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Computer-Aided Design AND APPLICATIONS

Application of Big Data Analysis and Visualization Technology in News Communication

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Abstract. There is a scientific aspect of data journalism. In other words, the era of big data can make communication science more and more scientific, and even make social science more and more scientific. Content visualization is represented by graphical presentation of content. The content of the report is visualized and reported using simple text descriptions such as charts and infographics. The meaning of the expression is concise and easy to understand, which is consistent with the habit of the human brain receiving information. Digging news is represented by data mining, that is, excavating newsworthy parts from massive data information, and then integrated into a report through news processing. Such news has the advantages of investigative reporting and in-depth reporting, and can be more objective and fair to watch the community.

Keywords: Big data, Visualization technology, News communication, In-depth reporting.
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1 INTRODUCTION

Big data is a major technological breakthrough in the research issues of our era. People can grasp the development of various issues with a certain degree of precision based on big data brought by new media technologies. Therefore, the major problem that needs to be solved in the methodology of big data analysis is first and foremost, how to realize the focus and reproduction of the actual situation of a certain individual, a certain thing or a certain social state through a multi-level and multi-dimensional data set, relevant results proposed by Li et al. [1, 2]. Basic issues of big data innovation and development in the news dissemination practice: big data, big data analysis and big data news coverage; practical application of big data in news reporting: Take "Yuejie Festival" as an example; for big data analysis The discussion: The contradiction between big data and news, information communism or information hegemony, the opening of data sources; and the future direction of big data research and development.

With the "Internet Plus" being widely used in various fields in 2015, more and more fields have begun to move toward the Internet. The Internet has become a popularization and a habit. People

need to receive Internet information at the same time. The information you need. TV news takes people's attention, or what people need to pay attention to recently or currently happening, using data visualization technology, through data collection, content arrangement, visualizing traditional textual and digital content processing, and ultimately through images and other intuitive Ways to show to the audience. Currently, several commonly used processing tools for TV news visualization include: graph tools, linear tools, and map tools, as well as social software data analysis, search keyword analysis, and traffic forwarding analysis.

2 THE PRACTICAL APPLICATION OF BIG DATA IN NEWS COMMUNICATION

A seminar focused on several tomb problems in the innovation and development of Big Data in news dissemination practice: big data, big data analysis and big data news reports; practical application of big data in the field of news reporting: "It is said that the Spring Festival" For example, the discussion of big data analysis: the contradiction between big data and news, information communism, information hegemonism, and the opening of data sources; and the future direction of big data research. The keyword coverage rate is shown in Figure 1.

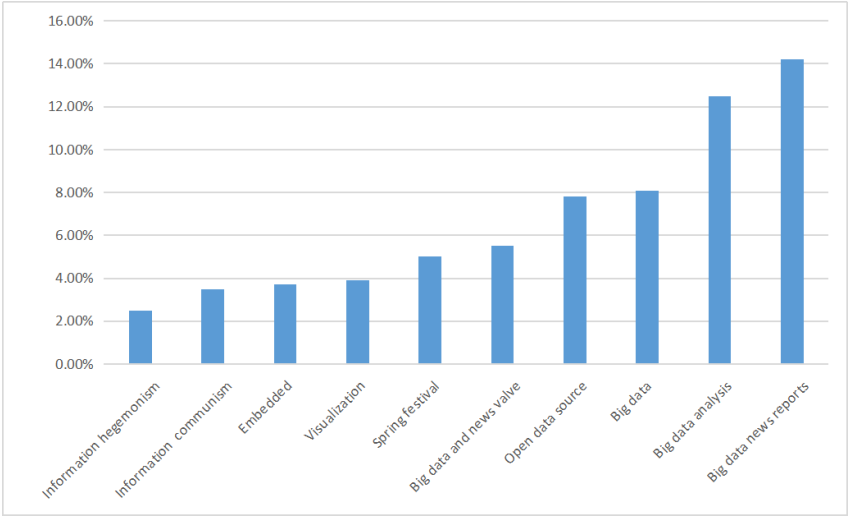

Figure 1: Keyword coverage for a meeting.

