

The Evolution and Reshaping of Data Journalism Value in the Metaverse Technology Context

Guoguang Li^{1*}, Dongli Ma¹

¹ Sichuan University of Media and Communications, Chengdu, Sichuan, China

Email Address

lgg02@sina.cn (Guoguang Li), 810675630@qq.com (Dongli Ma)

*Correspondence: lgg02@sina.cn

Received: 11 July 2023; Accepted: 28 July 2023; Published: 17 August 2023

Abstract:

With the advancement of information technology and the evolution of human civilization, information technologies such as artificial intelligence, big data, cloud computing, and blockchain, rooted in mobile communication, have experienced rapid development. In 2021, the metaverse emerged as the ultimate version of virtual reality technology, building a more advanced and realistic virtual space for people through forms such as virtual reality, augmented reality, and mixed reality. Within the Metaverse, what changes might occur in the presentation of data journalism driven by big data? Will there be a shift in the value of data journalism in immersive environments? Taking the visualization of data journalism as a starting point and combining the technological characteristics of the metaverse, this paper re-examines the value of data journalism from the perspectives of instrumental rationality and value rationality. It proposes a realistic way to reframe the value of data journalism in the era of the Metaverse, and aims to provide constructive interpretations for assessing the value of data journalism.

Keywords:

Metaverse, Data Journalism, News Value, Transformation, Reshaping

1. Introduction

The concept of the metaverse has gained substantial attention from both society and academia since its inception. For over a year, discussions about commercial strategies and academic inquiries related to the metaverse have been continuous. So, what is the metaverse exactly, and how is it different from virtual reality technologies like VR? What changes can we expect in the presentation of data journalism based on big data under metaverse technology? What are the differences in determining the news value between the metaverse and the present? These questions are of crucial guiding significance for the development of data journalism in the metaverse era. Perhaps even Mark Zuckerberg did not anticipate that the term “metaverse” would become the culmination or ultimate state of development in the mobile internet landscape when he introduced the concept. According to Du Junfei, the metaverse is a digital platform for

interaction built on the infrastructure of Web 3.0, which makes use of 3D or MR representations to merge real and unreal scenarios, thereby allowing users to have immersive experiences. [1] The metaverse, viewed philosophically, symbolizes digitization's potential future, centered on an image-based technology in a generation powered by technology. [2] Chen Changfeng emphasizes that metaverse technology, according to the virtual reality perspective, is driving transformative changes in the digital news industry, requiring a redefinition of news in the mobile internet context. Data journalism has emerged as a new form of journalism with the development of Internet technology. The evaluation of news value in data journalism is commonly determined by the subjects reached through it. The news value viewpoint facilitates analysis of whether the narrative accumulation of data is justifiable. [3] In the era of the metaverse, the combination of big data as “mediated facts” [4] and virtual reality provides users with an unprecedented sense of data immersion through the visualization of data. Could this potentially influence the analysis and assessment of big data, thereby altering the determination of news value? Peng Lan also expressed concerns about whether the over-immersion of the metaverse could turn into a devouring “black hole” that consumes individuals. [5] Previous studies have focussed mostly on the integration of immersive experiences using metaverse technology and how value is demonstrated in data journalism. However, there is less attention paid to the development of the value of immersive data journalism in the context of metaverse technology. The following paper takes the impact of metaverse technology on the value of data journalism as a starting point. It analyses the trends in the development of data journalism and proposes a way forward for reshaping the value of data journalism. Through this approach, the aim is to widen the theoretical perspective of data journalism value and provide inspiration for research into the value of data journalism.

