

Analysis of the 7.20 Zhengzhou Rainstorm Based on Bilibili Video Data

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How to cite this paper: Cui, X. Y. (2023). Analysis of the 7.20 Zhengzhou Rainstorm Based on Bilibili Video Data. *Open Journal of Social Sciences*, 11, 397-403. <https://doi.org/10.4236/jss.2023.115025>

Received: March 28, 2023

Accepted: May 27, 2023

Published: May 30, 2023

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Abstract

The 7.20 Zhengzhou rainstorm was a serious rainstorm disaster event that caused severe flooding and significant damage to infrastructure, homes, and vehicles, and issues such as the event itself and the emergency response of related departments have triggered continuous and extensive discussions. In this study, we collected live videos from the incident period of Bilibili, and analyzed the video data using text analysis and social network analysis to explore the reflections, concerns and needs of people in the situation of major natural disasters. In recent years, various natural disasters have occurred frequently, and recreating the scenes and analyzing people's demands from the perspective of self-media is of practical significance to remind people of the lessons learned and improve urban planning strategies.

Keywords

Bilibili Video, Zhengzhou Rainstorm, Event Analysis

1. Introduction

According to official reports, from July 17th to July 23rd, 2021, Henan Province experienced an extremely rare and severe rainstorm that resulted in serious flooding and disasters, especially on July 20th, when Zhengzhou City suffered significant human casualties and property losses. The disaster affected a total of 150 counties (cities, districts) in Henan Province, with 14.786 million people affected. The disaster caused 398 deaths or missing persons, including 380 in Zhengzhou City, accounting for 95.5% of the entire province. The direct economic losses amounted to 120.06 billion yuan (approximately 18.6 billion US dollars as the exchange rate in July, 2021), of which 40.9 billion yuan was in Zhengzhou City, accounting for 34.1% of the entire province (Yu, 2022). Shortcomings such as poorly organized prevention and improper emergency response

deserve deep reflection. A large number of scholars have reflected on this, searching the China National Knowledge Infrastructure and using the search formula $TKA = (\text{"urban governance"} + \text{"social governance"} + \text{"emergency management"} + \text{smart city} + \text{"resilient city"} + \text{"early warning"} + \text{"emotional communication"})$ was conducted, and a total of 2765 papers related papers were found, which shows that a large number of scholars have analyzed the event. However, the scholars' reflections basically analyze the event from the restoration of the event in the news reports as the data base, and have not yet seen the analysis from the people's reaction at the scene when the event occurred. In contrast, the video of the disaster scene on Bilibili, which was uploaded by the people spontaneously, objectively reflects the real scene and needs at that time, and if from this perspective, different findings may be obtained. This paper is based on such an idea of collecting data from Bilibili and analyzing the videos of the event, in order to get some new discoveries.

2. Data Acquisition

2.1. Data Collection and Research Methods

In this study, Bilibili was selected as the data sample for several reasons.

1) Bilibili has a large and active user community in China. In the fourth quarter of 2022, Bilibili's daily active users reached 92.8 million, and the monthly active users increased to 326 million (Financial Report Assistant, 2023). This means that the videos uploaded to the platform are likely to be reflective of the perspectives and experiences of a significant segment of the population affected by the Zhengzhou rainstorm.

2) Bilibili is known for its rich and diverse intellectual content, which includes not only entertainment but also educational and informative videos. This suggests that the videos uploaded to the platform may contain a wealth of information and insights that could be valuable in analyzing the crux of the disaster.

3) Bilibili has attracted numerous official accounts of large newspapers and news media, such as Xinhua News Agency. This suggests that Bilibili is seen as a reputable and trustworthy platform by many official sources, which could enhance the credibility of the data collected.

Overall, Bilibili's large and active user community, diverse intellectual content, and reputation for reliability make it an ideal data source for analyzing the crux of the Zhengzhou rainstorm.

Octopus Data Collector was used for data collection, establishing the collection process, cyclically extracting data, then editing fields, and starting the collection to automatically generate an Excel data file, and a total of 340 data were collected from July 20 to August 20, 2021 by this method.

2.2. Research Methodology

In this study, textual analysis and social network analysis were mainly used to analyze the data. Textual Analysis is the representation of text and the selection

of its feature terms; textual analysis is a fundamental problem in text mining and information retrieval, which quantifies feature words extracted from text to represent textual information (Jiang, 2023). In this study, text analysis was used to analyze the title text in the collected videos as a way to discover what people were concerned about before the major floods. The Social Network Analysis (SNA) method, also known as Structural Analysis, is used to analyze the relational structure of social networks and their attributes. The significance of SNA is that it can provide a precise quantitative analysis of relationships, which can provide a quantitative tool for the construction of certain middle-level theories and the testing of empirical propositions, and can even build a bridge between “macro and micro” (Gao & Yang, 2017). In this study, we use social network analysis to analyze the co-textual content of the split video and finally, to identify the content of people’s live expressions.

