# New Way of News Dissemination Based on Big Data Analysis and Visualization Technology

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***Abstract*—With the advent of the wave of the Internet big data era, in view of the continuous rapid and high growth of Internet information volume, how to effectively and reasonably use Internet big data analysis, through scientific, effective and scientific information data mining, classification and classification expression, Changing the generation and methods of traditional information dissemination to better meet the various information needs of human life in the future has gradually become the key point of information dissemination and reform and development in the era of Internet big data. This research adopts the research method of questionnaire survey to support the development of this research. Based on the theoretical basis of the existing relationship research between China and foreign countries, combined with practical cases, this paper examines the status of the media industry's extensive use of the Internet in news production activities, and uses the concept of media information communication to analyze the impact of the new Internet technology on the way of media work. The experimental results show that 26% of new media practitioners in newspapers and 34% of new media practitioners in websites are using new visual charts such as data maps and timelines. The visual reporting of data news conforms to the development trend of the digital age and is the future journalism industry important direction of development.**

***Keywords—big data, visualization, news communication, future trends***

## I. INTRODUCTION

With the rapid development of human economic and social level and the increasing level of information processing technology, various data stocks in human society are also increasing at an astonishing rate that humans cannot fully understand, and the types of data stored are also increasing. This kind of national economic data contains extremely huge potential social and economic value, and is praised by economists as a "new oil" and "a new economic asset equivalent to coins or gold and silver", and has gradually formed a new type of economic It is an important source of output and factors, and a huge resource value and wealth that is closely related to the level of human economic and social development. The scale of the development of the huge big data analysis industry has also led to the emergence of a new concept such as "big data analysis" today. In recent years, the word "big data analysis" has become a hot word repeatedly mentioned in all walks of life. Humans use it to describe and define the massive data information formed in various application fields of human beings during the outbreak of information technology, or it is regarded as the arrival of the development of a kind of information age. The revolutionary implication of the development of visualization technology is not only because of the explosive increase of large-scale data analysis, but also a qualitative leap different from the previous methods of data mining, processing and utilization [1].

As a new thing in journalism and communication, compared with the enthusiastic discussion of data media in the industry, the research on it in academia has become relatively backward, and only a few scholars at home and abroad have carried out research on it. Based on the research and foundation of visual learning, visual thinking and visual communication, Z Güney discusses and proposes methods for evaluating visual, visual and virtual technologies in science education and engineering education, and designs a visual learning project for multimedia teaching [2]. Arjun S maps facts to visualizations based on the characteristics of visualizations and the complexity of data facts, and explores how system-generated data facts can be viewed as interactive widgets to help news data interpretation visualizations and pioneer new approaches [3]. NM Morales established the theoretical conceptual framework necessary for practice, dividing elements into interactive maps and knowledge production, maps as a tool for promoting political and social engagement, and as a tool for visualizing data for the benefit of user experience [4]. When domestic researchers discuss the production model of data journalism, a specific news form supported by big data, they often recite the research results or theoretical models of foreign researchers. There is also no first-hand research data from within the media organization, which also expands a certain operational space for this research.

This paper will conduct research on news communication based on big data analysis and visualization technology. First of all, the article will study the production process of data news from data collection, data analysis and visualization, and put forward suggestions for improvement of visualization production in my country based on specific cases at home and abroad. Finally, this article combines the limitations and characteristics of data news visualization reports. Its future development trend is predicted.

## II. EXPLORATION OF NEW WAYS OF NEWS DISSEMINATION UNDER DATA NEWS VISUALIZATION

### A. Changes in News Production Process

Different from the traditional text news format, data news takes data as the core, and the collection, analysis and presentation of data is the whole process of its visual reporting. In terms of gathering information, traditional news briefings mainly rely on interviews with on-the-spot

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reporters, obtain materials through news and news on-site research, and organize them into first-hand information. Data journalism is that journalists receive original data from different channels, and the information comes from different sources; in terms of information analysis, traditional news is mainly based on the news knowledge obtained by reporters in interviews, while data journalism introduces related technologies for comprehensive data analysis.

(1) Data collection

The acquisition and collection of data is the beginning of data news production and directly affects the final result [5]. To ensure the authenticity and accuracy of data news, data collection should be as complete and effective as possible. In terms of data volume, the data receiving channel should be expanded as much as possible. From the perspective of data quality, data sources should have clear sources, and data providers should be effective and reliable.