2. From Instrumental to Value Rationality: Data Journalism Production Logic

Max Weber, the German philosopher, proposed the concepts of value rationality and instrumental rationality. According to him, these are two unique modes of social behavior and are characterized as “value-rational action” and “instrumentally rational action”. [6] In value-rational action, the focus is on the pursuit of absolute and unconditional values. In contrast, instrumentally rational action is geared towards using tools to accomplish goals and maximize outcomes. Data journalism is a new form of journalism that produces news through data-driven processes. It is defined as a quantitative reporting method that uses computer programs to collect, analyze, and present factual and statistical materials. [7] In data journalism, the production process typically involves the use of web scraping tools to collect, cleanse, analyze, and filter relevant data and then present it through visualization. Regarding production, programming or open-source software are employed as tools for acquiring, cleaning, analyzing, and presenting data in data journalism. Instrumental rationality is an important part of the entire data journalism production process. However, when considering the societal function of data journalism, a sole emphasis on instrumental rationality could lead to means overshadowing ends, giving rise to what Max Weber referred to as the “iron cage” of modernity and resulting in a deviation from the core values of news. From the perspective of journalistic professionalism, the use of data should enhance news reporting and serve the public interest. Alberto Cairo, a Spanish data journalist, believes that data journalism is not about presenting data itself, but

about serving the individuals or entities that the data represents. Therefore, for data journalism reporting, it is crucial to consider the newsworthiness of the subject by shifting from instrumental rationality to value rationality, and to enable the transformation of the communicative context from “information dissemination” to “knowledge dissemination”.

2.1. Everything is Data: Life Quantified by Data

The philosophical viewpoint “Everything is numbers” originated from the Pythagorean school of ancient Greek philosophy. This viewpoint asserts that numbers serve as the foundation of reality and are the basis for determining the form and essence of all things. According to this viewpoint, numbers are considered the governing principles and relationships of the world. [8] The advancement of internet technology has facilitated the widespread use of sensors in mobile communication, making “quantifying everything” an achievable reality. People’s lives are increasingly becoming digitized. The concept of “numbers” has widened to include not only quantified numerical values but also all textual and symbolic content that can be digitally represented. All these aspects are consolidated under the term “data” and used in data journalism reporting. According to American scholar Nicholas Negroponte in “Being Digital”, computing is no longer about computers alone, but rather, it revolves around living. [9] Due to the widespread use of sensor-based wearable devices, data has become ubiquitous, penetrating every aspect of life with information. The concept of a “data-driven existence” has become a tangible reality. As opposed to a “digitized” existence, a “data-driven existence” accentuates data as the instrument, method, and medium for interaction between people and digital space. [10]

2.2. Data Visualization: Presenting data in a technical way

Exploring creative and diverse forms of presentation is a trend in the global field of data journalism. [11] The theory of the “pictorial turn” was introduced by American scholar Thomas Michel, who suggested that disciplines like philosophy and sociology are shifting toward images. Contemporary culture is gradually moving away from the language-centered rational cultural model to a more image-centered emotional cultural model, with the advent of the visual era and the shift towards image culture. [12] Data journalism has emerged in the era of the “pictorial turn”. From an operational perspective, data journalism focuses on data as its main content and centers around it. It transforms complex and abstract data into visual graphics, thereby creating a multi-dimensional and vibrant narrative structure. Data visualization is a symbolic expression that visually encodes the content of data and the relationships between data elements. Common ways of expressing it include timelines, spatial representations, and hyperlinks. By interacting with these visualizations, such as dragging a timeline slider or clicking buttons for different spatial locations, users can access simplified information related to their actions. As they continue to interact, more comprehensive information is revealed.

Data journalism visualization is achieved through two technological foundations: computer programming languages and mobile communication technologies. On one hand, programming is used to select appropriate visualization charts based on news content. Statistical theories help in presenting data dynamically, thus improving its visual representation. On the other hand, 5G technology has a significant influence on the effectiveness of data visualization regarding presentation quality. Data journalism

is commonly presented in web formats, necessitating high-speed image loading and low latency for animated graphics. Using Roy Ascott's phrase "The Future Is Now" to describe the future of the metaverse, the rapid advancement of 6G is foreseeable. The "Global 6G Technology Conference" held in Nanjing on March 22, 2023, marked the arrival of the future where 6G will serve as a link between the real physical world and the virtual digital world. [13] Immersive data content characterized by visual, auditory, and sensory elements will likely shape the future direction of data journalism.