3. Data Analysis

3.1. Descriptive Statistical Analysis of Video Samples

In this study, we collected live videos from Bilibili during the incident period of the 7.20 Zhengzhou rainstorm. To ensure the reliability and representativeness of the data, we established specific criteria for selecting videos. Firstly, we only included videos that were geotagged in Zhengzhou to ensure that they were filmed at the scene of the disaster. Second, we excluded videos with low video quality or those that contained irrelevant or inappropriate content. By following these criteria, the data of 340 videos that met the standards for our analysis of 720 Zhengzhou rainstorm posted on Bilibili were collected, and the collection included total views, bullet comments, coins, likes and shares in a total of five fields. The number of views represents the exposure and attention of the video or event, but does not reflect the recognition of users. In contrast, the interactive indicators of likes, comments, shares and coins are more realistic and have richer connotations. For example, likes represent users’ affirmation and support for video content, coins represent users’ incentive for video makers to continue creating relevant content, bullet comments represent the discussion heat of events, and shares represent users’ desire for video content to be spread. For this purpose, the number of views, bullet comments, coins given by users and likes are selected for statistical analysis of the collected videos.

As can be seen from **Table 1**, the number of three indicators, total number of bullet comments, coins and shares, is relatively low. Videos with strong

Table 1. Number of various types of evaluations of Bilibili videos of the 720 Zhengzhou rainstorm incident.

| Indicators | Number of views | Number of bullet comments | Number of coins given by users | Number of Likes | Number of shares |
|---------------|-----------------|---------------------------|--------------------------------|-----------------|------------------|
| Total volume | 4867.39 million | 117,700 | 542,600 | 284.19 million | 156,500 |
| Average value | 143,600 | 0.03 million | 0.16 million | 0.84 million | 0.05 million |

entertainment and interaction are more likely to get the number of bullet comments and coins, and videos with skills and opinions are more likely to get more shares; therefore, the number of these three indicators for disaster videos is less, which is more in line with the law of self-media.

The total number of views and the number of likes are the important indicators in this case. The distribution of these two indicators is further analyzed.

After sorting the videos by their play volume from high to low, we found that the the number of views of the top 63 videos accounted for 80% of the total play volume, i.e. 16% of the videos contributed 80% of the play volume; similarly, after sorting the videos by the number of likes from high to low, we found that the number of likes of the top 34 videos accounted for 80% of the total likes, i.e. 10% of the videos contributed 80% of the likes. This shows that, firstly, both the number of views and the number of likes follow the two-eight law, that is, a large number of plays and likes come from a small number of videos; secondly, the number of likes has a higher concentration than the number of views.

Comparing the titles of the top 63 videos in terms of views and the top 33 videos in terms of likes, we find that 30 of the top 33 videos in terms of likes are also among the top 63 videos in terms of views. This means that the number of likes is a more reflective indicator of the popularity of the videos.

Further comparison of the content of the 30 videos selected for both important indicators includes the following types: 1) videos with vivid descriptions of scenes, such as “A picture tells you how heavy the rain is in Zhengzhou!” 2) instructional videos, such as “Zhengzhou rainstorm relief donation anti-fraud guide” 3) videos that inspire courage to fight against disasters, such as “the children playing instruments at Zhengzhou East Station during the rainstorm!” 4) shocking factual videos of “the Zhengzhou rainstorm, with a 3-hour hike along the way”.

3.2. Video Content Analysis

1) Text analysis

Text analysis and social network analysis were used to analyze the content of 340 videos related to the Zhengzhou rainstorm. Firstly, we imported the titles of the video data using Collective Search, and performed data cleaning—removing basic or irrelevant information such as “Henan”, “Zhengzhou”, “put away “ and other basic or irrelevant information was removed to highlight the focus of the visualization and avoid interference. Next, the words were screened, and words with videos greater than 3 were selected to draw a high-frequency word cloud map (as shown in **Figure 1**). By means of the word cloud, all the video text data are transformed into a collection of words, thus simply showing the frequency and relative importance of the words appearing in the text data.

