Study on China's Visual Sports Data News in the Omni-media Era

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Abstract—In the big data era, telling stories with data has carved out a new way for the development of sports journalism. "Data journalism" is a new form of reporting and news writing in the all-media era, and visualization, as an important tool of news presentation, can give viewers an immediate and profound impression. By integrating data with sports news, a well-designed data visualization is tailored towards audiences in a creative way. Through literature review and content analysis, this study will summarize the development process of data visualization in sports news and its characteristics, and further explore new ways of sports news data visualization in this new era from the perspectives of technology and communication. The paper supposes this theme will be of practical importance to the visualization research on the news report of major sports events.

Keywords- Omni-media, big data, visualization, sports data news

I. INTRODUCTION

Nowadays, information dissemination has distinguishing features such as immediacy, interactivity, global transformation and massive amounts of data. The public's general acceptance of information, speed of reaction and ways of data processing have undergone significant changes. With multi-platform online terminals, diversified transmission channels and data visualization forms, we have ushered in the all-media era, when advantages of different media are pressed home, resources are largely integrated and development is put in priority [1]. Among other media forms, data journalism shows great merit on all-media platforms. This is a new form of news report that can quickly capture data, dig deeper into stories through statistical analysis and present them by using visualizations, making data journalism one of the most important news report forms in this era [2].

In 2019, the State Council of China issued the Outline for Building a Leading Sports Nation, which made important instructions on the development of sports industries in the new era, further emphasized the important place sports have in national strategies, and provided a platform for the incubation of various industries. "Sports + media" will be a wide trend for sports journalism, and "picture reading" has gradually been replaced by data visualizations. Technologies in this field have matured, such as visualization technology, 5G, VR/AR, AI, and are helping promote the development of newly emerged convergent sports journalism. Among other modes, sports data journalism has visual aesthetics that are preferred by users. Characterized by diversified, real-time, comprehensive, and entertaining stories, sports data journalism shows strong advantages by satisfying users' need for fragmented reading. Sports data journalism has alleviated social issues such as asymmetric information, and instead transformed the digital divide into a driving force. Under the guidance of national sports policies, sophisticated all-media platforms and interdisciplinary research results have all promoted the competitiveness of visualizations for sports data journalism.

II. DEFINITION OF KEY CONCEPTS

A. Visualization

Visualization is in essence the process of transforming data, and logical connections into visual forms that are easily accepted by audiences. Graphics are the main component of the visual forms to communicate news and information to the audience, and the visual elements such as graphic shape, color and position have become the key factors in this communication process [3]. The application of visualization in data logging can simplify the presentation of varied data and clarify the complex logic.

B. Sports News Visualization

News visualization aims at converting news data into digital images and displaying them on the screen by means of advanced computer network engineering and image processing technologies. This means that the news is no longer presented in public places in text, but instead in visual forms to deliver a visual impact [4]. However, the concept of news visualization is ever-evolving with the development of technology. Sports news visualization is the application of news visualization in sports. However, it should be made clear that the use of data in

raw sports news cannot be regarded as an example of sports news visualization.

C. The Visual Narrative of Sports Data Journalism

The visual narrative of sports news results from in-depth processing and innovation of traditional narrative which features video, audio and text. In sports news writing, the accurate use of data is the essence of journalism. The visual narrative of sports news is to visualize abstract data and dig into the correlation within the data to form news texts that are composed of highly intertextual, dynamic and interactive visual information. These news texts are intended to reveal the in-depth information of the data [5]. The visual narrative is not merely a choice of visual forms and means. Nor is it a simple adoption of infographics or data maps to present sports news. Its ultimate goal is to present the data like telling a story, making it easier for the audience to understand. The visual narrative has changed the traditional way of sports news narrative.

III. METHODS

A. Documentation

After determining the research subject, goals and methods, we consulted through various accessible channels a large amount of documentation on sports data, sports data journalism and the visualization of sports data. We have based the study on the theories from 16 papers and 3 publications after going through relative literature at Shanghai Library and 212 Chinese and English documents and periodicals through search engines including CNKI, Wanfang Data, CQVIP and National Library of China.

B. Content Analysis

We mainly use the method of content analysis to analyze the selected visualized sports news and mathematical statistics to analyze the data sources and visualization methods of 108 visualized works. In-depth research is conducted on the specific content of the sample from the perspective of interaction design as well as the patterns and topic selection of news. The resulting statistical outcomes are expected to objectively show the characteristics and limitations of sports data news on new media.

IV. DISCUSSION

A. Changes in the visualization of sports data journalism

Data journalism, or data-driven journalism, involves using big data technology in the production of information to process massive amounts of data within a short time, analyzing the information filtered by big data, exploring the deep information behind the data through in-depth analysis and statistics, and eventually presenting the data to the audience in an intuitive and structured way. The definition of data journalism is not yet unified in the academic community. According to Guo, data journalism is considered a specific application of computational communication research in which the correlations and patterns of data are studied and displayed through rich and interactive visualization methods. As a new branch and application of journalism, data journalism has found its way into the mainstream media [6]. In general, it communicates information by adopting big data technologies to process and analyze information that is then visualized via computer graphics based on different characteristics of media.