2.3. Data-Driven News: Interpreting News Value

The purpose of data journalism reporting is not just to explain the significance of the data but also to selectively use it to demonstrate the value of the reported topic. Data analysis is a crucial step in demonstrating the news value. In the era of big data, new standards have emerged beyond traditional news value. An essential method of interpreting the value of data journalism is through speaking with data. Under the influence of big data, data journalism is distinguished not only by its substantial volume but also by its wide scope. Data journalism narrative involves concretizing abstract data, uncovering correlations between data points, and discovering the profound meanings hidden within the data. [13] Even when big data becomes the central content of the news, it is still critical to follow the traditional five elements of journalism and employ data to convey stories with emotional impact. To improve storytelling, it is essential to analyze data logically, reorganize it from diverse perspectives, and add elements of accuracy and humanity to narratives using a scientific approach. This approach not only boosts the effectiveness of the narrative and enhances innovative storytelling techniques but also reflects news value. In the metaverse, with the advancements of 5G and 6G technologies, data analysis and presentation have improved, permitting more efficient and speedy data acquisition. This guarantees that data journalism utilizes big data intermediation to interpret news value comprehensively and profoundly.

3. Fusion of Reality and Virtuality: the Transformation of Data Journalism Value

The technologies associated with 5G have transformed people's lives and redefined the conventional notion of physical presence and absence. [16] In the metaverse, driven by the influence of digital twins, the fusion of reality and virtuality emerges as a prominent aspect of the internet in the metaverse era. The emphasis on spatial concepts, especially the pairing of augmented reality, is prompted by the body's response to spatial stimuli. [17] It introduces the body as a variable in the process of acquiring data for journalism. Immersive perception engenders fresh ways of bodily presence and absence, impacting the authenticity and objectivity of data journalism and also affecting the evaluation of its worth.

3.1. Fusion of Reality and Virtuality: The Transformation of Data Journalism Value

3.1.1. The Value of Data Journalism in the Context of Technology Availability

In 1979, the American psychologist James J. Gibson introduced the concept of "affordance" in his book "The Ecological Approach to Visual Perception" as a means to describe the association between animals and their environment. He opined that "the affordance of a specific environment is what it offers the animal, what it provides

or furnishes”. [18] In 1991, the British design theorist William Gaver incorporated this theory into the area of design, using the phrase “technological affordance” to investigate the relationship between the technological environment and its users. It illustrates the potential of a specific technology, primarily new technology when utilized by individuals to complete specific tasks. At present, virtual reality (VR) technology has been extensively used in data journalism. With the profound level of immersion and interaction accessibility offered by virtual reality, data journalism representation has been diversified and enriched, thereby increasing its communicative value. In 2018, The Arizona Republic won the Pulitzer Prize for Explanatory Reporting with their data journalism piece titled “The Wall: Unknown Stories, Unintended Consequences”. Through the skillful combination of text, videos, podcasts, and virtual reality technology, the report presented the challenges associated with constructing a barrier along the U.S.-Mexico border, as well as the unexpected consequences, from multiple angles. In the future, metaverse technology will provide users with high-quality mobile holographic experiences, eliminating data barriers in data journalism. Valuable information will be extracted from vast amounts of structured, semi-structured, and unstructured data through intelligent algorithms. As for data presentation, high-immersion XR technology will provide a unique and immersive perception experience, offering a comprehensive sense of immersion and interaction.

