Research on Users’ Emotion in the Later Period of the Inversion of public opinion--Taking the case of Wang Fengya as an example

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Abstract. Online public opinion reversal events occur frequently. The emotional characteristics and reasons of users in the later period of online public opinion reversal events are still not clear. Therefore, it is necessary to analyze the user emotions in the later period of the online public opinion reversal event, so as to help strengthen the supervision of public opinions and avoid the negative impact on the society in the process of public opinion reversal as far as possible. In this paper, Wang Fengya's public opinion reversal event was taken as an example. Python crawler was used to capture the user comment data of the later period of this network public opinion reversal event. Combined with BosonNLP emotion dictionary, HowNet emotion dictionary and the characteristics of data capture, a custom emotion dictionary was constructed to realize the emotion analysis based on the custom emotion dictionary. In the later period of the reversal of public opinion on the Internet, user emotion has the characteristics of scattered user group structure, extreme and irrational emotion, and a high proportion of negative emotional comments. This is related to China's economic development, the composition of Weibo network users and the diversity of media communication means.

1. Introduction
According to the "2018 Weibo user development report", by the end of 2018, the daily active users have increased to 200 million[1]. Weibo users are enthusiastic about interaction, and Weibo gathers a large number of real-time topic messages. Weibo becomes a network public opinion platform with strong influence. However, Weibo public opinions are complex and changeable, and rumors are rampant. Some emergencies may cause public opinions reversal. In the event of public opinion reversal, the positive and negative tendencies of users' emotions are obviously distinguished.

Wang Fengya event is a typical public opinion reversal event. At the beginning, "writer Chen LAN" and "little tree of hope" posted a microblog, questioning Yang Meiqin's fraudulent donation and abuse of Wang Fengya to her death. The Taikang County Public Security Bureau investigated and issued a statement that she had not died and most of the money was used for her treatment. After Wang Fengya's death, the "Youcao" published the death of a child Wang Fengya, which questioned the abuse of Wang Fengya and unfair treatment between boy and girl and was forwarded by a large number of media. The discussion volume of online public opinion surged. The public opinion is one-sided to Wang Fengya family fulminates and reviles. Then, media found Wang Fengya’s brother get the help of the Yan Ran foundation relief and reviles then, media found Wang Fengya’s brother get the help of the Yan Ran foundation relief for cleft lip surgery, and most of the donations are indeed used for the treatment of Wang Fengya, and no evidence showed Wang Fengya was abused. After that, most users apologized for previous inappropriate words. Media and users in the center of public opinion apologized and deleted the inappropriate microblogs. Finally, the incident gradually subsided.
Therefore, taking Wang Fengya public opinion reversal event as an example, this paper takes the Weibo user comment data at the later period of event as the basis to conduct an emotional analysis of the Weibo user's comments, identify the user's emotional tendency, and complete a custom emotion dictionary. According to the results of sentiment analysis, the user sentiment chart analysis is carried out to summarize the social reasons behind the user's emotional characteristics in the later period of the reversal of the public opinion. It provides support for further user microblog sentiment analysis, which is helpful to propose practical and feasible network public opinion countermeasures. The method provides assistance to promote the supervision and management of public opinion.

2. Research status at home and abroad

2.1 Emotional analysis

Emotional analysis involves knowledge in many fields, such as psychology, management, data mining, etc. Its application fields include opinion mining, personalized recommendation and public opinion monitoring. The Review Seer developed by K.Dave is the world's first emotion analysis tool. The Pulse system developed by M.Gamon et al. can automatically mine the online users' opinions on the evaluation of the automobile [2]. At present, the emotion analysis technology is machine learning and emotion dictionary, and emotion dictionary method is widely used in information prediction, product evaluation and public opinion. Many literatures use ROSTCM6 and ICTCLAS analysis system. ROSTCM6 is a humanistic research platform constructed by professor Shen Yang, Wuhan university, etc. It can support word segmentation, emotion analysis and other analysis methods. ICTCLAS word segmentation system is a Chinese lexical analysis system developed by Dr. Zhang Huaping of the Chinese academy of sciences. Its functions include Chinese and English word segmentation, keyword extraction and microblog analysis. Among them, tourist satisfaction based on ROSTCM method -- taking five domestic terraced field scenic spots as examples[3] and the impact of media communication on the doctor-patient relationship[4] use ROSTCM6; evaluation methods of APP user experience combined with ICTCLAS[5] and the English translation of Xu Yuanchong's tang poems from the perspective of conceptual integration theory -- a case study based on ICTCLAS2013[6] use ICTCLAS. However, due to the complex text content of microblog users and the frequent use and rapid change of network terms, the ROSTCM6 and ICTCLAS analysis system cannot effectively identify the emotions of microblog users. Therefore, a custom emotion dictionary will be adopted to analyze the emotions of users, so as to analyze the emotions of users more accurately and effectively.