(2) Data analysis

Data analysis is an important part of data news production. The data themselves are not important, their value only begins to emerge when they are fully explained. Data analysis can conduct horizontal and vertical comparison of data and data overlay through one-dimensional and multi-dimensional data, mining data from different angles, and deepening news value [6]. One-dimensional analysis of data is relatively simple and can only reflect some things. The combination of multi-dimensional comparisons between data can reflect the overall state of affairs.

(3) Visual presentation

Visualization is the ultimate production link of data news and the ultimate way of presenting data news. Data collection and analysis is the preparatory stage for data visualization, which will eventually be presented through visualization. Visualization includes various charts, and we can classify them into static infographics and dynamic infographics according to the degree of interaction of data news visualizations [7-8]. Currently, news visualization can be achieved through open source software tools, i.e. interactive graphic production using Google chart, Google map, Tableau Sportfire.

### *B. New Ways of News Dissemination*

In the way of news dissemination, data news visualization has experienced a series of changes from news text to news format. In terms of news text, data news is no longer dominated by linear text information, and data has become the main narrative language; in terms of news format, news information is imaged to form visual communication; in terms of audience perception, audiences are no longer passive recipients of information, the real linkage between its interactive participation and news formation [9].

(1) Data narrative

As far as news texts are concerned, visual news reporting has completely changed the previous text-based reporting methods. Data is no longer a foil for the article, but an important narrative statement. In regular news reports, the media is expressed based on understanding the syntactic and semantic structure of the text, and "5W+1H" is considered as a classic media writing mode. In terms of logical architecture, data and information media have no fixed functions, and the logical relationship between data and information can be projected from different dimensions and visual designs, which is a great challenge to the creative ability and technical level of creators. As a result, great visual reporting often stands out in terms of narrative logic and technical presentation.

(2) Visual communication

As far as the news report format is concerned, the data information news report is to use various data information graphs to realize the instant visual communication of the news, which becomes an instant visual representation method. The reporting method of visual communication makes intuitive classification, analysis and interpretation of complicated text information, improves readers' way of reading text chapter by chapter, and encourages readers to use visual symbols to quickly retrieve information content. In a sense, visualization is the transformation of concepts and data into graphs. In the era of big data, with the explosive development of information, people spend a lot of time and energy in the sea of information. And this kind of visual news simplifies information through visual dissemination, makes massive data easy to read, and adapts to information overload and the fast pace of modern life. It is foreseeable that it will become the main form of news in the future.

(3) Interactive participation

In terms of public perception, the visualization of data-based news information replaces the traditional way of news dissemination. In dynamic infographics, viewers independently choose what news is presented by clicking on different dimensions and metrics. Due to the different points of concern and interest, the public will have their own inclinations and preferences in selection. Furthermore, in the bidirectional interactive infographic, readers can upload personal data and become an active source of news data [10-11]. For your favorite data news, you can freely promote it on social media, actually participate in the production and dissemination of news, and achieve a two-way connection with news. This kind of interaction has greatly enhanced the public's sense of participation in news, and has gotten rid of the previous role of passively receiving information.

### *C. Development Trend of News Communication under Data News Visualization*

(1)Data and Text Fusion

The advantage of data and text fusion data visualization lies in appearance, such as the appearance of news points, event process, correlation, etc., while the advantage of text is more in interpretation, including causal analysis and differentiated interpretation, complex situations and event details. Description [12-13]. Data journalism fully values the benefits of data visualization, but inevitably leads to a lack of causal analysis and historical detail. To this end, data journalism can make up for this shortfall by enhancing the merging of data and text. While data journalism is dominated by graphics, that doesn't mean words no longer matter. How to strengthen the integration of text and data and realize the complementary advantages of the two will be the direction of future data journalism exploration.

(2) Visual design innovation

The visual presentation of data media provides creators with great development and living space in narrative logic and technological development. Due to the development of data media image visualization, more forms of visualization design will appear. At present, most of the visual news projects of Chinese media are dominated by static infographics, and the visual presentation is relatively simple [14]. This is because the production level of news data in my country is still in its infancy, and the operation concept and related technologies are not mature enough. However, the development of data journalism has attracted the attention of domestic media. More and more people in our country are exploring and practicing the visualization of data journalism, and the visualization of dynamic infographics will continue to grow and develop [15-16]. In this project, the author will continuously innovate the visual presentation form according to the different news categories and news topics, and at the same time integrate audio and video elements in addition to the infographic to optimize the reading experience of the audience.