3.1.2. Relevance Transfer of News Value Under Schema Cognition

Schema theory, which has roots in Kantian philosophy, states that schemas are fundamental sources of imagination, representing broad generalizations of numerous individual experiences in life. In everyday life, people automatically categorize specific stimuli into preexisting cognitive structures, also known as schemas, to facilitate comprehension. Cognition based on schemas associates datasets with distinct attributes by using storytelling. This connection, which is anchored in the core of news value, strengthens the link between visual stimuli and narrative content, creating a sense of deep contemplation. [19] Schema-based cognition, in data journalism reporting, reinforces Wertheimer's proposed Gestalt visual perception theory by expanding the users' perceptual schema-based cognition. This facilitates comprehensive perception of big data content, while also enabling the transfer of relevance in news value. It enables users not only to read news in the real world but also to have schema-based cognition in the realm of virtual reality. Therefore, it expands the scope of data journalism value assessment.

3.2. Narrative Storytelling: Emotional Shift in Data Journalism Texts

The virtual reality technology has transformed the narrative storytelling approach from a literary technique into a new form of interactive storytelling. It allows emotional expression within news texts to be constructed within a “hypertext” technological environment. Data becomes a symbol of emotional expression. This shift from rationality to emotionality broadens the significance of data journalism. It enables users to empathize through interactive experiences and provides room for user engagement in emotional storytelling. For example, the 2014 Global Data Journalism Award-winning work “The Migrants Files” established a rigorous and comprehensive database of migrant deaths through data collection, documenting information of over twenty thousand refugees who fled to Europe since 2000. The work employed interactive maps to depict refugee death counts in various European regions.

Throughout the interactive process, users comprehended the European immigration crisis through colors and numbers, generating emotional resonance. Unlike the passive relationship between communicators and recipients, users' emotional connection to news content is more intimate, representing the emotional expression of various actors within the news ecosystem beyond the standards of news value.

From this perspective, the assessment of data journalism value should not be confined to static and rigid criteria set solely by news producers. Rather, it should involve users in a "co-creation" process within the news production, integrating user-generated emotions into the narrative storytelling of news texts. Through the narrative expression of data, the emotional impact of news reporting is enhanced, accomplishing the emotional shift in data-driven narrative storytelling.

3.3. Embodied Communication: Integration of Body and Technology to Construct Immersive Experiences

In the early stages of the metaverse, data journalism facilitated an emotional experience where readers and the text were jointly present, shifting the narrative space from screen-based textual expression to an expandable virtual realm. This reconstruction led to a novel triadic relationship among creators, narrative works, and users. Baudrillard posited that media constructs virtual simulated worlds through informational symbols, giving rise to a "hyperreal" illusion. Virtual reality technology transforms users' engagement with data journalism into an immersive experience, where users, aided by wearable devices, perceive data stories through a first-person perspective. This immersive perception generates a sense of "hyperreality", making users feel truly present. Guided by narrative storytelling paths, it constructs empathetic psychological resonance and offers users a more compelling and immersive experience through experiential interaction. This approach provides a new direction for constructing news value.

4. Multi-dimensional Narratives and Comprehensive Experiences: Reshaping the Value of Data Journalism with Metaverse

As the primary communication technology of the future metaverse, 6G will serve as the link between the physical and digital worlds. It is foreseeable that in the era of 6G, data journalism will become more expedient, three-dimensional, and immersive in terms of data collection, cleansing, analysis, and presentation. In terms of news narratives, data journalism will extensively and profoundly "speak through data", expanding the boundaries of its value. In the metaverse era of data journalism production, the key to creation lies in how to conduct multi-dimensional narratives that enable users to experience full awareness, thereby reshaping news value.

4.1. Multi-dimensional Narratives: Big Data Narratives and Detailed Storytelling

From a narrative perspective, data journalism should be grounded in principles of authenticity and objectivity. In the metaverse era, employing big data-driven narratives requires multi-dimensional perceptible presentation in terms of narrative themes, structures, styles, etc. Using data for narrative entails a detailed and story-like depiction, revealing a greater depth of detail.