2.1 Big Data Analysis

When referring to the "big" of "big data," most people think that it refers to the mass of its data. In this regard, Professor Yu Guoming of the People's University pointed out that this is actually a kind of inconceivable and paradoxical knowledge. In fact, there were also massive data sets in the pre-big data era. However, due to its single dimensions, the review of international press conferences and the separation of people or social organic activities, the value of analyzing and understanding the truth is extremely limited, relevant results proposed by Fittkau et al. [3]. The real value of big data lies not in its largeness, but in the cross-repetition of multi-angle, multi-level information in its all-dimensional dimension; the continuation of information associated with human or social organisms in the temporal dimension. Presented. Concentricity and Density Values can be seen from Table 1and Figure 2.

Research topic category	Concentricity	density
A	12.38	32.98

B	6.5	8.5
C	12.822	17.654
D	3.5	7

Table 1: Concentricity and density values of aggregated clusters.

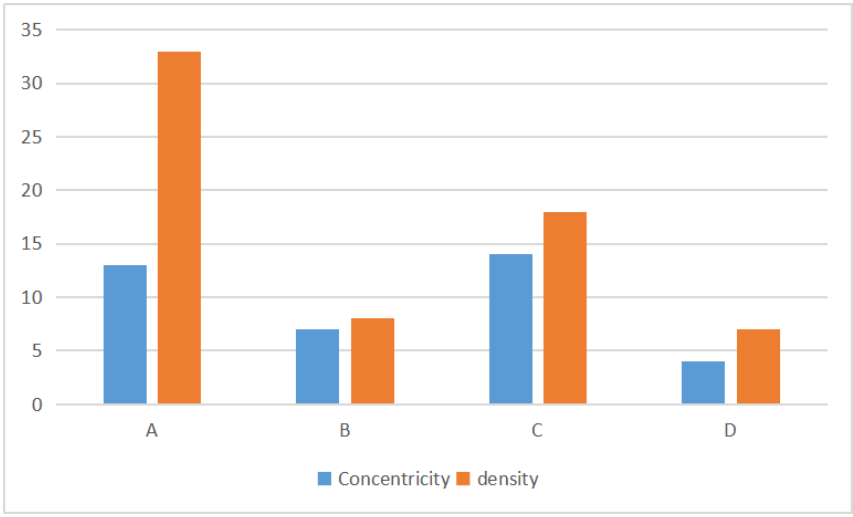

Figure 2: Concentricity and density values.

The professor of land at Peking University will separately interpret “big data”, in which “big” refers to large-scale, large-space, long-formed or obtained data; “number” refers to quantity, number, or related information or Facts can be measured and quantitatively analyzed. "According to" can be said to be valuable information, facts, and content. It can also be the basis for judgments, decisions, and actions. Where "big" is an adjective, "number" is a noun, and "according to" can be a noun or a verb. The combination of the three can have a lot of understanding and application.

2.2 Big Data News Report

Use co-word analysis methods for research. This method is to analyze the relationship between subjects in subject areas by analyzing the frequency of occurrence of subject terms in a literature, so as to reveal the research structure of the subject. Co-word analysis data processing ideas has been shown in Figure 3.

According to Guo Junyi, editor of the CCTV News Network, data news should include three aspects. The first is to use the various data tools like Baidu Index to mine news. Because the traditional way of gathering news data is more through informants and interviews. In fact, the arrival of big data has provided a new tool for our media workers to help everyone tap new ones. The second is to do data citations, and the third is data visualization. Only with these three characteristics can it be true data news.

Statistical analysis of the frequency of keywords can reveal a research hotspot in a subject area. The author retrieved 1,208 keywords from 700 sample documents, and merged keywords with similar meanings, relevant results proposed by Cook et al. [4-6]. For example, the "media fusion" and "media fusion" were merged into "media fusion" and the "social media" was "socialized." The Internet "social media" was merged into "social media", and then according to the Price high-frequency keyword selection criteria, 30 key words whose citations were cited more than 7 times were selected.

