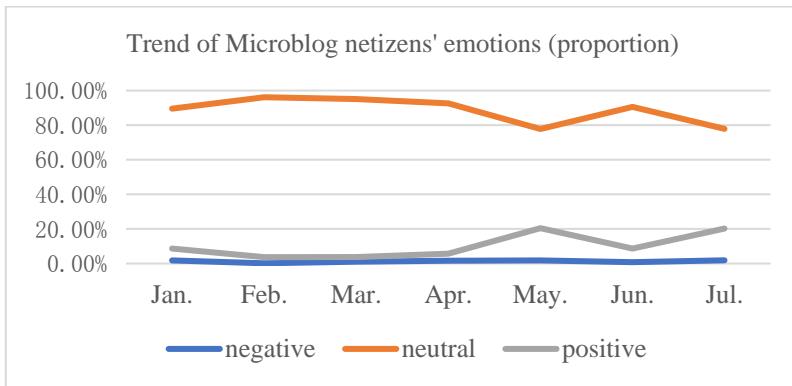


Fig. 3. Trend of Microblog netizens' emotions (proportion).

The total proportion of positive and neutral sentiment is stable. By analyzing the data from January to April, we found that the positive sentiment of news reports gradually increased, while the positive sentiment of Microblog users showed a decreasing trend. positive sentiment of news media reports was basically the same as in April in May, and declined in June. The positive sentiment of Microblog netizens rose more in May, fell back in June but was still higher than in April, and the data rose back to close to May in July.

Based on the analysis through proportions, the study introduces the analysis of sample space, where different sample space sample data changes have different effects on the share, and the smaller the sample space, the greater the volatility. In addition, the level of attention to the topic can also be inferred from the number of samples. From the observation of the number of reports shown in Figure 4, it can be concluded that the media coverage reached a new high in February, while the number of reports fluctuated around 700 in the rest of the months. As shown in Figure 5, the discussion among Microblog netizens reached a record low in February, a new high in March, and a decline in April, but an upward trend began to emerge thereafter. At this point in the experiment, it can be found that the relationship between netizens' sentiment, attention and media coverage is not obvious, and there is almost no similarity between the two function curves.

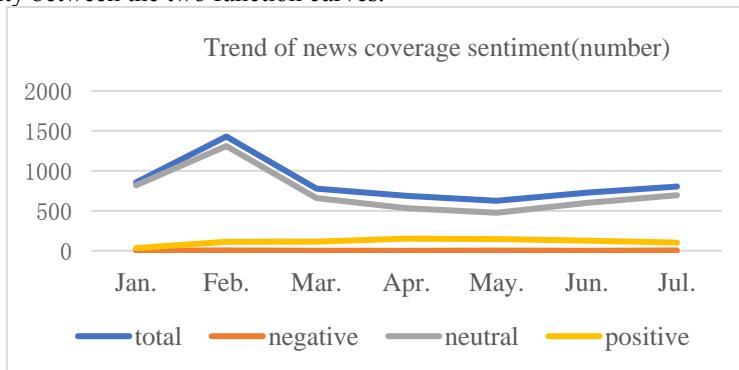


Fig. 4. Trend of news coverage sentiment (number).

Then, the logic of the evolution of events is explored through event evolutionary graph. Wang Lancheng proposes that the event evolutionary graph is a directional diagram formed by using events as nodes and the relationship between events as edges, which is used to portray the logical evolutionary relationship between events, and its cause-and-effect relationship can fully elaborate the evolutionary path of online public opinion and clearly show the direction of online public opinion evolution.^[15]

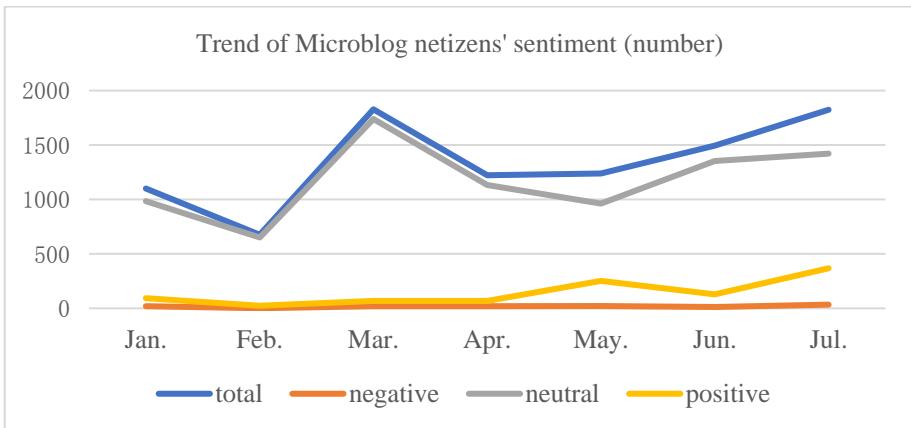


Fig. 5. Trend of Microblog netizens' sentiment (number).

