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Rethinking Digital Humanitarianism in Data-driven Reports—Disaster Coverages of Typhoon Incidents as an Example

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Abstract: China is one of the countries most severely affected by natural disasters in the world, with a wide variety of disasters and a broad distribution across regions. The "Top 10 Natural Disasters of 2023" report revealed that Typhoon Du Suri, the fifth typhoon of 2023, caused significant damage in China, making typhoons a hot topic every summer. Through factual investigation and representation, this study examines information reporting on hurricane events published by various news media. The study aims to sum up the detailing qualities of data-driven journalism in disaster reporting. Based on this, the study explores social responsibility and humanitarianism, and offers targeted suggestions, providing references for the construction of data journalism in future disaster reporting.

1. Literature Review

1.1 Data Journalism: A New Model of Journalism in the New Era

The advent of advanced technologies such as cloud computing and the data science has enabled everything to be recorded in the form of data, signaling the arrival of the big data era. Big data's application scenarios are increasingly penetrating the news industry. Data journalism is an effective integration of the news industry and big data, referring to the discovery of news leads from vast amounts of data through techniques such as data capture, mining, statistical analysis, and the presentation of news stories through visualization technologies [8].

Tracing the development of data journalism, the practice in Western media can be dated back to the 19th century[2].China, however, started to employ precision journalism in the 20th century, a concept proposed by American scholar Philip Meyer in the 1960s, advocating for data-driven journalism. This indicates that the start of data journalism in China was relatively late. It was not until the early 21st century, with the rise of the internet and the rapid development of information technology, that data journalism began to develop significantly in China.

Data journalism, as a new form of journalism supported by the era's backdrop, has made significant breakthroughs in concepts of news production, the process of news creation, and the expression of news. It marks an important milestone in the evolution of news reporting [1].

Regarding the content of data journalism, research by Chinese scholars on data journalism visualization can be summarized into four aspects: First, the theory of communication and

development of data journalism visualization. Second, ethical research on the content and data sources of data journalism visualization. Third, studies on the practices of data journalism visualization both domestically and internationally. Fourth, research on the application of data journalism visualization in various scenarios.

In terms of presentation, data journalism primarily manifests in three forms: data visualization, infographic news, and data maps. Data maps, often set against the backdrop of electronic maps integrating various pieces of information, are frequently used in disaster reporting [4].

1.2 Visualizing Disasters: The Application of Data Journalism in Disaster Reporting

Disaster reporting primarily covers four types of sudden events: natural disasters, accident disasters, public health incidents, and social security events, all of which hold extremely high news value. The diversity and uniqueness of disaster scenarios mean that employing data journalism can enhance persuasiveness. Disaster reporting requires the rapid dissemination of information on casualties, property damage, causes of the disaster, relief and rescue efforts, and the post-disaster situation in the affected areas[3].Data journalism, with its multi-layered, comprehensive, and three-dimensional big data information, offers advantages in disaster reporting [9].

China's disaster news in terms of data application started late, with major achievements concentrated after 2016. Caixin's disaster report "The 2016 Floods" won a nomination for the 2017 Data Journalism Award, marking the formal beginning of the chapter on disaster reporting data visualization. Since the outbreak of the COVID-19 pandemic in 2020, academic interest in disaster report data journalism has reached unprecedented levels.

In recent years, most research on data journalism visualization has focused on big data technology and data journalism media. There has been less research on the application of data journalism in specific types of news reporting. However, with the outbreak of the COVID-19 pandemic and rising global temperatures, there is increasing concern over natural disasters and personal health, leading to more related publicity and reporting by various news media. The "Top 10 Natural Disasters of 2023" report highlighted Typhoon Du Suri, the fifth typhoon of 2023, which caused significant damage in China. This study takes typhoons as an example of natural disasters to explore the current status of the integration and application of disaster reporting and data journalism. By statistically analyzing and visually analyzing the data journalism related to typhoon events published by various news media, this study discusses the social service function and humanitarian care of data journalism in disaster reporting [10].