4.1.1. Using data to tell stories and reflect humanistic sentiments

Before undergoing the cleansing process, massive amounts of data are often unstructured, disordered, and devoid of emotion. In the production process of data journalism, utilizing open-source software to clean and analyze data, and employing these data in a meaningful way, imbues the narrative with warmth and imbues the story with a humanistic sentiment, making it especially significant. Alberto Cairo, a professor at the University of Miami, USA, has put forth the viewpoint, “Never forget that behind the data are people; this is our core goal”. He believes that in data journalism, data is merely a source, and the primary objective of journalism is to serve the public interest and embody the humanistic spirit behind the data. In the realm of data journalism under the influence of metaverse, during multidimensional immersive storytelling, it’s crucial to fully leverage the strengths of data journalism. This involves integrating big data into the narrative, seamlessly blending macro and micro perspectives, encompassing both the whole and the parts, incorporating social contexts and individual destinies, and ultimately creating a form of reception and identification experience that aligns with the requirements of humanistic discourse. [20]

4.1.2. Combining narrative with argumentation improves the accuracy of data journalism

As a quantified form of journalistic reporting, data journalism plays a crucial role in supporting news facts with data content, directly contributing to the accuracy of factual reporting. This form of argumentation assists in conveying the thematic expression within news narratives. In the production of data journalism, it’s essential to analyze data for argumentation, combining it with facts to arrive at scientific conclusions that make the news more genuine and authoritative. However, as a novel paradigm of news reporting, data journalism is fundamentally journalism, and its primary function lies in narrative using journalistic elements. Therefore, it is important to judiciously utilize the argumentative function of data journalism within the macrostructure of its narrative, supplementing and clarifying news facts to enhance the logical rigor and persuasiveness of the storytelling. In the era of the metaverse, it’s even more crucial to manage the relationship between extensive data and both argumentation and narrative. By leveraging technological processing, the immersive perception of data journalism can be enhanced. Simultaneously, addressing issues like news authenticity and reporting objectivity is vital to enhance the communicative impact of data journalism.

4.2. Full Sensory Experience: A New Dimension of Data Journalism Value

From the current trajectory of technological advancement, with the progress of sensor technology and the widespread integration of technologies such as 6G, artificial intelligence, big data, cloud computing, and blockchain into data journalism, new dimensions of news value will emerge beyond traditional journalistic principles. As users engage with news, they will experience a comprehensive “pleasure of reading” through a multi-faceted perception, enhanced by the utilization of these technologies.

4.2.1. Multi-sensory experiences increase engagement and enjoyment

From the perspective of news value, the widespread use of sensors renders users' bodily organs as “components”, immersing them in the sensory perception of data journalism and adding a sense of fun. Under the framework of metaverse technology,

data journalism transforms users' experience from traditional "reading" into a holistic "immersion". The heightened immersion offered by the first-person perspective creates a more three-dimensional encounter with data content. Within the blended virtual and physical metaverse, there will be an increasing emphasis on bodily experience, as the body serves as a direct link between the realms of real and virtual, facilitating their integration. [17] This blend of virtual and real immersion imparts users with a sense of identification akin to that experienced in games. Just as Huizinga proposed in "Homo Ludens", "man begins with play, culture begins with play", the gamification of data journalism adds an element of amusement to users' multi-sensory experiences.

4.2.2. AR technology enhances the timeliness of data journalism

Augmented Reality (AR) technology is currently the "first gateway" to enter the metaverse, integrating visual interactive technologies of AR, VR, and MR. Through wearable devices, it creates an environment where reality and virtuality merge, enabling human-computer interaction. This technology provides users with a seamless transition between the virtual and real world, offering an immersive experience. Virtual Reality (VR) was the earliest technology used for immersive news reporting within the realm of virtual reality. For instance, in 2015, The New York Times developed the NYT VR app and distributed Google Cardboard-style VR glasses to over a million subscribers while reporting on major hot topics. Currently, VR technology for news reporting has matured, and the application of AR and MR technologies in the field of news communication is gradually increasing. With the support of Augmented Reality (AR) technology, data journalism will offer a highly immersive experience. Amid the interconnectivity of everything and the constant online presence of data, users can comprehensively perceive various types of data and achieve real-time updates in data exploration. This aspect of timeliness holds significant value.