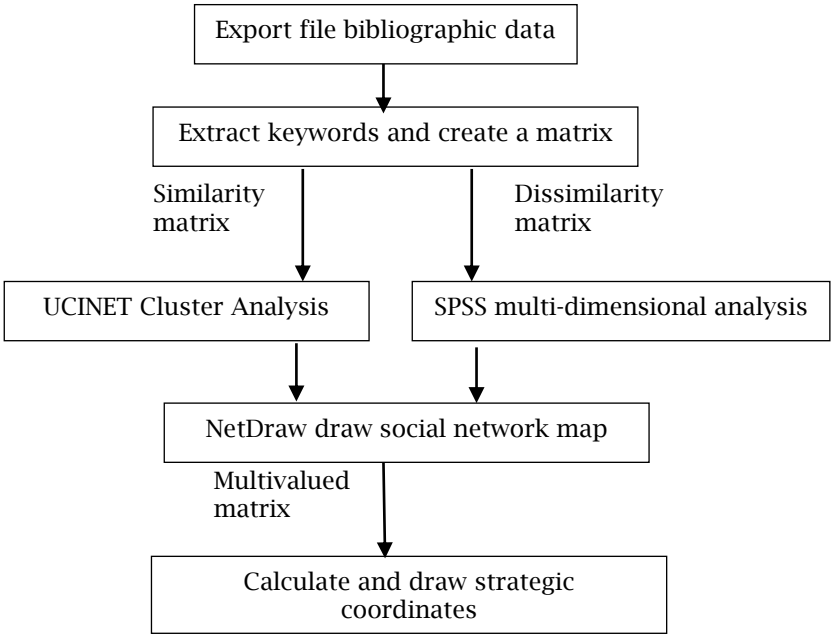

Figure 3: Co-word analysis data processing ideas.

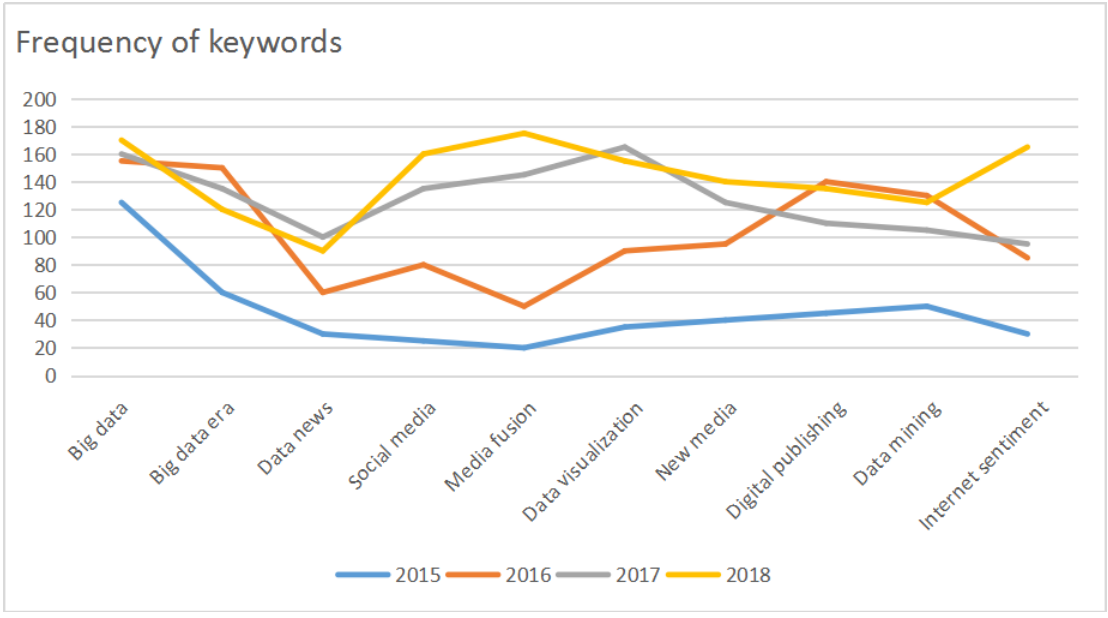

Figure 4: The annual frequency of keywords in different years.

They can reflect the hot spots of big data research in the field of news dissemination. (See Table 2). Figure 4 shows the annual frequency of keywords in different years.

No.	Key words	frequency	No.	Key words	frequency
1	Big Data	535	16	development trend	18
2	Big Data Era	102	17	Lyrical guidance	15
3	Data news	76	18	Social sentiment	14
4	social media	39	19	Academic Journal	14
5	Media fusion	35	20	Big data technology	12
6	data visualization	32	21	Internet +	11
7	new media	29	22	data analysis	10
8	Digital Publishing	28	23	News report	10
9	Data mining	26	24	Lyric analysis	9
10	Internet sentiment	24	25	Media Transformation	9
11	edit	23	26	Science Journal	8
12	Publishing Industry	22	27	TV show	7
13	Digitizing	22	28	development trend	7
14	traditional media	21	29	Lyrical guidance	6
15	News production	20	30	Social sentiment	6

Table 2: High frequency keyword list.