4.2 Event evolutionary graph

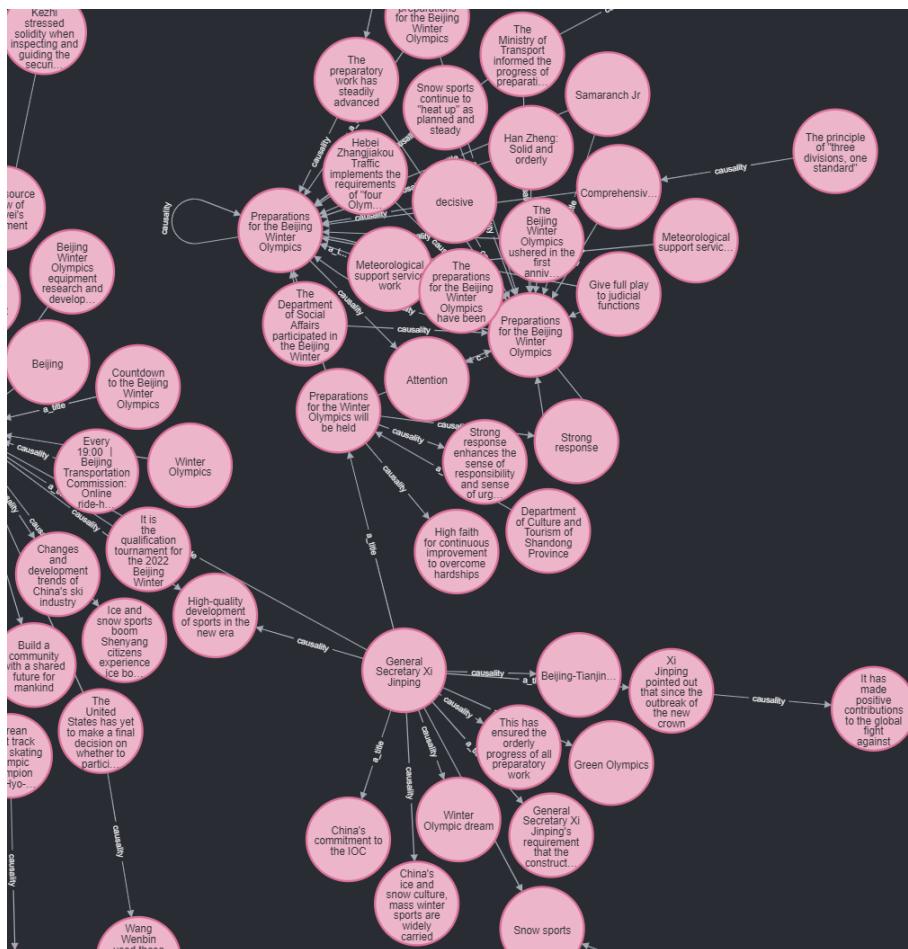


Fig. 6. Partial graph of news coverage from January to April.

Analyzing from the focus of news reports, as shown in Figure 6, we can assume the following reasons for the rise in positive media sentiment from January to April: the continued attention from the government, the continuous improvement of the epidemic prevention and control system, and the challenges from other countries.

Because of the attention from the government, Winter Olympics has not only promoted the progress of the preparatory work, but also expanded the attention of the Winter Olympics from local to general expansion. Such as reporting the security preparations for the Winter Olympics, the decisive deployment meeting of the Beijing Winter Olympics and Winter Paralympics, and the live broadcast of CCTV's Beijing Winter Olympics countdown one-year cultural party. Observing the graph we find that a large number of motions on the development of ice and snow sports were proposed at this year's national conference. For example, Taiwanese youths should go to participate in the Beijing Winter Olympics, Because of the huge support from the government, media positive emotion began to climb stably.