1) From data accumulation to visual presentation

Information overload has emerged as a major problem in handling data in the era of big data. Data journalism in sports, compared with that in livelihood, economy, agriculture and other fields, is richer in variety and more complicated in content. Therefore, it is a challenge to effectively extract information from a huge amount of data, visualize and present it using the narrative skills of storytelling. In the early days of sports data journalism, the collected data were mainly arranged in a simple order and presented in the form of graphics and images. Although they appeared succinct and intuitive, their logic and structure were blurred and even not reflected. It is safe to say that the accumulation of data cannot fully show the essence and unique charm of sports [7]. Today as the visualization technology of data journalism is improving and the experience in visual aesthetics of creation practice is increasing, data journalism in sports tends to be characterized by visual narrative.

On December 1, 2019, Beijing Daily published a news report [8] following the draw for the UEFA EURO 2020 final tournament. Seeing the inefficiency of communicating the message in text, the news report used six graphs to visualize the grouping of 24 countries in six groups from A to F with their respective national flags added. In this way, the logical presentation of information was greatly enhanced.

Figure 1.   Grouping in European Cup 2020

2) From one-dimensional statistics to multidimensional composites

Sports data can be divided into one-dimensional simple data and multidimensional composite data. The former category refers to the statistical data of basic attributes of sports while the latter one is data that integrates multiple factors like time and space, previous performances and scores [9]. Data news visualization in sports should not be satisfied with showing the surface of sports events. It should strive to achieve the integration of visual aesthetics, fun and fidelity of sports news based on statistics, unfold the nature of sports phenomena and increase the depth of news reports. The visualization

methods tend to be more diversified according to different audience groups and communication channels.

During the 2016 Summer Olympics in Rio, The New York Times used tracks as the axis, on which all the men's 100m medalists from 1896 to 2012 appeared together. Readers can easily see from the distance between the competitors and the finish line that within three centuries, the 100-meter athletes have broken the 11-second record and run into the 9-second era. Prediction, as the core value of big data, allowed this report to trigger a heated discussion. It dug into multidimensional data including dynamic factors of the event and athletes' previous records and physical fitness and then communicated the news in a way that boasted both the rational charm of data and the aesthetics of visual art. Such commitments increased the depth of the sports news and maximized its commercial value to attract more audiences.
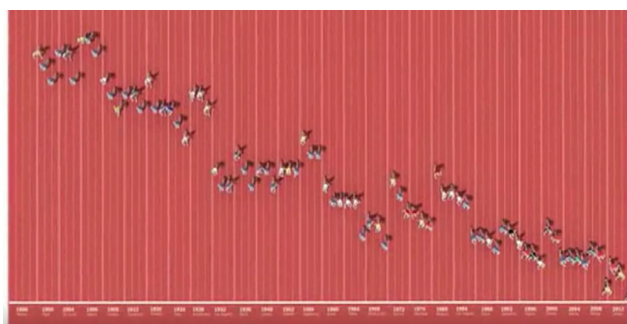
Figure 2. Comparison of Results of Men's 100m Medal Winners from 1896 to 2012

3) From one-way to interactive communication

To meet the needs of end users of news dissemination against the backdrop of media convergence, customized, diversified, aesthetic, and interactive forms should be introduced in news reports. Visualized data news with rich visual representations and a strong sense of interaction has grabbed the wide attention of news producers [10]. Nowadays, the end users of sports news on the social network have long changed their mode of thinking from text-focused to image-focused. Visual elements have become an important part of sports news dissemination. Hence, sports news visualization is the main way to meet the audience's aesthetic needs. For example, as a web portal of sports information, Sina Sports provides audiences with sports information in Chinese covering popular events around the world. With original columns, comprehensive coverage, incisive and professional commentary and the multimedia approach of expressions, the website can keep audiences informed of the worldwide events in sports [11].

Figure 3. Interactions in Live-steam Room on Tencent Sports App.

B. Characteristics of sports data news visualization in China in omni-media era

Currently, data journalism is widely used across various media platforms at different administrative levels, including the national-level People's Daily "central kitchen" news hub, as well as county-level omni-media platforms and mobile Apps. Though news producers make data news based on the characteristics and requirements of different media, the core guidance behind their work is to reduce traditional word narrative and instead use data stories to make full use of big data and digital technologies for news communication [12]. As for sports data news, the production falls into two categories: First, hot sports news at the site, created by real-time analysis through big data technology on massive sets of complicated data collected at the match site, and delivered in an intuitive way dedicated to reflecting the collected data; second, pre-match prediction, post-match analysis and related match evolution, created by analysis and comparison on the big data of previous matches, and delivered in an interactive and entertaining visualized way which presents multidimensional information and follows the need of sports journalism [13]. In general, the visualization of sports data news has the following four characteristics.