3 DATA VISUALIZATION TECHNOLOGY AND TV NEWS

3.1 Data Visualization Technology and Its Significance for TV News

With the "Internet Plus" being widely used in various fields in 2015, more and more fields have begun to move towards the Internet. The Internet has become a popularization and a habit. People need to receive Internet information at the same time. The information you need. TV news takes people's attention, or what people need to pay attention to recently or currently happening, using data visualization technology, through data collection, content arrangement, visualizing traditional textual and digital content processing, and ultimately through images and other intuitive Ways to show to the audience [7, 8]. Currently, several commonly used processing tools for TV news visualization include: graph tools, linear tools, and map tools, as well as social software data analysis, search keyword analysis, and traffic forwarding.

The development of China television news reports has been in the stage of continuous development since its birth. Since then, CCTV has increased the proportion of live broadcasting, and the live broadcast has become News broadcast is one of the usual ways of reporting. At present, CCTV has applied data visualization technology to multiple channels such as integrated channels and news channels, and broadcasted visualized TV news such as Digital Ten Years and Counting Destiny Community. Data visualization application legend can be seen from Figure 5.

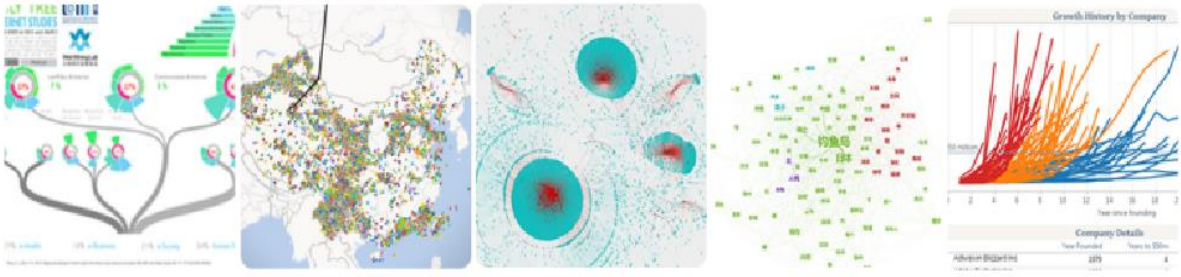

Figure 5: Data visualization application legend.

3.2 Analysis of the Effect of Visual Processing on News Communication

There are many factors influencing the effect of data news communication, including the audience's race, knowledge structure and belief, etc. But under the background of mass communication, visual elements are particularly important to the effect of sports data news communication. Data news visualization is a comprehensive study involving color, graphics, psychology, communication and other disciplines, but its essence is to analyze the effects of visual elements on the audience's physiology and psychology, so as to study the effect of visualization on data news communication. Whether it is from traditional news or online news, the main way for audiences to get information is through visual, auditory, tactile and other cognitive organs.

(1) Analysis of the impact of color elements on the effect of news communication

Color is one of the indispensable elements of visualization, and it has a more direct impact on the audience's psychology than charts and words. Gregory, a well-known British psychologist, put forward in his book Visual Psychology that "color perception is of great significance to human beings - it is the core of visual aesthetics and deeply affects our emotional state". Color is an important factor affecting the effect of data news visualization, but also affects the effect of data news dissemination as shown in Figure 6. Making use of the data of users from all over Facebook website to produce the distribution map of American baseball fans, the various colors in the map distinguish the location of different team fans, and the change of color represents the degree of support for the team. Audiences can quickly capture the core of the information through the changes of maps and colors in the United States, effectively embodying the news value. It can be seen that different colors have different stimulation on the audience's vision, thus affecting the audience's understanding of sports data news.