At the beginning of the year, the Health and Welfare Commission announced that the overall domestic epidemic prevention and control situation was reassuring in conjunction with the certification activities of the National Bobsleigh Center, followed by China's message to the outside world to create the basic conditions for the Winter Olympics by controlling the domestic epidemic. During the same period, NPC deputy Du Li interpreted the significance of the Winter Olympics from an athlete's perspective, followed by Foreign Minister Wang Yi's message to the outside world of his willingness to strengthen international cooperation in the fight against the epidemic, with the prospect of reaching a consensus on international health code interoperability in the future. Therefore, with the controllable covid-19 situation, media sentiment shows positive emotion.

Meanwhile, some countries tried to influence the emotion of media to ruin the Winter Olympics, however, they failed. In the one-year countdown to the Winter Olympics, the U.S. openly provoked China and attempted to join forces with several countries to boycott the Beijing Winter Olympics. But a closer look at the graph reveals that the U.S. move has not been widely embraced, in addition to the Russian Foreign Ministry publicly accused its behavior "unbelievable", Japan and South Korea have also successively "clarified" that they did not boycott the Winter Olympics, followed by South Korea also confirmed the candidacy for the Winter Olympics the list of speed skating team members. Therefore, international pressure has little influence on media emotions.

Netizens' positive sentiment showed a downward trend from January to April. From Figure 7, we can find that netizens' concerns roughly centered on celebrity promotion, sports competition, epidemic prevention and control and international situation. Generally speaking, due to the deviation of netizens' perception and the information released by the state, there is an asymmetry between the information obtained by netizens and the latest information of the Winter Olympics, resulting in the decline of positive sentiment due to the influence of one-sided remarks from Europe and America.

From the graph, we find that "ice and snow sports" has a high degree of cluster centrality, indicating its greater influence. Combined with the promotion of ice hockey in China proposed by the government in February, and an actor becoming the ambassador of ice hockey promotion in March. Observing the graph, we found that with the higher intention from the government, more and more celebrities joined the promotion of Winter Olympics. Then, more and more people who focus on celebrities started to pay attention to ice and snow sports and participate in ice and snow sports. The positive emotion figure of preparing Winter Olympics rise continuously.

The World Championships in figure skating triggered a discussion among netizens, and the evolutionary path of "Is Jin Boyang complacent" -> "What has he been training for" shows that netizens are not satisfied with the performance of the athletes. The evolution path of "Japanese 17-year-old genius" -> "Kenyama Yujin" -> "I don't know when Chinese men's

singles skaters will be able to develop such" -> The evolution path of "athlete" shows that netizens are both amazed by Japanese athlete Kenyama Yuzuru's superb skills and are looking forward to the development of Chinese men's singles skating talents.

