Analysis of the Impact of Big Data Technology on News Ecology

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Abstract—With the rapid rise of big data technology, big data has become an important resource of news media. Big data constantly changes the production of news and the operation of media companies, leading to profound changes in the news ecology. Based on the theory of media technology, this paper studies the problems of news production, news dissemination, news occupation and the evolution of news sources, and analyzes the impact of big data technology on news media, news content, news environment and other elements of news ecology.

1. Introduction
The development of media technology has a profound impact on the development pattern of media industry. From the perspective of news ecology, the emergence of radio and television technology has replaced the central position of newspaper media in the news ecosystem. The rise of Internet technology has changed the news ecosystem from a central structure to a non-linear network structure. The Internet has become the medium of media, connecting TV, radio, newspapers, magazines, social media, even large retailers and many other media forms. The production process and presentation form of news are more diverse, and the traditional media are evolving and even rebirth in the drastic change. The change of technology endows each element of the news ecosystem with a new form and connotation. They influence each other and promote their own development. Big data is changing the way the human world runs. Data in different fields are reorganized or reused through the form of "Internet plus", resulting in immeasurable value. The industry and domain formed by social division of labor are being rebuilt, and news media are also in it.

With the continuous development of information technology, big data has become a resource accumulated in the process of social development. The development of computer storage technology makes the data of human society increase at an indescribable speed. How to mine and process massive data becomes the key to its value and significance.

Big data is not only one of the important resources of news media, but also changing the way of news production and survival. The intelligent trend of news industry has a profound impact on news production process, news communication mode, the relationship between news communication audience and news production media and many other news ecological elements. Big data technology has greatly increased the proportion of media technology applied in the field of news. It is difficult to define the role and status of people in the news ecology, which brings about problems such as values, journalism professionalism and social responsibility. This paper explores the application of big data in
the news ecological environment, and studies the impact of the application of big data in different forms and degrees on the news ecology.

2. News Production Tends to Be Automatic

2.1 Data Dews
The traditional news process is usually a small team cooperation of 1-2 journalists, that is, according to the planned topics, interview the interviewees, obtain the information in the form of text, voice and video, and then organize and edit to complete the news release writing or news video editing. The application of big data technology in news collection has realized the evolution of news production process from manual to computer automation. The vigorous development of data news is a typical representative of computer automation news production.

Data news is different from the previous computer-aided reports or accurate news. It is no longer a local survey sampling and a relatively simple quantitative analysis, but has strengthened the scale of data, the depth of data mining and presentation. The significance behind the mined data usually has high news value, either by exposing the “blind spots” that the public rarely pay attention to, or the topics closely related to the audience but not paid close attention to by most people.

2.2 Automated Writing
Automatic news writing is that robots predict the parts that may be concerned by users from the vast network of information, follow the algorithm to mine, and present it in the basic format of news reports. This is actually computer self-learning and the analysis of massive data. The core technology is cloud computing and big data analysis. The intelligent algorithm automatically generates and publishes more and more sports and financial news and emergency reports by sorting out the real-time data automatically collected by the computer. The first advantage is “fast”, which can release news almost at the same time as the incident occurs; the second is “quick follow-up”, which constantly collects the reactions of all parties after the incident, and quickly releases follow-up reports. This kind of automatic news has no cost, and because it is based on massive data, the news report presented is closer to the real objective, which is far beyond the traditional news production method of style interview. At present, due to the limitation of algorithm, automatic news can only be limited to sports, finance, emergencies and disasters.

How to obtain valuable data? Is it representative sampling or mass coverage? Is the user feedback received from one person or from all sides? These problems make the news media pay more and more attention. In the era of big data, the core competitiveness of content producers increasingly depends on the breadth and depth of news valuable information and data they can obtain. The acquisition and mining of big data is difficult for traditional news media to complete by manually collecting information. News media must reconsider their own business composition.

3. The Socialization of News Dissemination

3.1 News Value Flows to Social Media
According to a research report released by Pew Research, the proportion of American adults who get news through social media such as twitter and Facebook increased from 42% to 62% from 2012 to 2016, 18% of them get news from social media "very often". According to a survey conducted by the research center in 2017, 45% of social media users in American adults use Facebook's information service, and 50% of them only get news from Facebook.
In the era of traditional media, content as an advantage helps newspapers and TV occupy the core position of the news industry. In the Internet era, the channel advantage of social media is better than the content advantage of news media in the dissemination of news. News value is flowing to social media.