1.3 Digital Humanitarianism in Disaster Reporting Through Data Visualization

Digital humanitarianism is a frequently discussed topic in the digital age. It refers to the emphasis on human emotions through digital means, which has many applications in disaster reporting. However, there are also some issues. The application of data in disaster reporting remains at a superficial listing stage, where many media outlets focus more on the form of reporting and the presentation of news content, neglecting the in-depth cultivation and meticulous work on the content to uncover the truth behind the data [5]. Therefore, this article interprets data journalism in disaster reporting, exploring the value of its social service function and humanitarian care. This also represents a powerful way to meet audience needs and break through communication difficulties in the future. Through literature analysis, it has been found that data journalism research mainly focuses on communication strategy studies and case analysis, but there is still a gap in research on the social service function and humanitarian care of data journalism. Therefore, we refer RQ1： How humanitarianism is presented in the visualization reports of typhoon themes.

2. Research Methods

This paper addresses RQ1 by utilizing a combination of research methods—descriptive statistics, content analysis, and case studies—to analyze 17 reports gathered from authoritative media data journalism columns, WeChat public accounts, Xiaohongshu, Weibo, and other new media platforms from 2019 to 2023, as summarized in Table 1.

Table 1: Typhoon-Related Data Journalism Statistics Table, 2019-2023

Number	Medium	Time	Headline
1	The Beijing News	August 2019	"Between the Coming and Going of Typhoons: Where is the Most Disaster-Affected Area in China?"
2	The Paper's American Digital Course	July 2023	"Is Another Super Typhoon Coming? Which Areas Were Most Affected in the Past 74 Years?"
3	China Meteorological Administration	September 2023	" yphoons Clustering Together? Up to Six Typhoons Appearing Simultaneously!"
4	Tencent	August 2021	"'Lupit' is About to Make Landfall! Will August be a 'High-Yield' Month for Typhoons?"
5	Xinhua Net	July 2023	" Counting Those Typhoons Directly Heading to Fujian and Guangdong"
6	Tencent	July 2023	"Reviewing the Typhoons That Have Made Landfall in Fujian Over the Past 62 Years"
7	Tongren Meteorology	August 2020	"Data Journalism: 'Bavi' to Become the Strongest Typhoon to Land in the Northeast Ever?"
8	Data Hotpot	May 2022	" Disaster Data Journalism: Who Died in Hurricane Maria"
9	New Media Culture Xiaosheng	June 2021	"Data Journalism/Typhoon Knowledge"
10	China Meteorological Administration	September 2023	"Data Journalism | Does Typhoon 'Prefer' Guangdong? What Typhoons Are Similar to 'Soudelor'?"
11	China Meteorological Administration	August 2023	"Data Journalism | 'Kanu' Comes to the Northeast! How Much Do You Know About 'Northward' Typhoons?"
12	China Meteorological Administration	September 2023	"Data Journalism | The Demonic Path of Typhoon 'Soudelor' – A Big Check on Similar Typhoons"
13	The Wonderful Museum of Young Youth	June 2023	"Data Journalism | 'Mangkhut' is Not Just Any Fruit – Reviewing Typhoon Landfalls in China Over the Past Five Years"
14	Status Two	June 2023	"Decoding Typhoon Disasters: Who Has the Big Data, Who Can Gain the Initiative?"
15	Xuzhou Meteorology	August 2020	"Data Reveals When and Where China is Most Likely to Encounter Typhoons"
16	Jiande Weather	August 2020	"Data Journalism: August May Welcome a Typhoon Outbreak Period"
17	Guizhou Meteorology	October 2020	"Data Journalism: This Year's Typhoons Have Some Personality – Will There be More Typhoons Making Landfall in China?"

3. Research Findings

3.1 Thematic Presentation Analysis

Based on the titles and content of the samples, the themes were divided into three categories: current progress, analysis and prediction, and summary and inventory. "Current progress" refers to reporting on the current progress and situation of typhoons. "Analysis and prediction" refers to reports predicting the future direction of typhoons. "Summary and inventory" refers to summarizing past events or comprehensive inventory reports.

After analyzing the 17 sample contents one by one, it was found that reports involving current progress numbered 6, analysis and prediction also numbered 6, and summary and inventory reports numbered 12, as shown in Figure 1.