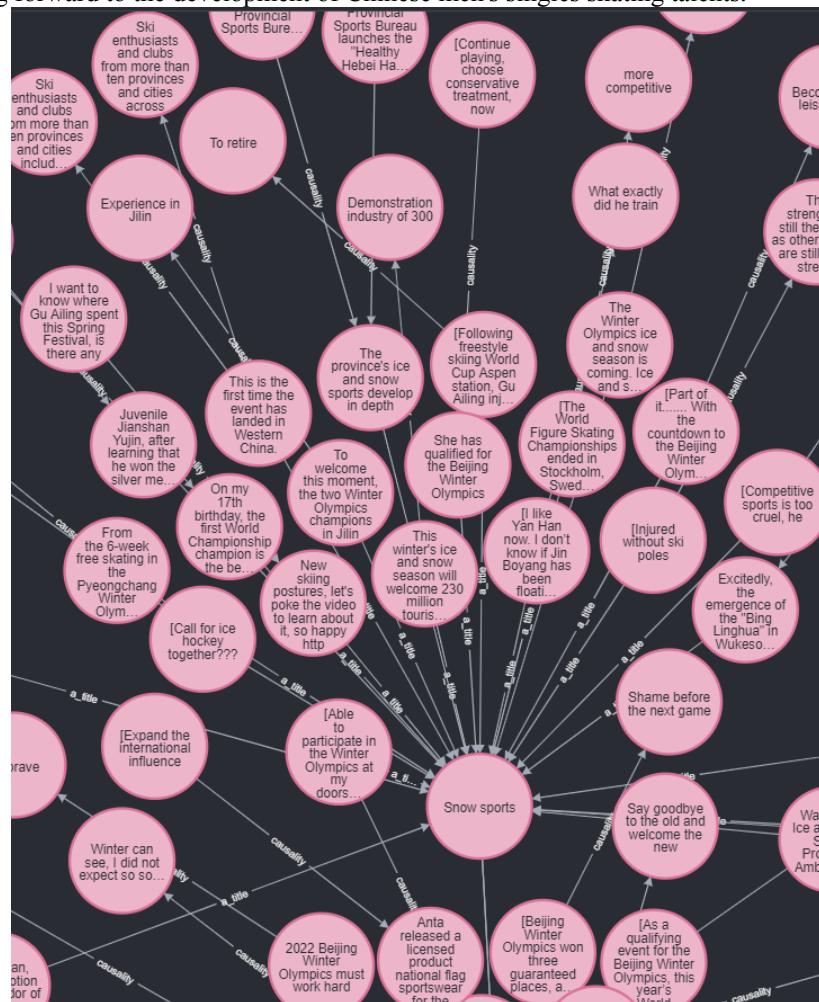


Fig. 7. Partial graph of microblog netizens from January to April.

From the analysis of the results in Figure 8, we can see that during this period of time, due to the World Championships in figure skating, netizens' attention to ice and snow sports increased, and they also focused on the volunteer work of the Winter Olympics. The evolution path from "gathering the advantages of talents and resources in the capital" -> "high-quality development of international volunteer services in the capital" shows that netizens are highly concerned about the volunteer work of Beijing Winter Olympic Games. Secondly, the degree of "sustainable development of the city" is much higher than other nodes around "volunteers", which further reflects the significance of the transformation of winter Olympic volunteers' activities.

News reports that sentiment trend in May was largely equivalent to that of April, followed by an increase in neutral weighting. The researcher believes there are two main domestic and international influences: on the one hand, domestic preparations are steadily underway, providing a basis for the Foreign Ministry to push back against the Western untruths; on the

other hand, more countries share the Chinese position and directly show their support for the Beijing Winter Olympics.

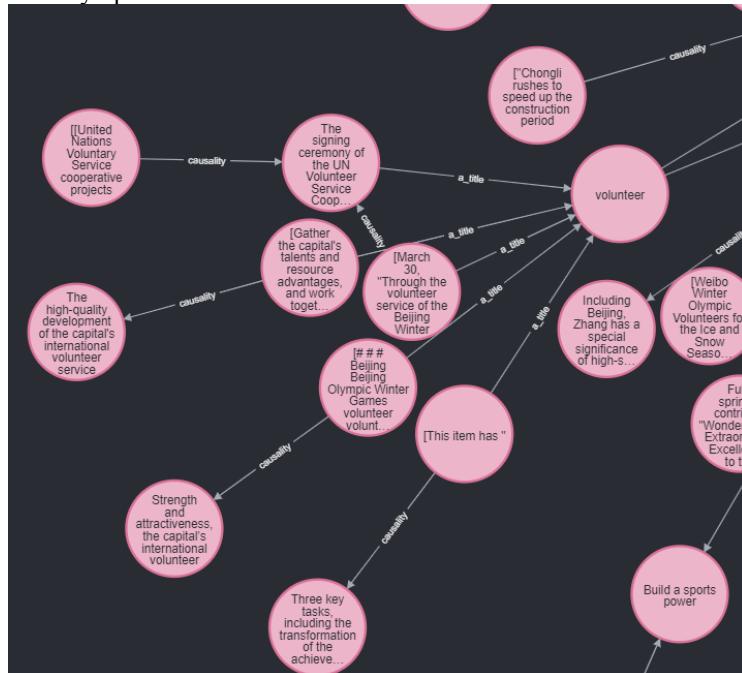


Fig. 8. The discussion graph of Microblog users on the topic of "volunteer".

During this period, preparations for the Winter Olympics were also in full swing: the Olympic Organizing Committee awarded broadcasting rights to Kwai, announced the use of applied intelligent voice translation technology to create a humanistic and barrier-free communication environment, and launched a collection and selection campaign for the mascot story. In order to direct the attention of all people to the Beijing Winter Olympics, the math test paper for the 2021 college entrance exam even features questions that use the Winter Olympics as an example. The domestic departments worked together to promote the preparations for the Winter Olympics, and the series of initiatives were highly praised by IOC President Bach. The Ministry of Foreign Affairs has also taken a strong stance in defense of China's rights in the face of U.S. House Speaker Nancy Patricia D'Alesandro Pelosi's attempt to block the Beijing Winter Olympics.