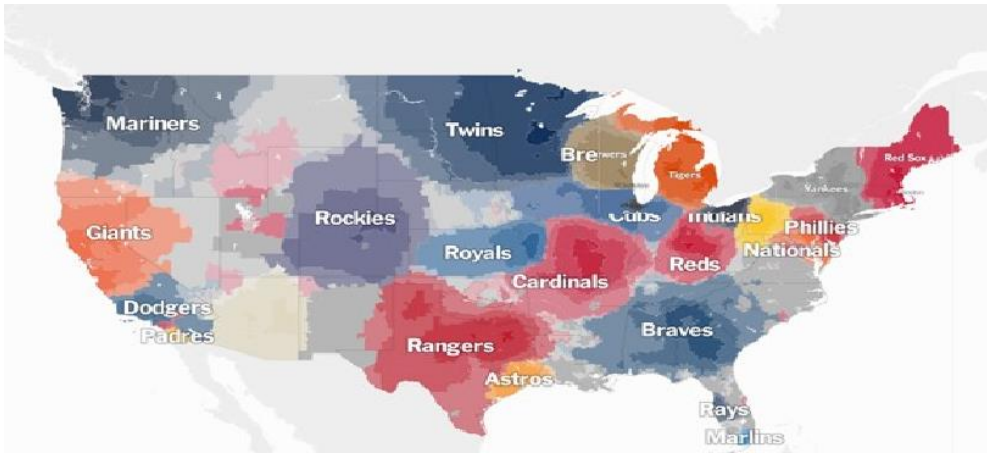

Figure 6: Baseball fan distribution Google map.

Visual color use also needs the scientific collocation of color, its essence is to use the contrast in color science. In the color contrast of the chart, the area contrast of the color represents the proportion and number of data described by the news. The scientific use of color in sports data news visualization needs comprehensive consideration from the aspects of hue, brightness, purity and contrast. The stimulation of color to the audience is used to attract attention and highlight the core connotation of sports news. At the same time, we should use color to alleviate the audience's tension in reading news, so as to avoid visual fatigue caused by excessive visual stimulation. The collocation of various colors as shown in Figure 7 can not only capture the club information of Chinese players by express delivery, but also have more visual impact than monochrome.

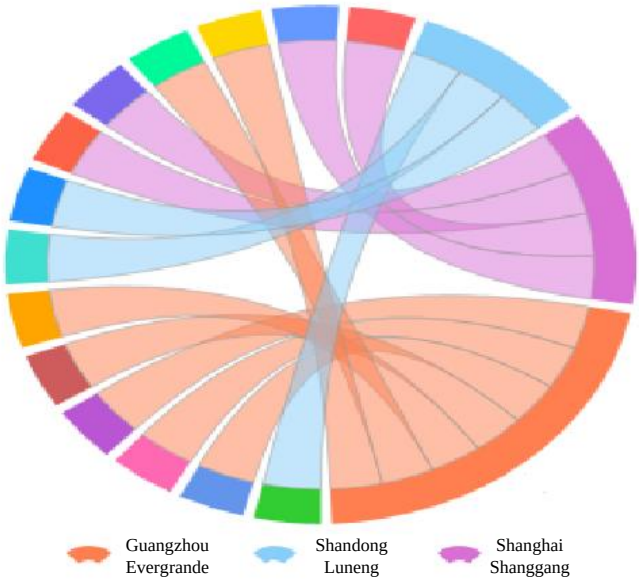

Figure 7: Distribution of some players' clubs.

(2) Analysis of the influence of graphic elements on the effect of news communication
In addition to color, visualization technology mostly presents the objective facts described by sports data news with tables and graphics. Analyzing the audience's cognition and understanding of tables and graphics is helpful to better disseminate sports data news and explore the scientific connotation of sports data news visualization. Charts are the most important presentation means of sports data news visualization. To study the visual perspective of graphics, we should start with the basic elements of unit graphics in charts, from point, line, surface to the whole graphics, and analyze the significance of graphics to sports data news dissemination from multiple perspectives.
The most basic graphic elements are points, lines and surfaces. Each point in the chart is the node where the audience stays. The size, location and number of points make the audience have different psychological effects. The different size of the area makes the audiences have a sense of movement. The higher the density of the points, the more tense and oppressive they will be. The orderly arrangement of the points will produce a sense of rhythm. In theory, lines are the aggregation of countless points, and both curves and straight lines represent the trajectory and direction of things. As lines in data news charts, they can represent the process of news events from beginning to end, lead the audience to read news charts. Different lines give people different visual psychology, and cause a variety of emotions and associations. Big data sharing and visualization docking mode as shown in Figure 8. The graph uses different colors of circles to

distinguish two teams, while the lines of different colors and widths between other Spurs players, baskets and Leonard represent Leonard's passing times and attack frequency.