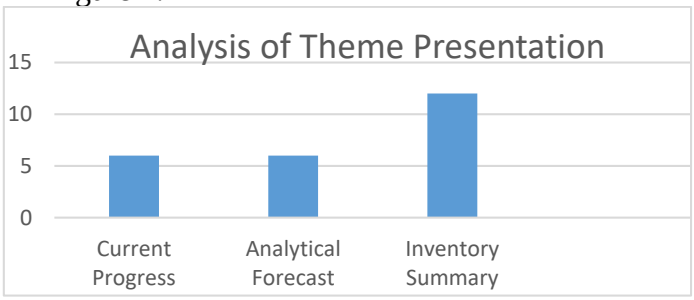

Figure 1: Analysis Chart of Theme Presentation

(1). There are many themes in the inventory summary category

It was indicated that the majority of typhoon-related data journalism reports are of the summary and inventory type. The number is even twice that of the current progress and analysis and prediction types. The reason is that accumulated typhoon data over many years is more abundant, making it easier to present in the form of data journalism. The changes in typhoon data over the years can also be more visually presented in chart form. In contrast, data on individual typhoons in a single year is relatively scant. A report that only mentions the current progress of a typhoon has less data to use and is harder to present changes, so reports on individual typhoons often combine text and data maps.

(2). There are Mixed and Diverse Themes

It was found that some reports mention all three thematic contents. For example, the Xinhua Net report from July 2023, "Data Journalism | Counting Those Typhoons Directly Heading to Fujian and Guangdong," first describes the current situation of "Du Suri," then predicts the future direction, with most of the article summarizing typhoons like "Du Suri" that have made landfall in Fujian, using infographics and timelines to clearly show the number of typhoons and their distribution to the audience. The conclusion predicts the situation after "Du Suri's" landfall again, with meteorological expert advice attached. The content is rich, allowing the audience to understand the causes and effects, and it exemplifies the social service and humanitarian care in disaster reporting through data journalism.

3.2 Visual Presentation Analysis

A major advantage of data journalism over traditional news reporting is its use of data to speak. Moreover, how to use data and how data is arranged for better dissemination is worth exploring[7]. In the topic of disaster reporting, choosing appropriate visualization charts to display the disaster situation is very crucial. From the state of visual presentation of data visualization, it can be divided into the following categories: traditional charts, data maps, timelines, and infographics.

Out of the 17 reports, there were a total of 75 data visualizations, including 10 traditional charts,

7 timelines, 30 infographics, and 28 data maps. It is evident that infographics and data maps are more frequently used, followed by traditional charts, and lastly, timelines, as shown in Figure 2.

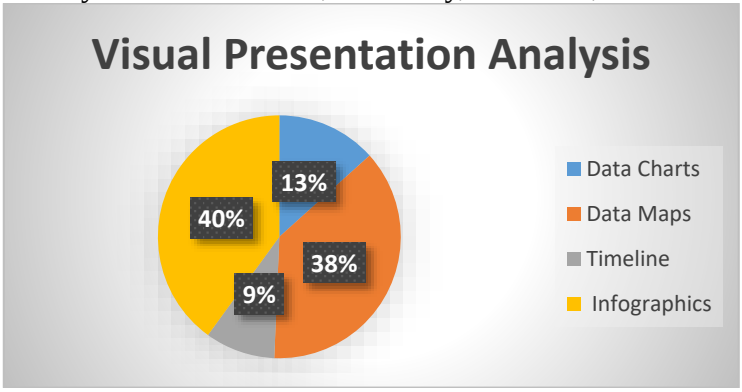

Figure 2: Visual Presentation Analysis Chart

(1). Unveiling Visual Doubling from Multidimensional Infographics

Traditional charts are often used in more serious news reports without much innovation, making it difficult to convey a sense of humanitarian care. In contrast, the advantage of infographics is their flexibility and the ability to integrate multidimensional information into a single image.

Moreover, a particularly special type of infographic is the dynamic infographic, which means that visual elements are not presented in a static state but as a series of connected frames, displaying dynamic images on the screen. Taking "Data Journalism/Typhoon Knowledge" by New Media Culture Xiaosheng in June 2021 as an example, it includes a dynamic infographic titled "Changes in Typhoon Landfall Provinces Distribution from 2000-2020." This report uses a static image for each year's typhoon landfall province count and combines 20 years' worth of static images into a sequence, played continuously to form an animation. This dynamic change visualization clearly shows the yearly changes in the distribution of typhoon landfall provinces. Presenting data changes in a dynamic format not only clearly reflects the changes in news information data but also enhances the audience's visual experience on the other hand.