The positive sentiment of Microblog users started to rise rapidly from April, from 5.77% to 20.44%, and although the proportion in June was lower than that in May, its number increased significantly. From Figure 9, we can see that the Tokyo Olympics was a "turning point" for Internet users. After the Tokyo Olympics, the focus of Internet netizens has changed from "whether Beijing can host the Winter Olympics" to "the form of the Beijing Winter Olympics", from "igniting sports enthusiasm and missing the Beijing Olympics" to "looking forward to the Beijing Winter Olympics", and from one-sided attention to the U.S. moves in the early stage to selective neglect in the late stage.

In the early June netizens showed their concern about Japan's epidemic prevention measures, but the public's attitude changed with the IOC's recognition of China's epidemic prevention measures. The graph shows that some netizens suggested comparing the current situation of epidemic prevention and control in China and Japan, combined with the smooth running of the Tokyo Olympics, thus concluding that the smooth running of the Beijing

Winter Olympics is a certainty, and the overall sentiment of the surrounding nodes is positive. Some of them hope that the atmosphere of the Winter Olympics will not be affected by too strict epidemic prevention and control measures.

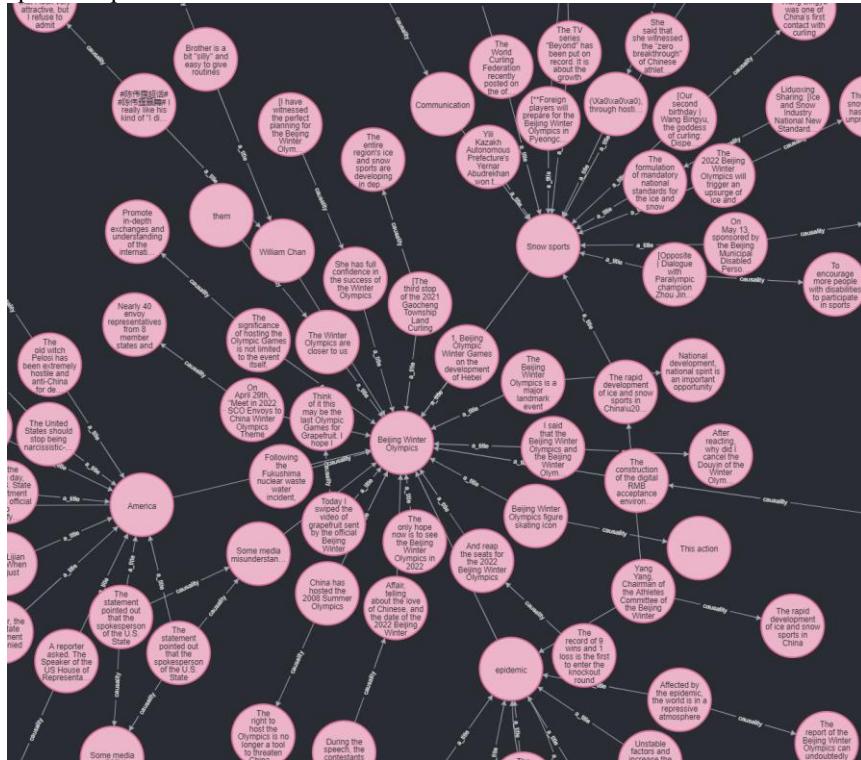


Fig. 9. Overall graph of Microblog netizens from April to July.

The successful opening of the Tokyo Olympic Games triggered numerous discussions among netizens about the Olympic events, the Chinese sports delegation's preventive measures and glorious performance, which is a signal that China has the ability, confidence and determination to run the Beijing Winter Olympic Games to the outside world. Among them, the "Xiao Ruoteng gold medal" incident on July 28 sparked a lot of discussion among netizens, and the topic of "Xiao Ruoteng uncrowned king" reached 830,000 heat degrees in half an hour on Microblog. Many gymnastics champions have questioned the resolution of the judging team and supported Xiao Ruoteng, such as Olympic champion Yang Wei, who proposed "Xiao Ruoteng is the all-around champion of the Eastern Olympics in our mind" to win the support of netizens. The graph shows that "Beijing Olympic Games" and "Beijing Winter Olympic Games" are listed, many netizens think of the unjust Beijing Olympic Games in light of the unfair decision of the judging panel of the Tokyo Olympic Games, and thus have expectations for the Beijing Winter Olympic Games. Although some netizens hope that we can "take revenge" at the Beijing Winter Olympics, a large number of netizens expressed their wish to participate in volunteer activities and contribute their share of effort.