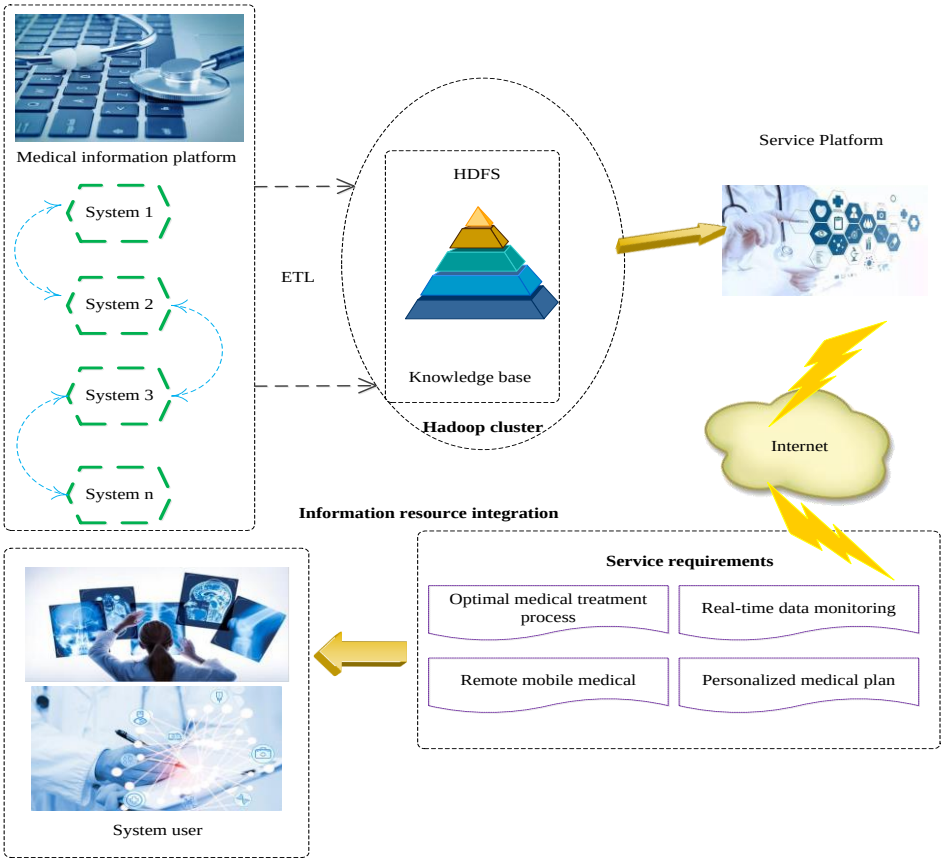

Figure 8: Big data sharing and visualization docking mode.

Gestalt psychology shows that the core of its research is shape, which is a whole organized by perceptual activities. Graphics in any data news chart are the result of the organization of audience perception, and each audience has its own unique ability to interpret and analyze graphics. When the size, location and shape of graphics or graphic elements in data news graphs change, the audience will have different perceptions of sports data news according to their own interpretation ability. In the eyes of the audience, simple visual presentation methods such as pie chart and column chart can also quickly and intuitively convey information, but these simple charts and graphics simply cannot meet the growing visual needs of the audience. On the contrary, those complicated figures and graphics that require the audience to spend some time thinking arouse the audience's interest in the data news, so as to complete the reading of the whole data news and achieve better communication effect.

(3) Analysis of the effect of graphic color, location and text elements on news communication

The dissemination effect of big data news is inseparable from visual elements, and color, graphics and appropriate text are also inseparable as the main elements of visualization. Only when the elements are combined to achieve the best state can they play a key role in the audience's acceptance of news. In the author's survey, 74.94% of the respondents believed that the reasonable combination of visual elements such as characters, points, lines, graphics location and

color could guide the audience to read well. It also truthfully reflects the relationship between news subjectivity, graphic representation, color accuracy and text readability, and the quality of large data news visualization.

The recognition of things is the result of the interaction of color and graphics. Color plays a decisive role in the recognition of the audience's graphics, but the unreasonable use of color will conflict with the audience's cognitive structure. The use of graphics should also conform to the theme of the news, and then according to the attributes of graphics to select accurate color, so that graphics and color achieve harmonious unity.

4 NEW APPLICATION OF BIG DATA ANALYSIS AND VISUALIZATION TECHNOLOGY IN NEWS COMMUNICATION

An event is analyzed using data of different magnitudes and categories, making it a three-dimensional interpretation and deconstruction. When different data levels areused to combine structural equations, the methods, weights, and structures in which they enter are also a technical problem that we need to solve [9,10]. This makes it easier for people to interpret it, and then to grasp it and consume it. It, go and use it. If some major news in daily life can be reported using big data, its depth will be greatly enhanced, it will also give people more dynamic and persuasive power, and help people more accurately. Big data application and data visualization growth rate in one place has been shown in Figure 9.