2.2 Public opinion reversal

The reversal of public opinion often spread with the help of certain media carriers, which is a phenomenon of polarization of comments in the process before after certain events are exposed. In terms of public opinion reversal, there are a large number of relevant foreign research literatures with more abundant contents. In 1996, Marshall Van Alstyne and Erik Brynjolfsson put forward the balkanization theory of network[7] and Cass Sunstein of Harvard University put forward the information cocoon house theory[8], which enriched the theoretical system of public opinion reversal. Now most foreign studies are devoted to the construction of public opinion reversal recognition model. Domestic relevant research literature quantity is few and the content mostly concentrates on the theory research. According to the statistical data of "public opinion reversal" in Cnki academic trend, related research articles started in 2014 and reached a peak in 2018, showing an overall rising trend. The article with a high number of citations on the Internet is The Causes and Regulations of "Resurgence of Resurgence" News[9] and Analysis of the development trend and causes of online public opinion in the news reversal drama" - Taking the case of "Chengdu female driver being beaten" as an example[10], which focus on the cause of reversal and the countermeasures. At the same time, a few researchers use big data to conduct systematic cluster analysis for public opinion inversion. The research on modeling based on user emotion and behavior characteristics is not perfect.
3. Emotion analysis method based on custom dictionary

3.1 Data collection
In the later period of the reversal of online public opinion, many users would comment and would not delete it. Therefore, it is possible to capture the comment data of representative Weibo users and analyze their emotions. In the later period of Wang Fengya event, the Beijing news’s microblog, doctor Dingxiang’s microblog and China youth daily’s microblog of all made a comprehensive combing of the incident, with high number of netizens' thumb up, comments and retweets. There were as many as 20,000 comments on doctor Dingxiang's microblog on May 28, 2018. Therefore, the microblog was used as the capture object to capture the user comment data. The data of 880 Weibo comments were successfully captured, including the user ID number, gender, nickname, comment time, comment content and the data information of the location. User comments will run from May 31, 2018 to December 26, 2018.

3.2 Set up a custom sentiment dictionary
Custom affective lexicon includes custom affective words lexicon, negative lexicon, degree lexicon and stop lexicon. Custom affective word dictionary includes positive and negative affective words and their affective values. BosonNLP emotion dictionary, HowNet emotion dictionary combines with data text features to build a custom emotion word dictionary by adding, deleting and reconstructing emotion words. Because adding new emotion words is conducive to accurate recognition of user comment data, it is more important. The process of adding affective words is as follows: Conduct word frequency statistics; Extract all emotion words in the high-frequency word list; Combine the data’s characteristics. Search those words in the custom dictionary; Add "keyboard man", "Internet violence", "moral kidnapping" and other 14 words. Based on the HowNet, this paper extracts 30 negation words to form the negation vocabulary. Forty degree words were extracted from the HowNet degree words, and the weight was assigned. Stop word list uses HowNet stop word list.

3.3 Design ideas
After data cleaning, 71 comment data were deleted. The custom emotion dictionary is built with Python. The jieba participle is used for word segmentation. The steps are as follows: Use the jieba participle, read the stop word list, then delete the stop word; Turn the list into a dictionary, with “key” as the word and “value” as the position where the word appears in the document; Classify the word segmentation results and find out the emotional words, negative words and degree adverbs in the text; Set the initial weight “W” is 1, from the first beginning, emotional words use weights “W” as the emotional value, emotional words recorded in “score”, find degree adverbs and negative words between two emotion words. If there are negative words, the emotional value is reversed. If there is a degree adverb, W times the value of the degree adverb. W traverses all emotion words, and the total score of each traversal is the emotional score of the user's comment. Score (I) is the emotional score of the first comment. u is the number of negative words between two emotional words. d is the weight of words between two emotional words, and word(j) is the emotional value of the JTH emotional word:

\[
\text{score}(i) = \sum_u (-1)^u * d * \text{word}(j)
\]

Finally, using custom emotion dictionary, the emotion value of each user comment is output in turn.

4. Emotional analysis and conclusion

4.1 Analysis of user emotion value
In the later period of the online public opinion reversal event, more than half of the users attacked the fabricated and misleading media and apologized for the previous wrong behavior. A few users speak objectively and seldom use positive and negative emotion words in comments. About a third of users had positive emotions. A small number of users believe that Wang Fengya was abused. Since the output result of the custom emotion dictionary is 12 decimal places, the non-zero emotion value is
rarely same. The emotion value cannot be directly displayed. Therefore, add data bucket into Tableau, set the data interval as 1.45, and divide all data into 32 groups, ranging from -26.10 to 18.85, as shown in figure 1.

![Figure 1. Emotional distribution map](image1.png)

There are 26 neutral users and more Negative users. The emotional intensity is mostly in the primary and intermediate level, with few high intensity values. As figure 2 shown, the mixed distribution of positive emotion value user comments and negative emotion value user comments in the later period of public opinion reversal shows that users' emotions are no longer one-sided.