The January-April 2021 period was marked by excessive internet discussion about the U.S. boycott of the Winter Olympics, with the public focusing more on the Tokyo Games and selectively ignoring some Western rhetoric. Right-wing forces on the U.S. side claimed that China was collecting American DNA to develop "super soldiers" and exerting pressure on U.S. corporate sponsors of the Beijing Winter Olympics; Canadian Prime Minister Justin Trudeau suggested that the Beijing Winter Olympics were an opportunity to suppress China; Italian political scientists and Heritage Foundation scholars Italian political scientists and

scholars at the Heritage Foundation have called for increased U.S. pressure on Greece to ban Chinese companies in the country in response to the Greek prime minister's attendance at the Winter Olympics in China. These stories are not discussed much on Microblog, as athletes from all over the world are already preparing for the Beijing Winter Olympics: Elise Christie, the British speed skating champion, is working part-time to raise money for the Winter Olympics; Sjinkie Knegt, the Dutch speed skater, sees the Beijing Winter Olympics as her biggest personal goal at the moment. The Netherlands' Sjinkie Knegt sees the Beijing Winter Olympics as her biggest goal.

5 Discussion

The above analysis shows that although the sentiment trends of news coverage and netizens' sentiment trends of the Beijing Winter Olympics are not consistent in terms of image intuition, it can be found through the graph: the sentiment trends of news coverage and netizens' sentiment trends are correlated as well as lagged. Moreover, the study found that the media coverage played a good role in spreading and guiding. In addition, the positive sentiment of Microblog netizens started to rise from April, which is related to the access to the positive information previously delivered by the media.

By combing through the news reports, the study found that the government's work laid the foundation for the increase of netizens' comments and the stabilization of positive emotions in the later stage. For example, under the guidance of President Xi Jinping, China actively promoted the preparations for the Winter Olympics, and then, in order to get the ice and snow sports out of the "Shanghai Pass", on the one hand, the Olympic Organizing Committee invited celebrities to participate in the promotion of ice and snow sports; on the other hand, Guangxi province and other places held various activities such as youth ice and snow games. A series of initiatives pushed the netizens' attention from whether the epidemic would affect the Winter Olympics to the U.S.'s obstruction of the Winter Olympics, and then to nearly ignore the U.S.'s behavior at a later stage and focus on the training of Chinese ice and snow athletes and the way the Beijing Winter Olympics would be held. The shift in the public's attention cannot be separated from the guidance at the government level. The Tokyo Winter Olympics was also a turning point in the change of public sentiment because the public compared the results of the fight against the epidemic in China and Japan. Of course, we also need to see the government's calm attitude and strong initiatives to deal with complex international relations. Data show that China has reached consensus with many countries, including Germany, New Zealand, South Korea and Russia, on participation in the Beijing Winter Olympics and international cooperation on vaccines.

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international relations. Data show that China has reached consensus with many countries, including Germany, New Zealand, South Korea and Russia, on participation in the Beijing Winter Olympics and international cooperation on vaccines.

In summary, the public is only concerned about the surface information, and the government and the public have different concerns and intention points in considering the issue, which leads to the fact that the trend of netizens' emotions and the media reports are not consistent in time. The government and media should explore a more effective information dissemination channel to actively promote the public to voluntarily and consciously understand international current affairs information, and the media should also innovate the form of content expression and dissemination, and use popularized and interesting forms to produce and disseminate information.

6 Summary

After analyzing the application scenarios of event evolutionary graph, this paper proposes to evaluate the communication effect of news by combining sentiment analysis and event evolutionary graph. The researcher believes that the application of event evolutionary graph can help analyze the deep logic of the evolution of things, help the government and the media understand the essential reasons for the decline of people's positive emotions, and provide implications for the media's news reporting format to promote the spread of positive emotions and create a healthy public opinion environment.

In the future research, the following three areas can be continued and improved.

First, the sources of the data set are expanded. In this paper, we mainly use Microblog netizen comments as the analysis, and will introduce the current new media platforms where young people gather, such as "TikTok" and "bilibili" in the future.

Second, refine the emotion labeling. The sentiment labeling in this paper only has three major categories: positive, negative and neutral, and the proportion of neutral sentiment among Internet netizens is too high due to coarse differentiation particles, and new methods can be introduced to refine the sentiment in the future.

Third, the event evolutionary graph in this study does not represent the distribution of emotions on the connecting lines of the nodes; in the future, different color lines can be used to represent different feelings and use different degree of color depths to show the degree of emotions.

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