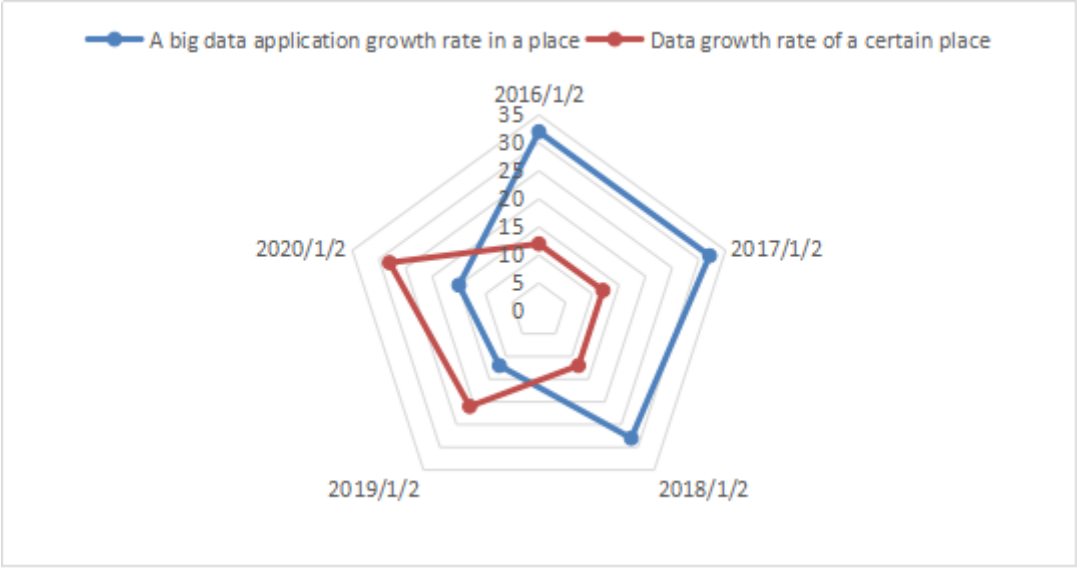

Figure 9: Big data application and data visualization growth rate in one place.

Visual news needs to occupy the original data as much as possible and develop data resources reasonably. First, we need to grasp the direction of topic selection of visual news accurately, and at the same time use and mine the prediction function of data. At present, the reports of visual news mostly focus on holidays, macro-national economy, national policies and policies, and all kinds of subjects are close, which also restricts the development and Realization of visual news data to a certain extent.

(1) Extended platform: towards all-media development

As one of the mainstream media, CCTV is the mouthpiece of the Party, the government and the people. It plays a leading role in the domestic media. Today, CCTV has successfully entered the media organization of all-media news reporting. The data news produced by CCTV is also extending its platform to all-media development. At present, CCTV has constructed a new media communication manifestation of "one cloud and multiple screens". It covers TV, computer, mobile phone and other terminals in an all-round and three-dimensional way. Under the attack of new media, the opening of the whole media strategy not only slows down the impact of traditional media, but also provides a new direction for development. TV news combined with data visualization technology, after the completion of visualization, is further published in the website, micro-blog, micro-messaging, client and other channels, extending the platform to all-media development. The visualization of TV news will have a great breakthrough and development space in the whole media environment.

(2) Utilizing high technology: combining VR technological innovation contents

Visual news can process and visualize data sets. From the point of view of data visualization, data visualization is closely related to computer. During the 2016 NPC and CPPCC sessions, many media, such as Xinhua News Agency and People's Network, used VR technology to make panoramic photographs and report on the news of the NPC and CPPCC sessions. TV media are also actively innovating with VR. In March 2016, Mango TV set up the whole platform of "I am a Singer" VR zone, using VR technology, to fully display the fourth season of "I am a Singer". In the VR zone, users can use the mouse to watch panoramic videos and see the 360-degree space-time layout of singers, stage and audience, which enhances the authenticity of the program and makes users immerse in the experience of immersion. In the exploration of the VR field, CCTV and other TV media have virtually increased their prominent advantages. The emergence of high-tech provides a basis for innovation of news content. Visual TV news will use high-tech, combined with VR technology, to produce innovative products that can impact users' senses and quality.