4.2 User group structure analysis
In the captured comment data, users come from 34 provinces of China and 8 overseas countries, and the number of comments from each region is not same. Wang Fengya incident has almost aroused the attention of users nationwide. However, the discussion degree of users varies from place to place. The number of comments in the southeast coast is generally more than ten, and the discussion degree in Beijing, Jiangsu, Henan and Fujian is relatively high. Henan had the highest number of comments, at 182.

4.3 Emotional polarity analysis of users

![Figure 3. User sentiment values change over time.](image2.png)

In the later period of Wang Fengya's online public opinion reversal, the emotional value of user changes with time, as shown in figure 3. At first, the number of positive emotions commented by users was less than negative ones. Then, the numbers of positive and negative emotions were roughly equal. Finally, the amount of discussion and public opinion on the event was reduced and it was forgotten by public opinion. Weibo users had the largest number of comments on May 31, 2018, with significant difference in users' emotional value. However, from August 23, the number of the latest comments reduced. In order to further study the characteristics, 150 user comments were randomly selected from 809 user data and 35 user comments without obvious direction were excluded. The number of media, Wang Fengya's family, volunteers and other users is 10, 51, 8 and 55. Most user comments were aimed at other users and the family, and the number of the former was higher. In the comments on other users, in addition to personal attacks on other users and accusations that other users do not know about the event, they are discussions between different views of users, including whether the state welfare
institutions are responsible; whether the daughter provides for the aged; whether the countryside is one of the causes; whether the donation or not decides the right to judge the event. As shown in figure 4, 26 are personal attacks, 6 accuse other users of not knowing about the event, and 37 are related to opinions. The number of topic discussion and personal attack is the highest, and most users' personal attack on other users is accompanied when they express their views on the topic.

![Figure 4. User comment content composition chart for other users.](image-url)

4.4 Emotional characteristics of users and the social reasons behind them

In the later period of online public opinion reversal event, user emotion presents the characteristics of loose group structure, extreme and irrational emotion, and high proportion of negative emotion users. Users scattered throughout the country. User emotion distinction is obvious and its content is irrational. Negative comments account for a high proportion. It is mainly caused by the state of China's economic development, the composition of microblog network users and the diversity of media communication means. Users with different economic conditions and regional backgrounds have different perspectives on the same event. Weibo users are mainly between 18 and 30 years old, with differences in education and comprehensive quality. No matter it is media or ordinary user, they can publish articles and comments, which lead to the information explosion. Users with different views often take the evidence favorable to their own side to speak, which may leads to generating network public opinion or network public opinion reversal events.

5. Summary

In this paper, Wang Fengya's public opinion reversal event was taken as an example. 880 Weibo comments captured by Python crawler were used as the data set to build a custom emotion dictionary. The user data was analyzed for user sentiment in the later period of online public opinion reversal. The results show the emotional state of users in the later period of online public opinion reversal is characterized by loose group structure, extreme emotion, irrational emotion and high proportion of negative comments, which is mainly related to the state of China's economic development, the composition of Weibo users and the diversified means of media communication. It supports further research on the emotional analysis, which is helpful to analyze the behaviors of users' microblog comments. However, due to the complex structure of Chinese sentences and the fast update of network words, this paper also has some limitations. In future research, machine learning algorithm should be used to collect data of multiple online public opinion inversion cases, build corresponding corpus, and conduct multiple trainings to achieve the optimal user sentiment analysis results.

Acknowledgements

This research was funded by the Scientific Research Foundation of Beijing Municipal Education Commission (KM201810028021).

Reference

[1] Sina Weibo data center, 2019, 2018 twitter users development report, http://data.Weibo.com/report/reportDetail?Id = 433.
[2] Shi, W. (2017) Big data mining of Chinese microblog posts -- perspective of emotion analysis. China social science press, Beijing.
[3] Xu, Y., You, X., Wang, Y. (2018) A study on the evaluation of tourist satisfaction based on
ROSTCM method -- taking five domestic terrace scenic spots as examples. Tourism BBS, 11(05):22-34.

[4] Yang, X. (2012) Research on the influence of media communication on doctor-patient relationship. Shanghai Jiao Tong University.

[5] Han X. (2017) Research on APP user experience evaluation method combined with ICTCLAS method. Tianjin university.

[6] Zhang, Q. (2015) English translation of Xu Yuanchong's tang poems from the perspective of conceptual integration theory -- a case study based on ICTCLAS2013. Reading and writing, 12(03):24-25+4.

[7] Marshall Vine, Eric Brynjolfsson. (1996) Could the Internet balkanize science, science, 274 (5292) : 1479-1480

[8] Cass, S. (2003) The republic of the Internet: democracy in the Internet society, Shanghai people's publishing house, Shanghai.

[9] Huang, H. (2015) Causes and regulations of "public opinion reversal" news. Young journalist, 2015(09):22-23.

[10] Tan, H., Zhao, X. (2015) An analysis of the development trend and causes of online public opinions in the news reversal drama -- a case study of "Chengdu female driver was beaten". Journal of news communication, 15(15):25-27.