Compared with traditional browsers and other information applications, news and information terminal applications gradually attract more users with its more real-time and aggregated information services.

According to the data of domestic news and information terminal applications, news and information app users are nearly saturated, and the demographic dividend gradually disappears. The overall scale of news industry users tends to be stable, and market competition forms a new industry pattern. In addition to the news clients of portal giants, more vertical news and information apps rely on intelligent algorithms to recommend content aggregation information products to attract customers and occupy the information market.

**Table 1. Domestic Mainstream News Information Platform[1]**

| Platform | Slogan | Product positioning | Product advantages |
|----------|--------|---------------------|--------------------|
| Toutiao  | What you care about is the headlines | Accurate and differentiated content recommendation based on personal characteristics | Big data and algorithm advantages, we media content production advantages based on headlines |
| Tencent  | Know everything in the world | Provide news information quickly, objectively and fairly | With QQ wechat and other Tencent products channel advantages, push speed is fast |
| NetEase  | Each has his own attitude to ride the wind and waves | News with attitude | The content advantage of NetEase portal is integrated, and the content quality is guaranteed. |
| ZAKER   | Delivering value information | Deep personalized customization integrates all kinds of content | Users can subscribe to the content independently, patent typesetting and content editing |
| Sohu    | Sohu News first | All media information platform | We media add fast and have many channels |
3.2 Symbiosis of Traditional Media and Social Media

Smart phones not only change the way people communicate with each other, but also change the way of information transmission. The integration of radio and television, mobile communication and the Internet promotes the rapid development of new formats such as mobile applications and social media, and accumulates a huge information consumption market. The huge number of users makes the media industry enter an unprecedented period of great development. Relevant supporting technologies such as cloud computing and big data continue to upgrade, which breaks the boundaries of media, professional media and other media forms are existing in the news ecology in a symbiotic way.

In the pre-news media era, the news production process ended at the moment when the report was broadcast or published. Because of its monopoly on news, traditional media do not need to consider the effect of information dissemination, audience recognition and other feedback information. In the era of new media, audience feedback is also a part of news information service. While focusing on the production of media content, news media should also comprehensively analyze users’ selection, acceptance, forwarding and comment on news information through user behavior data, so as to provide personalized information service according to user feedback and improve the competitiveness of news media.

If traditional media and social media can share user data, traditional media can establish citizen news database with the help of social network, and maximize news dissemination by using the proportion of users of social network. Social media itself will also be more competitive in pushing content, thus gaining more user activity.

In terms of content production, traditional news media still have inherent advantages, and the channel advantage of social media is also a necessary condition for communication. Therefore, exploring the symbiosis of the two is one of the effective ways for traditional media and social media to break through and innovate.

4. Journalists Have More Diversified Majors

4.1 Loss of Monopoly

Individual citizens may become news collectors at any time by using the shooting and network publishing functions of smart phones. Citizen news can spread rapidly in a short time and become a social hot spot. Professional journalists are no longer the only insiders of news. Relying on big data technology, intelligent writing robot can replace manual writing in specific fields, and automatic media editing program can also free journalists from heavy news editing work, but at the same time, it has brought about the reduction of relevant posts, and even completely replaced by robots [2]. The traditional monopoly position of journalists has been lost in both the mastery of news information sources and the writing of press releases.

4.2 Ability to Interpret Data

In the future, the interviewees of journalists are no longer individual people, but a complete database. Sensitivity to data is one of the essential qualities for future journalists [3].

In the era of big data, journalists must have the innovative ability of data collection, processing and visualization, which is based on news thinking and sensitivity [4]. Journalists need to find news perspective from massive data, extract events from the complexity of data, and express them in the most attractive visual way, so as to enhance the persuasiveness of news and improve the effect of information dissemination [5]. Social media is one of the important sources of news data. The ubiquitous sensors in cities are also huge data networks. The government, enterprises and scientific research institutions have more advantages than journalists in collecting such data. Of course, the news media can also establish their own data collection system to carry out network survey on the public for certain problems. Generally speaking, because of the personal privacy involved, journalists still have a huge advantage in access to the database, so the ability to interpret data becomes the key to the reconstruction of news communication power under the background of big data.
4.3 Multidisciplinary Integration

Journalism belongs to social science in the traditional classification. In the traditional media era, journalists only need to master the news acquisition and writing technology of single attribute media. However, the application of big data technology in the field of news makes news gradually turn to multi-disciplinary integration.