(3) Increased predictive reporting

Although the visualization of data news is not good at expressing the scene and specific story details, it can analyze and present data, so that the public can understand the development trend and laws of things from a macro perspective [17-18]. Interpreting relevance is the power of visual reference. With the introduction of big data analysis, the correlation of data in various indicators and dimensions enables us to discover the connections between things, thereby further summarizing certain trends and laws of events. In the past, such predictions were mainly based on the author's subjective experience and professionalism, but the big data analysis technology of data journalism makes the process of guessing more scientific, thus making the conclusion more accurate. In this regard, the development of data news visualization will allow news forecasting to shine, and its reporting weight will increase significantly.

## III. Investigation and Research on News Dissemination Methods under Data News Visualization

### A. Research Methods

This paper adopts the online questionnaire survey method and selects the news dissemination method of front-line new media practitioners through a questionnaire survey.

### B. Data Collection

This paper mainly uses Questionnaire Star to distribute questionnaires online. A total of 285 questionnaires were distributed online. Because there will be a small reward after filling out the questionnaire, the effective rate of the returned questionnaires is 100%.

### C. Data Processing and Analysis

This paper uses SPSS 22.0 software to count and analyze the results of the questionnaire, and conduct t test. The t-test formula used in this paper is as follows:

$$t = \frac{\overline{X} - \mu}{\frac{\sigma X}{\sqrt{n}}} \tag{1}$$

$$t = \frac{\overline{X_1} - \overline{X_2}}{\sqrt{\frac{(n_1 - 1)S_1^2 + (n_2 - 1)S_2^2}{n_1 + n_2 - 2}(\frac{1}{n_1} + \frac{1}{n_2})}} \tag{2}$$

Among them, formula (1) is the single population test, which is the sample mean, s is the sample standard deviation, and n is the number of samples. Formula (2) is a double population test, the sum is the two-sample variance, and the sum is the sample size

## IV. Investigation and Research Analysis of News Dissemination Methods under Data News Visualization

### A. Distribution of News Topics of New Media Practitioners

First of all, analyze the news topics of the respondents: in the valid questionnaires collected, 2% of the new media practitioners of newspapers pay attention to culture and sports, while 9% of new media practitioners of websites pay attention to this item; 37% of the new media of newspapers Practitioners pay attention to social life, and 35% of newspapers and new media practitioners pay attention to finance, 27% of newspapers and new media practitioners pay attention to politics; 27% of online new media practitioners pay attention to social life, 44% pay attention to finance and economics, 12% pay attention to politics. As shown in Table I and Figure 1.

TABLE I. News Topics Statistics

| | Culture and Sports | social life | Finance | politics | other |
|---|---|---|---|---|---|
| Newspaper new media practitioners | 2% | 37% | 35% | 12% | 14% |
| Website new media practitioners | 9% | 27% | 44% | 12% | 9% |