4.2.3. Interactive experiences enhance the interactivity of data journalism

Currently, interactivity is a distinctive feature that sets data journalism apart from traditional journalism. The interactivity in data journalism is more immersive, allowing users to better understand the facts and values conveyed by the news and even participate in the news production process. On one hand, journalists collect and gather factual data from authoritative data platforms during the production of data journalism. They then clean and analyze the data for relevance before presenting it in an interactive visual format. When users read the news, they can simply move or click the mouse to reveal relevant narrative content. Paul Bradshaw believes that the forms of dissemination for data journalism should be given special attention. Among the six forms of data journalism dissemination he outlines, he considers social dissemination to be a fundamental condition for the personalized dissemination of data journalism. In addition to visual information graphics spreading quickly on social media, the dissemination of the data itself is also suitable for social media platforms. On the other hand, media outlets can involve users in the production of data journalism by adopting a crowdsourced news approach, thus enhancing interactivity. The crowdsourced news model allows users to participate in the process of creating data journalism, transforming the sources of news facts from professional journalists to the general public. Previously, the data content investigated, collected, and analyzed by journalists is shifted to users. Journalists only need to assess the value of the

information provided by users and then aggregate it. This not only broadens and deepens the scope of news content but also encourages users to actively share the reports on social media during the dissemination process. For instance, The Guardian's data blog collected a staggering 450,000 documents while investigating the expenses of Members of Parliament. Due to the immense volume of data and time constraints, The Guardian implemented an open project for readers to participate in the analysis of the materials. Readers were invited to identify anomalies in the data and uncover the news value. Therefore, interactive data visualizations play a role in altering the narrative logic of news and enhancing its entertainment value. [22] With the advancement of 6G technology, data journalism will become even more interactive, with stronger user engagement.

5. Conclusions

Data journalism, a new form of journalism that has emerged as the Internet has developed to a certain stage, is closely tied to the acquisition of news data materials through Internet platforms. The metaverse, as the next stage of internet development, constructs a blended space of virtual and real through forms like virtual reality, augmented reality, and mixed reality. Data journalism represents a new genre of journalism in the metaverse era, characterized by highly immersive data acquisition. Users' reading of data journalism will shift from being visual to auditory and perceptual. Metaverse technology will reshape the value boundaries of traditional data journalism, leading to the transformation of news value scope and the emergence of new dimensions of value. These changes have brought significant differences in the dissemination effectiveness of data journalism compared to traditional data journalism. Given this, when producing data journalism under metaverse technology, it is crucial to integrate the characteristics of the metaverse technology. This involves reshaping news value through multidimensionality and full perceptual experiences, combining technology with narrative to convey the humanistic spirit of news facts, and enhancing the communicative value of data journalism.

Conflicts of Interest

The author declares that there is no conflict of interest regarding the publication of this article.

Funding

This work was supported by the Major Research Cultivation Project at Sichuan University of Media and Communications: Ethical Issues in Sports Events in the 5G Era, grant number (X20220101).

Acknowledgments

The authors would like to acknowledge Sichuan University of Media and Communications for the financial support.

References

- [1] Du, J.F. "Utopia": Ideological Notes on Metaverse and Web3. *Journalism University*, 2022, 06, 19-34+119-120.