1) Complicated data sources

Data, as the core of sports data news, is diverse and complicated and needs professionals to analyze. Basic sports data includes information on the date and site of the match, weather, athletes and the match itself. Besides these conventional data, big data technology is used to promote multidimensional data mining, generating diverse data like

athletes' motion trajectory, tactic diagrams, and effectiveness of attack and defense. The massive sets of complicated data and frequent use of unfamiliar terminologies make text narrative inappropriate for sports news dissemination. Instead, the visualization of data news can present complicated data in a vivid and intuitive way, making information more expressive with better dissemination performance and easier for audiences to read.

Figure 4.   Road map of Shanghai Marathon 2020

Figure 5.   Visualized control platform for Hangzhou Marathon 2020

2)   Multidimensional reports

With the support of big data technology, sports news boasts higher possibility of data mining in terms of space and time than other kinds of data news. This characteristic allows sports news producers to collect massive sets of match data in a short time, and conduct in-depth analysis on data of previous matches, athlete experience, site history and development of the game. This expands the scale and scope of the report with abundant data to illustrate multidimensional information at every stage of the match [14-15]. For instance, we could frequently see such news report on NBA, and below Figure 6 serves as an illustration where the news producer was able to make the report immediately based on data of previous matches.

Figure 6.   Stephen Curry got a career high 62 points, Warriors revenged Trailblazers

3)   Entertaining and interactive style

As the tendency of demassification grows stronger on the Internet communication, audiences tend to follow different sports games and show varied interests. Therefore, sports news producers make tailored content for their audiences according to reading habits and sports preference of audiences, medium conventions and personal preferences. More precisely, they create user personas to make dissemination more targeted, and use visualized content to increase interaction between information and audiences, which in return further supports the user personas [16-17]. Meanwhile, converging media allows various ways of news visualization and makes sports news easier to read and more pleasing to the eye, enhancing the entertaining characteristic of sports news.

4)   Strong narrative

Narrative is another important characteristic of sports data news visualization. Sports data news visualization must be both data-driven and narrative-driven, as narrative is a key to the dissemination of data news. Data news visualization is more than making graphics, and story and logic matter. To achieve the best dissemination performance, it should make tailored content based on interest graphs of audiences and turn varied and complicated data into a clear story with strong narrative.

Simply put, sports data news embraces enriched content and forms thanks to the revolution of media technology, and tends to be multidimensional, entertaining, interactive and narrative due to the unique complicated nature of big data. Meanwhile, data visualization technology has changed and vitalized the production and presentation of sports news. It creates a new media environment which imperceptibly changes how audiences view media and what they pursue, proving the strong visual expression of sports data news.

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C. Limitations of sports data news on new media in China

1) Selected topics are too conventional

For reports of large-scale matches like the World Cup, audiences vary in sports knowledge, understanding and attention, as there may be audiences who follow the match closely, ordinary fans passionate about uncommon knowledge or gossip, and enthusiasts who prefer in-depth reports. Chinese media should know their core and targeted audiences, and design multilevel and multidimensional report topics to meet the varied requirements of different audiences. In other words, they should offer as many topics as possible in addition to conventional topics, covering from in-depth analysis to interesting uncommon knowledge, so their reports can serve as options for more groups.

2) Contents are tedious and unfocused

Some sports news reports cover massive complicated materials which sometimes include some less important ones. In this case, it is necessary to reduce audiences' reading pressure through interactive design, like putting unimportant information in one icon with an access button. Simplifying the users' operation and reading interface is the key to visualization strategy, not just for news sports reports, but also for other data reports. If a report only focuses on the form of visualization and simply puts data together, its audiences may not even finish reading it. Generally, proper visualization design can deliver the key messages of the graphic in five seconds, known as the "five-second rule". This means that the audience can quickly get what the report intends to deliver and what they want to know further, even if they just have a glance.

3) Data mining is not in-depth

Though Chinese media have a lower passion about big data at the moment, data news remains to be the mainstream. Therefore, a media platform choosing data news is like riding the tide of the era. Meanwhile, as investigative journalism in the Chinese market requires media workers to find a new way to investigate and express, data news serves their requirements well, because it is a brand-new way to report news through data and technology. However, the commercial rationale accounts more for the switch to data news than professional pursuit. Chinese media tend to report data news in a visualized way to present eye-catching and easy-to-click operation; they have no passion to explore how to utilize the data-driven way to offer professional quantitative reports and in-depth investigations.

V. CONCLUSION

The communication pattern of omni-media creates a medium environment with high potential to integrate news production and big data technology. The breakthroughs and innovation of visualization technology drive the development of sports data news, helping to present high-quality sports news in diverse visual ways and creating a promising future for sports data news in the omni-media environment. Through this research, we find that though sports data news visualization boasts many advantages and characteristics, the current sports data news on new media in China faces some certain limitations. We hope future research can focus more on the problems and provide solutions.

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