Currently, examples of dynamic infographics used in typhoon data journalism are rare, and the above illustration merely connects static infographics without utilizing maps or the shape of typhoons to create animations. In disaster reporting, an exemplary use of dynamic infographics to its fullest potential is the prediction made by German marine science research on the spread speed and impact of radioactive elements after Japan's discharge of nuclear wastewater (see Figure 3 for a part of the dynamic image). This dynamic infographic uses the fluidity of water to predict the harm and flow trends over a certain period. The bold use of color also has a shocking effect on the public, making this infographic more impactful than typical static infographics, hence emphasizing the disaster's seriousness to the public.

Therefore, in the reporting of typhoon data news, this form can be emulated to use the shape of typhoons to predict their paths, providing the public with clear guidance on the disaster's harm and the extent of its impact. By utilizing dynamic infographics that incorporate the movement and potential paths of typhoons, journalists can offer a more vivid and engaging presentation of data, thereby enhancing public understanding and awareness of the disaster's implications.

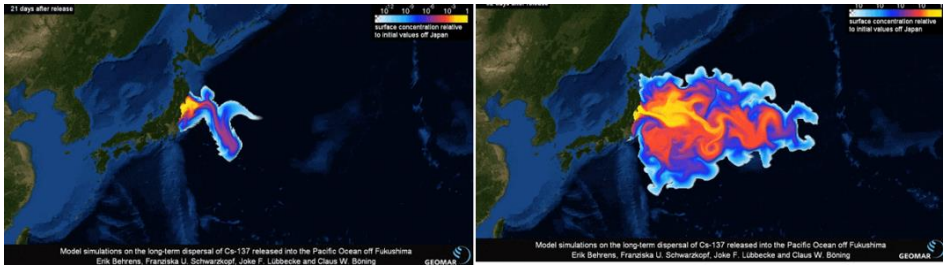

Figure 3: Prediction by German Marine Science Research on the Spread Speed and Impact of Radioactive Elements after Japan's Discharge of Nuclear Wastewater

(2). Social responsibility through Typhoon Reporting Videos

In visualization presentations, creating videos is another effective method to enhance intuitiveness. For instance, in June 2023, "The Wonderful Museum of Young Youth" released a report titled "Data Journalism | 'Mangkhut' is Not Just Any Fruit – Reviewing Typhoon Landfalls in China Over the Past Five Years" which featured a 1-minute and 26-second video at the beginning. This video showcased the legendary life of "Mangkhut," including the destruction of houses and environments, prompting public concern. By using animation to depict the harms brought by typhoons, it offers a positive visual experience. The copy contained many sentences related to individuals, such as "An economic loss of 143.35 billion yuan, enough for one person to spend for four hundred years," exemplifying the social service function. The economic loss is related to everyone, demonstrating humanitarian care, which is what most cold data journalism reports should learn from.

(3). Humanitarian Care through Interactive Visualization

In visual presentations, audiences favor interactive visualizations. Interactive visualization refers to adding appropriate click paths based on the news content, providing some control to the audience, thus attracting more attention to the news content.

A good example is seen in the "Disaster Data Journalism: Who Died in Hurricane Maria" released by Data Hotpot in May 2022. Data Hotpot adapted an international case of a typhoon, so the original report "Who Died in Hurricane Maria" serves as the basis. This approach to data journalism, incorporating interactive elements, allows readers to engage more deeply with the content, making the impact of disasters more comprehensible and personal. Interactive visualizations not only inform but also evoke empathy, drawing the audience closer to the human stories behind the data.

This is a distribution map of the deceased arranged in order of the time of death, where each square represents one person. As you scroll with your mouse, you learn how people died during different periods (see figure 4 for details). The simple use of color provides a strong visual impact, telling a story to the readers. This kind of interactive visualization is an excellent manifestation of humanitarian care and social service function.