- [2] Duan, W.W. Reality Impact: The Metaverse as a World Generator. *Morning Edition*, 2022, 04, 4-6+10.
- [3] Fang, J.; Ge, S.R.; Deng, H.Y.; Hui, Y.H, et al. Using Data as a Method: Theory and Practice of Data Narration. Renmin University of China Press: China, China, 2023; pp. 234; ISBN: 9787300313849.
- [4] Yang, B.J.; Sun, X. On the Individual Characteristics of the Authenticity of Big Data Journalism. *Contemporary Communication*, 2019, 05, 10-13.
- [5] Peng, L. Prospects and Concerns on the Path of Metaverse: An Analysis Based on User Perspective of Demand-Behavior. *Exploration & Contention*, 2022, 07, 78-85+178.
- [6] Wang, C.Y.; Zheng, C. Value Rationality and Instrumental Rationality and Their Methodological Significance: Based on Max Weber's Rationalization Division. *Journal of Jinan University (Social Science Edition)*, 2014, 24, 02, 48-53.
- [7] Fang, J. Introduction to Data Journalism: Operational Concepts and Case Analysis (Second Edition)[M]. Renmin University of China Press: China, China, 2020; pp. 3; ISBN: 9787300265193.
- [8] Yu, X.Q.; Wang, Q. Two Concepts of “All Things Are Numbers” and Their Influence on Scientific Development. *Dialectics of Nature*, 1994, 04, 45-51.
- [9] Hu, Y, translated by Fan Haiyan. Niklas Luhmann: Digital Survival. Hainan Publishing House: China, China, 1997; pp. 15; ISBN: 9787806176436.
- [10] Peng, L. “Data Survival”: Quantified, Externalized Individuals and Life. *Journal of Soochow University (Philosophy and Social Sciences Edition)*, 2022, 4, 02, 154-163.
- [11] Fang, J.; Gao, L. Data Journalism: A Field Urgently in Need of Professional Norms — Based on a Quantitative Study of Five Domestic Data Journalism Columns. *International Journalist*, 2015, 37, 12, 105-124.
- [12] Yang, X.R. Image Turn or Image Dominance: Pictorial Representation and Reflection in the Age of Reading Images. *Chinese Literature Criticism*, 2015, 01, 100-109+129.
- [13] Zhao, S. “6G” May Be the Next Super Trend. *China Economic Times*, 2023-03-24 (002).
- [14] Ling, Y. The Newsworthiness of Data and Its Usage Risks. *Frontline of Journalism*, 2016, 16, 16-18.
- [15] Xu, X.D. Turning, Deconstructing, and Reconstructing: Research on Data Journalism Visualization Narration. *International Journalist*, 2019, 41, 11, 142-155.
- [16] Li, G.G. Presence and Absence of the Body in the Visual and Auditory Communication of Sports Events in the 5G Era. *Contemporary Television*, 2022, 09, 24-28.
- [17] Peng, L. Fusion of Reality and Illusion: Space and Body in the Metaverse. *Journalism University*, 2022, 06, 1-18+119.
- [18] Huang, Y.L.; Luo, Y.Q. Affordance and Epistemology: Innovative Research Path of Digital Journalism. *Journalism*, 2021, 10, 13-20+32.

- [19]Wang, P.; Zhang, C. Story Digging and Data Implanting: Glimpses and Development of Data Journalism Visualization - Based on the Perspective of Modern Schema Theory. *Ningxia Social Sciences*, 2021, 04, 210-216.
- [20]Liu, T. Conceptual Understanding of Data Journalism: Critical Review of Visual Practice and Humanistic Concept Reflection of Data Journalism. *Journalism and Writing*, 2019, 04, 65-71.
- [21]Wu, X.K.; Tong, Z. Breaking Through and Reconstructing Traditional News Values with Data Journalism. *Contemporary Communication*, 2017, 04, 15-19.



© 2023 by the author(s); licensee International Technology and Science Publications (ITS), this work for open access publication is under the Creative Commons Attribution International License (CC BY 4.0). (<http://creativecommons.org/licenses/by/4.0/>)