(3) Normalization: visualization of TV news will become a mainstream reporting form

When going out, hotels, restaurants, cafes, supermarkets, buses and other public places also covered WIFI signals. In addition, the network speed of mobile phone 4G is no less than that of WIFI. Convenient wireless network and 4G network, improve the speed of Internet information dissemination, users can use mobile phones, computers to access the Internet, convenient information dissemination. Video is relatively large in capacity. In the process of transmission, more traffic is needed. However, the popularization of WIFI and the use of wireless traffic reduce the obstacles of video transmission. Compared with words and pictures, video is an intuitive and visual display of the news process, and the development of technology also facilitates the wide dissemination of video news. TV news combines data visualization technology to report Abstract news data and content in different forms of visualization such as charts, which further promotes the accuracy and vividness of the report. Visual data in TV news can also be combined with the uniqueness of television, and presented in the form of animation simulation and restoration. The Internet is like a flat road. TV news wears visual clothes and rides on all-media cars, which are brought to the front of the vast number of users. WIFI and 4G Network + all media platform, visual television news will become a normal form of reporting.

5 CONCLUSIONS

The quality of big data sources is often in the hands of the government and large companies. How to open up the use of such big data sources, concerns the development of society and the well-being of people's lives, must be guaranteed by the system and mechanism. In this regard, the U.S. government’s data opening policy not only serves as a good reference for the government to open up data sources, but also for large companies. The openness of the data sources it holds has important implications. Visualized news needs to use data visualization design to present more novel technology to netizens and make news more vivid. Television news visualization is a complex process, which requires not only journalists to expand their thinking, but also workers to have data

awareness. Under such circumstances, domestic and foreign television media should strengthen the training of information literacy of workers, especially journalists in China.

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REFERENCES

[1] Li, B.; Zhu, T.: Visualization analysis for big data in computational cyberpsychology, Human Centered Computing, 2014, 701-707. https://doi.org/10.1007/978-3-319-15554-8_59.
[2] Aiche, S.; Sachsenberg, T.; Kenar, E.; Walzer, M.; Wiswedel, B.; Kristl, T.: Workflows for automated downstream data analysis and visualization in large-scale computational mass spectrometry, PROTEOMICS, 15(8), 2015, 1443-1447. https://doi.org/10.1002/pmic.201400391.
[3] Fittkau F.; Krause A.; Hasselbring W.: Software landscape and application visualization for system comprehension with ExplorViz, Information and Software Technology, 87, 2017, 259-277. https://doi.org/10.1016/j.infsof.2016.07.004.
[4] Cook, D.; Lee E. K.; Majumder M.: Data visualization and statistical graphics in big data analysis, Annual Review of Statistics and Its Application, 3(1), 2016, 133-159. https://doi.org/10.1146/annurev-statistics-041715-033420.
[5] Dastani, M.: The role of visual perception in data visualization, Journal of Visual Languages and Computing, 13(6), 2002, 601-622. https://doi.org/10.1006/jvlc.2002.0235.
[6] Rachel, V. D. S.: Development of visual perception and the role of visual concepts in critical studies, International Journal of Education Through Art, 5(1), 2009, 23-35. https://doi.org/10.1386/eta.5.1.23_1.
[7] Zhong, R. Y.; Lan, S.; Xu, C.; Dai, Q.; Huang, G. Q.: Visualization of rfid-enabled shopfloor logistics big data in cloud manufacturing, International Journal of Advanced Manufacturing Technology, 84, 2015, 5-16. https://doi.org/10.1007/s00170-015-7702-1.
[8] Hu, J.; and Zhang, Y.: Discovering the interdisciplinary nature of big data research through social network analysis and visualization, Scientometrics, 112, 2017, 91-109. https://doi.org/10.1007/s11192-017-2383-1.
[9] Ning, H.; Belanger, D. G.; Xia, Y.; Piuri, V.; Zomaya, A. Y.: Guest editorial special issue on big data analytics and management in internet of things, IEEE Internet of Things Journal, 2(4), 2015, 265-267. https://doi.org/10.1109/JIOT.2015.2459291.
[10] Yang, B.; Meloche, J.; Liu Z.H.: Visualization of the Chinese academic web based on social network analysis, Journal of Information Science, 36(2), 2010, 131-143. https://doi.org/10.1177/0165551509353373.