The greatest charm of data news lies in that it compares the seemingly unrelated mass data in the form of charts, filters out the complicated data generated in the process of news events, and restores it to the news event itself, so that the audience can understand the news story at a glance. The five main projects of the belt and road initiative planned by South China Morning Post uses dynamic maps to show related projects. For example, in the report page of “plugging China into Europe”, you can start the “digital train” from Yiwu to London by rolling down the mouse. The window on the left will display the geographic and cultural information of the corresponding site, so that readers can feel the feeling of going to Europe by train in person.

![Figure 2. The Five Main Projects of the Belt and Road Initiative](image-url)

With the rapid development of data news, the demand for professional ability of journalists in the field has been constantly improved. The production of data news requires journalists to have the following abilities: (1) The ability to collect, screen and analyze professional data, which requires journalists to have a computer-related technical foundation. (2) The ability to visualize big data, that is, with the help of computer graphics technology, to design news presentation forms with extraordinary expressive power by artistic means, which requires journalists to have art and computer facilities Education background. (3) If news media want to cooperate with social network and other diversified data sources, journalists need to have sufficient professional ability to filter redundancy in the vast ocean of information fragments and find information value.
At present, the big data technology teams of most media groups all over the world are composed of programmers, designers and journalists. However, the most important part is still the reporter editors, whose mode of thinking determines the final presentation of news stories.

The current “Newsman” is no longer the concept of individual journalists, but a multidisciplinary team covering data collection, data mining, AI technology, intelligent algorithm and so on. News media can also directly cooperate with data technology companies to innovate the development path of big data era.

5. Popularization of News Sources
Before the popularity of the Internet, traditional media was the only channel to control the spread of news and information. With the rapid development of network media platform in the field of news, individual users can not only produce information, but also distribute and disseminate information. The intelligent information distribution in the era of big data does not have a complete and sufficient shutdown system. Therefore, personal opinions may lead to group effect and aggregate a large number of users, cause large-scale forwarding, and even affect the agenda setting, which, to a certain extent, weakens the connection of traditional professional media on the control of communication content and communication channels.

The large scale of information data makes it possible for users to make personalized choices, and the experience of users' news media platform is constantly improved. The demand of news consumers has been changing, not only from single to multiple, but also from passive acceptance to active choice. In the era of big data popularized by mobile terminals, the positioning of news consumers has also changed. They are both the receivers of news and the producers of data.

The rise of social media has made the spread of news very fast. The front-line "reporters" who first send back reports have changed from professional journalists to unknown passers-by. Information dissemination has changed from the traditional news media to the receiving terminal one-way mechanical transmission to the multiple transmission of non-linear and atomic explosion between social media. In the process of multiple news transmission, the event progress is affected by the results of social network news dissemination, and the public has become a part of the news process. The first time of social events, pictures from various angles and scenes spread rapidly in social media, and various demands and rescue were also launched through social media. In the news reports broadcast by the follow-up TV stations, there is no news value except for the official comments and explanations. Therefore, the value of the follow-up reports of news media lies in more authentic and authoritative background information, which requires professional media to analyze massive background data and put forward different views.

In the process of consuming news, the user is the receiver of news firstly, and his behavior of sharing and reprinting makes the user become a new communication center and the transmitter of news events. The user comments on the news, which produces new data. His opinion or query may become the second driving force to promote the news progress, thus participating in the news and becoming the news producer. When the event occurs, the user publishes the information collected in the first scene through the network, and the user becomes the news collector and information source. The mood, experience, opinions and comments released by users all the time on the network can be an important data source for news planning themes. The positioning of users in news consumption has undergone a subversive change.

Traditional media play the role of “Gatekeeper” with monopolistic information resources and technical support. The setting of media agenda determines what people “see”, and then influences people's “What to think” and “how to think” [6]. With the development of Internet technology, media information is rapidly transmitted to the public in an explosive manner. However, with the spread of media audience and the rise of competitive we media, the original structure of mass communication has been completely changed.