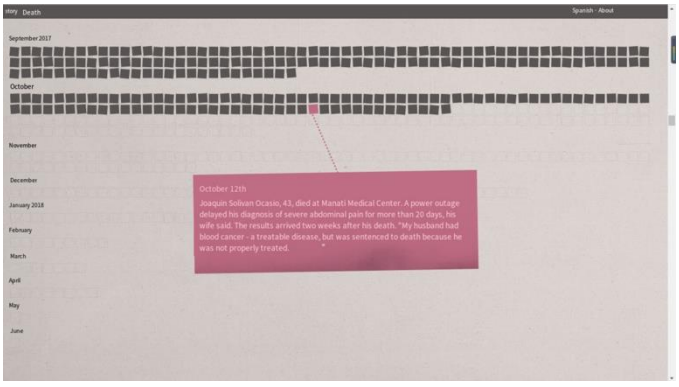

Figure 4: Disaster Data Journalism: Distribution Map of the Deceased in "Who Died in Hurricane Maria"

3.3 Visualization of Emotional Expression

Typhoon disaster visualizations make full use of report titles, colors, and graphic design to narrate stories, especially reports of interactive visualizations, which highlight the creators' intention to convey emotions. Although the theme of disaster reporting is relatively heavy, creators have imbued their visual reports with a strong sense of humanitarian care, expanding the reporting function of data.

Most articles conclude with safety precautions and defensive measures the public should take, representing the humanitarian care in typhoon reporting data journalism. We hope to see this care not only reflected in the text but also in charts and data, making the data feel warmer.

In "Between the Coming and Going of Typhoons: Where is the Most Disaster-Affected Area in China?" by The Beijing News, some charts are in gray and deep red tones, which can give a depressing feeling but indeed show the harm of typhoons with precise communicative value. However, from an emotional perspective, it would be beneficial to include more positive content towards the end and use brighter tones to ensure the article isn't solely serious.

In the video about the legendary life of "Mangkhut," linking data with animation allows the audience to understand the extent of typhoon damage while learning how to respond to typhoons. The application of data visualization enables emotional resonance among the audience, demonstrating humanitarian concern and expanding the function of data journalism to serve societal values.

4. Discussion

Due to the unique nature of disaster reporting themes, audiences may experience feelings of gloom or resistance when reading such reports. Sometimes, under the enhancement of big data, the loss of life or property is just a series of numbers. As news media, it is essential to evoke emotional connections in the audience within the report. Extending the social service function and humanitarian care of data journalism in disaster reporting is the focus of this article. This paper has utilized descriptive statistics, content analysis, and case study methods to arrive at the following conclusions:

Firstly, data journalism reports on disaster events are very suited to dynamic storytelling. The development of a disaster event is not static but constantly changing. Dynamic infographics in data journalism are an excellent way to convey this. In summary and inventory theme reports, making full use of years of typhoon data and presenting it dynamically can provide a better visual experience and mitigate the seriousness and heaviness of the content[5].

Secondly, videos and interactive experiences are well-suited for data journalism applications in disaster events. Therefore, disaster event data journalism reports can also make scientific use of new technologies to continually enrich presentation forms. Utilizing drones to provide an aerial view of the disaster area can enhance the spatial sense of the report. Leveraging the latest VR, AR, 3D, H5, and panoramic video technologies can offer audiences an immersive experience, making them feel as if they are on the disaster scene. At the same time, interactive visualizations should be employed to allow audience participation for a better experience[6].

In summary, only by animating and enlivening the data, and ensuring data journalism content is genuinely related to the lives of the general public, can we better leverage the advantages of data presentation and more effectively highlight the social service function and humanitarian care value of data journalism in disaster reporting.

This paper also has its limitations. First, the sample size collected is small due to time constraints and limitations of search tools, meaning the case analysis in this paper only studies a narrow scope of samples and cannot represent all reports, thus raising certain disputes in terms of universality. Secondly, the samples involved in this study are solely from typhoon reports in China between 2019 and 2023, and cannot represent the global application of data journalism in disaster reporting, thus its representativeness is also limited. It is hoped that in the future, big data or more computational

communication tools can be used to collect more extensive data for analysis, and that other scholars can gather more information to further verify the conclusions.

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