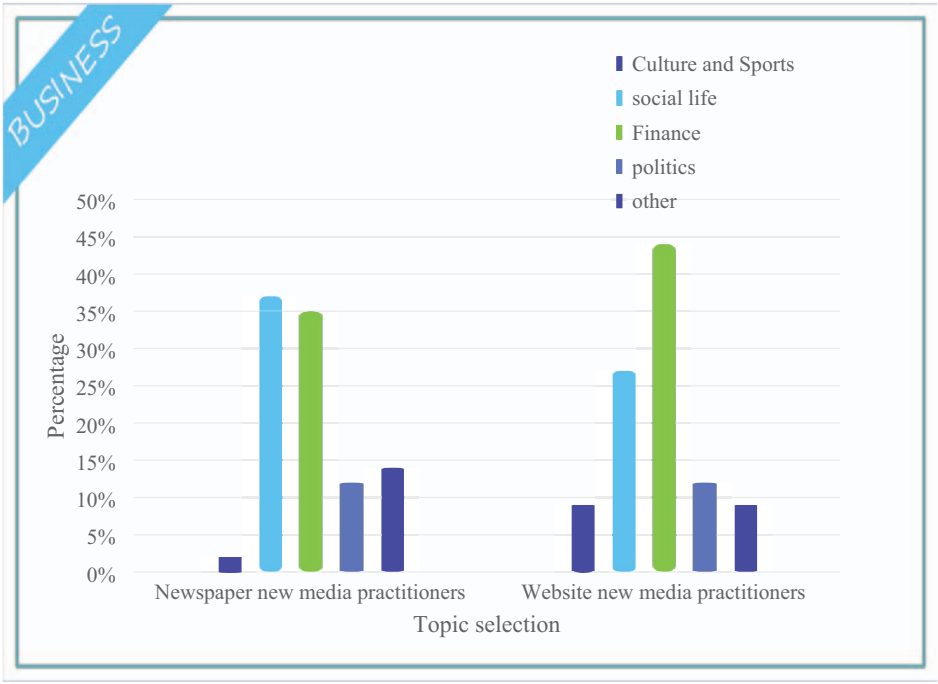


Fig. 1. Analysis of the topic selection of practitioners

It is worth noting that most of the two are financial issues, which are inseparable from the special attributes of financial news. Funding-related segments, such as financial operating data, industry growth, company operating reports, etc., are naturally associated with numbers and data, making them ideal for presentation and presentation in the form of data journalism. In addition, as new media practitioners, they will of course pay more attention to all aspects of local life, which is the main reason for the high proportion of social life issues between the two. Through comparison, we can also find some common concerns of the two new media practitioners on this topic.

### *B. Distribution of Visualization Types Chosen by New Media Practitioners*

Next, the distribution of visualization types chosen by new media practitioners was investigated, and the results are shown in Figure 2.

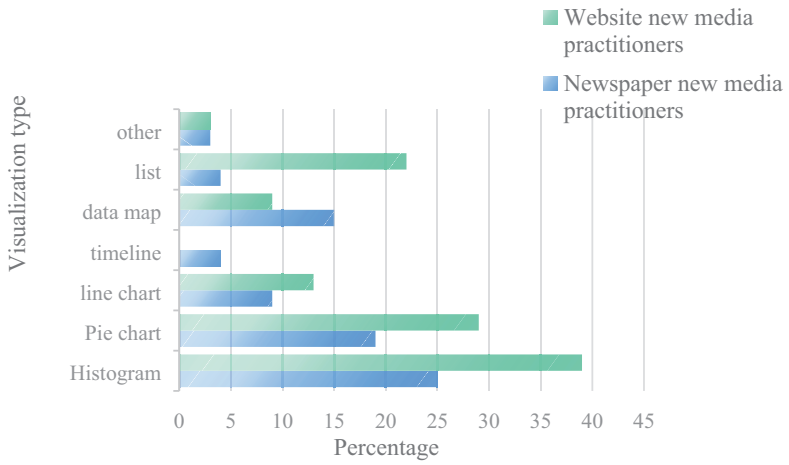


Fig. 2. The distribution of visualization types chosen by new media practitioners

As can be seen from Figure 2, the selection of visualization types focuses on traditional charts such as bar charts and pie charts. 25% of newspaper practitioners choose the visual representation of bar charts, while 39% of new media practitioners on websites choose bar charts. Visual representation of graphs; 19% of new media practitioners in newspaper offices chose the visual representation of pie charts, and 29% of new media practitioners in websites chose the visual representation of pie charts. But there are also new types of visualizations such as data maps, timelines, and a small portion of plain text descriptions. In a single data news report, there are generally overlapping

applications of multiple data chart types, and data news that uses a single data chart application is extremely rare.

## V. Conclusions

Data journalism is already an independent way of news reporting. The reason why it can be independent of traditional news reporting lies in the fundamental changes in the way of news production and dissemination. In news production, through specific research on data collection, data analysis and visual presentation in the process of news data production, we have a deeper understanding of data visualization production. Compared with practice, we have seen the gap in the production of media news visualization in our country, and we have also made clearer the direction of future efforts. In news communication, the changes of news visualization data in news narration, news format and audience perception optimize and expand the communication mode. Data narration, visual communication and interactive participation constitute the symbol of its communication.

The benefits of data journalism visualization are obvious, but it also has its inevitable drawbacks and limitations. By recognizing its shortcomings, we can gain a more complete picture of data journalism and make key judgments about its future growth trends. The visual reporting of news data conforms to the growth trend of the digital age and is an important direction for the development of journalism in the future. Although the production level of news data in my country is still relatively low, with the deepening of exploration and practice, the development of data news in China will continue to mature and find its own development path.

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