With the development of big data technology, great changes have taken place in the media agenda setting, and the concept of data has gradually penetrated into news reports. From individuals to groups,
and then to the media, the agenda setting is completed from bottom to top. It is a new way for media development to show news events in an all-round, multi angle and objective way with data.

For news media, the study of users is very important because of the change in the way users accept and process information in the news ecology. Users' preferences will be affected by age changes, personal experience, social hot spots and other factors. Using big data and intelligent algorithms to understand users' interests, preferences and behavior trends can continuously increase user stickiness, so as to aggregate more user original content and form a larger data information source.

6. The Negative Impact of Big Data

6.1 Incomplete Leads to Unreal
In the era of big data, the Internet of things and the Internet generate and store an astonishing amount of data every day, but there are very few data that can be mastered by professional media. The reason is not only that the number of users is not fully covered, but also data sharing is almost impossible to achieve, and the data that news media can access is difficult to achieve diversification in dimensions. No matter in terms of quantity or dimension, the current big data is not all data. Not a full sample means that it is biased to some extent, so the analysis of big data should fully consider its sample coverage.

Different enterprises continue to bring forth new ideas by various means to attract users' attention and obtain user data. However, this is not the whole data of users. Due to the monopoly of the data owned by various industries, it is difficult to make the data public, which may cause the industry data to be artificially tampered with or discarded in the process of collection, storage, analysis, sorting and transmission. The advantage of data lies in its authenticity. At present, big data technology is still in the primary stage of development, and the completeness, authenticity and singleness of data are difficult to be guaranteed. Its application will also be negatively affected. The media industry should carefully examine its objective value.

6.2 The Subjectivity of Intelligent Algorithm Affects the Objectivity of Data
The value of big data lies in algorithms. The core of big data technology competition is not only the share of data, but also the intelligence of algorithm. The precise and intelligent value matching characteristics of big data will upgrade and reconstruct the relationship between people, people and things, and things and things.

Users give their behavior data to the intelligent algorithm without reservation, so that it can get the user's decision preference, sketch out the personal information picture, so as to predict the user's behavior and even thought, and then push back to the user, so the user accepts the thought, behavior and choice given by the algorithm. The choice that users think they have made may only be an action command issued by the algorithm on the basis of comprehensive analysis of information environment and user personality. Algorithms are unwittingly stealing users' subjective power.

6.3 Privacy Protection
In order to get the corresponding service, we have to provide personal information. User data is analyzed, mined and classified in the database, which becomes the basis of business strategy. When news production also analyzes and sorts out big data, it is inevitable to retrieve users' private data, and users are not in the whole process. Users do not have the right to know about the acquisition and processing of data, so they can't say “no” to data collection. Users bear a huge risk of privacy security, and news production may also violate the privacy of users.

Finding the balance between news content production and user privacy protection and truly realizing user privacy security by technology and system will be an important guarantee for the sustainable development of news media under the background of big data.
7. Conclusion

Big data technology makes news response faster, news clues more accurate, and news background mining more in-depth and comprehensive. The traditional media lost the monopoly of information, and the audience became the media. With the help of artificial intelligence, news production has realized automation and coordination. The positioning and connotation of “newsman” in news production has been subversive changed, and the news ecology has been reconstructed. At the same time, the authenticity of big data is difficult to guarantee, big data may become the puppet of algorithm, and how to protect user privacy and other issues need to be solved.

References
[1] Sootoo Network Research Institute. “Research Report on Q2 news and information app in 2018”. July 2018.
[2] Ran Mingxian, Liu Ranran, Deng Liwu. “Analysis of journalists' living space under the background of robot writing”. Journal of news research. No. 20, 2015.
[3] Qiu Junxi, Chen Changfeng. “The innovation of Journalism under big data thinking: the exploration of data based journalism in Britain and America”. China Radio and television journal. July 2013.
[4] Wu Fei. “New media changes the life of journalistic professionalism? -- citizen journalism movement and the responsibility of professional journalists”. Journalist. March 2013.
[5] Wang Ping. “Reconstruction of news communication power in the era of big data”. China Radio. November 2014.
[6] Xie Rui, Zhu Yanyi. “Media agenda setting under big data”. News research guide. December 2015.