Figure 1 clearly shows that the words “subway,” “citizens,” “hours,” “waterlogged,” The words “refueling” and “rescue” are repeatedly mentioned by people. It can be inferred from this that a) the severity of the accident and the cause of

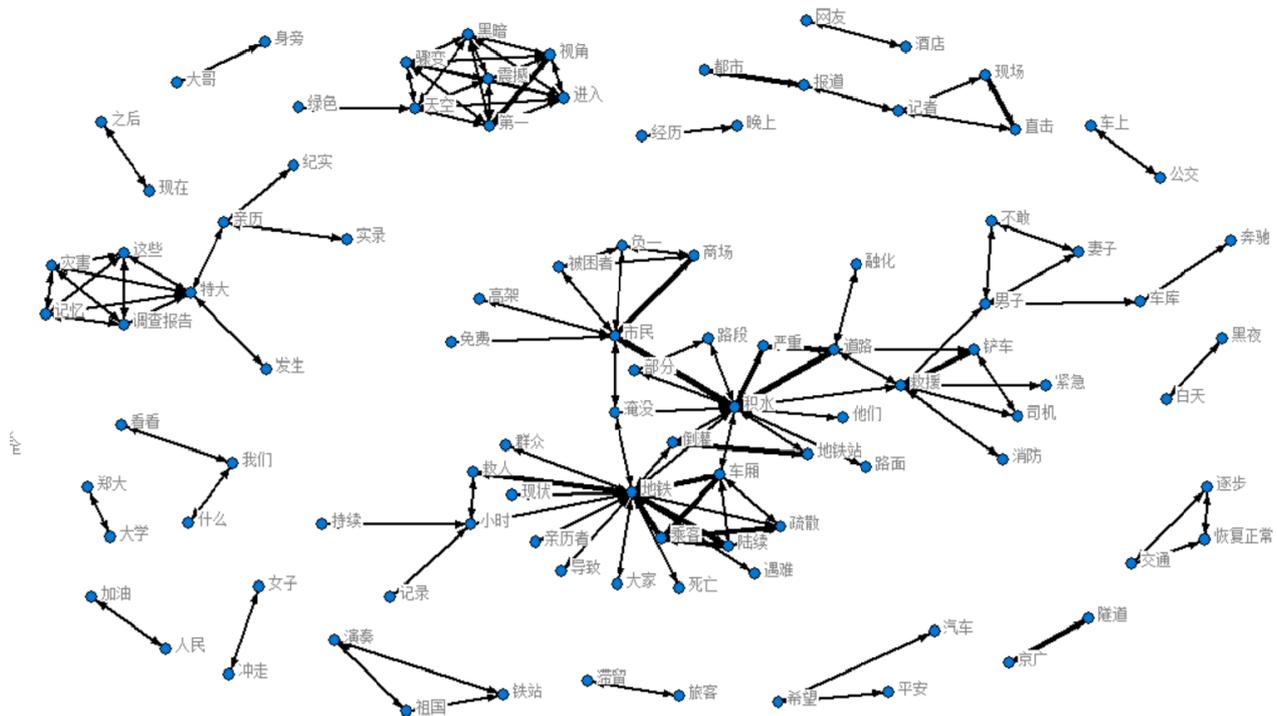


Figure 2. High-frequency word co-word relationship network of 720 event b-site video titles.

traffic situation and reflecting the seriousness of traffic disruptions in natural disasters; The words “mega” and “sudden change” describe the unusual nature of the rainstorm and the sensation it caused.

Through textual analysis and social network analysis, the following contents were found to be of great interest: the No. 5 subway incident, the travel of citizens and the rescue and storm conditions, etc. These contents reflect the public’s concern about the consequences of the rainstorm and the current situation of the local area, and also show the society’s concern and attitude towards the disaster. These data help us to better understand the community’s concern about the rainstorm event and its evaluation of the relief measures provided by the local government and social organizations.

4. Conclusion

The results of this study from the analysis of live videos from Bilibili videos found that:

- 1) Social media platforms have a positive effect on natural disaster communication, which can help deliver positive energy and rescue information, as well as trigger public attention and participation.
- 2) After a natural disaster, people have great controversy and reflection on the seriousness of the accident and the causes caused. Discussions and comments on social media platforms can reflect the public’s attitude and emotion toward natural disasters.
- 3) Natural disasters can have a generally bad impact on citizens’ lives and tra-

vel, so more attention needs to be paid to disaster prevention and mitigation and to improving the ability to cope with natural disasters. This is a different conclusion compared with other scholars.

Through our analysis, we believe that major disasters require attention to the following points:

1) Timely and accurate media coverage is crucial to disaster response. The government and the media need to strengthen cooperation to release disaster information and rescue progress in a timely manner, and to deliver accurate and timely information to the public so that people can better cope with disasters.

2) In major disasters, the transmission of positive energy is crucial to the psychological health of disaster victims and social stability. The government and all parties in society need to strengthen propaganda to guide people to be positive and brave in facing disasters, as well as to strengthen psychological guidance and help for disaster victims.

3) The improvement of individual disaster prevention awareness and self-protection ability is also crucial. When a disaster occurs, the level of personal disaster prevention awareness and self-protection ability will directly affect the life safety of individuals in a disaster. Therefore, the government and all parties in society need to strengthen the publicity and training of disaster response, improve people's awareness of disaster prevention and self-protection ability, and reduce the damage and loss caused by disasters to individuals.

Conflicts of Interest

The author declares no conflicts of interest regarding the publication of this paper.

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