

The Virtual and Realistic Journey of Digital Human: An Assemblage of Urban Communication

Yukun Yin^{1,a,*}

¹*Faculty of Humanities and Arts, Macau University of Science and Technology, Avenida Wai Long, Taipa, Macau, China*

a. Yinyuk810@163.com

**corresponding author*

Abstract: Artificial intelligence technology provides conditions for the development, improvement, and promotion of digital humans. As a hot spot in current social media, digital humans have formed a continuously changing but relatively stable urban assemblage with elements such as urban image architecture, urban cultural communication, and urban image in social platforms. From the assemblage perspective, this paper analyzes the content of virtual people and urban culture communication in social media through assemblage ethnography. These materials show that in the social environment of rapid development and change of new technology, active use of new technology and new media platforms is conducive to the dissemination and development of traditional culture, while increasing the attraction to young audiences and building a dynamic urban imagination. It also emphasizes the importance of paying attention to the interaction between humans and non-humans and breaking the boundary between virtual and reality in the ever-changing social environment.

Keywords: digital human, city communication, assemblage

1. Introduction

The development of artificial intelligence production technology has had a profound impact on the development of all walks of life in society. It not only promotes the advancement of science and technology but also reshapes the way people communicate in work and life [1]. With the commercialization and large-scale promotion of artificial intelligence technology, the technology of understanding and empathy for human thought has developed rapidly. At the same time, people gradually shaped it into a humanoid image [2]. Equipped with AI intelligent systems, digital human who appear in front of the public in the image of characters have been widely discussed and used recently. Digital man begins with the virtual character in the meta-universe. With the advent of Chat GPT in 2022, the meta-universe role of the virtual world is pushed into the practical application market. Through the practical application of the digital ecosystem, the digital virtual and the real world are combined in a new way to break the field barrier between virtual and reality [3]. Increase the sense of coexistence and social existence of interaction between people and virtual digital human to maximize user satisfaction [4]. According to IDC's "Current Situation and Analysis of Chinese AI Digital Human Market, 2022" report released in 2022, Chinese AI digital human market is on the rise. The development of technology and the maturity of the market will transition the digital human to a pure AI-driven digital human stage that can intelligently interact. The application fields of digital

customer service, AI tour guide, exhibition hall digital person, virtual anchor, virtual host, and so on have become the mainstream scenes of the digital person in the current application stage [5]. By combining traditional and local culture with AI intelligent interactive technology, increasing the interactivity and interest in cultural pavilions has become another bright spot for cities to promote the image of the city and attract the audience. In the 2022 Shenzhen Cultural Expo, the audience will enter the long volume of virtual culture in a separate form, attracting the attention of a large number of tourists [6]. The construction and dissemination of urban culture have shifted from the new media short video as the main means to the new stage of combining AI digital intelligent technology.

As a non-entity subject of virtual technology that appears on social media platforms or multiple scenes, AI digital human have formed a new and constantly evolving interface relationship with urban entities [7]. The combination of AI digital human and cultural tourism projects in various cities extends the original relationship between human organisms and urban entities to the combination of AI technology virtual subjects, human organisms and urban entities. As an entity of existence, city has always been a complex existence [8]. The physical space of the city, the human organism living in the city, the basic material equipment of the city, the cultural system of the city and other heterogeneous elements constitute the components of the city [9]. Therefore, the alliance of these different heterogeneous elements forms a new assemblage [10]. It also provides a new perspective of assemblage to understand the complex urban cultural composition and dissemination of heterogeneous human/non-human, organic/inorganic, technical/natural elements [11].

This study avoids using the traditional binary opposition of content and representation to understand the current changes and diverse phenomena in urban communication, and understands the application scenarios and comprehensive effects of AI digital human in various new media platforms from a changing perspective. Using the method of assemblage ethnography, through the analysis of videos, pictures and texts published in the new media platform, this paper studies the reasons behind the relationship between AI digital human and human users and cities in the new urban communication, and explores more possibilities for development in the future communication.

2. Literature review

Artificial intelligence devices not only communicate with people from simple voice and text expression, but also gradually appear in human life through gestures, spatial movements, and even emotional expression. For this reason, different professional definitions have emerged for such artificial intelligence objects, including digital human [12]. It is generally believed that digital human are similar to people in form, characteristics and expressions, can express intonation and body movements, and can make appropriate responses [13]. Deloitte, an internationally renowned consulting company, believes that digital human are not only reacting to language and non-language, but also a human avatar. With the development of artificial intelligence technology, they communicate with customers. UneeQ, a well-known digital person operating company, gives a definition from a more commercial perspective, believing that the creation of digital human reflects the personality, voice and essence of the brand they serve. With the help of AI technology, emotions such as happiness, empathy, and warmth can be expressed, and feedback to customers can also be expressed through body behavior and tone [14]. In short, a digital human is a complex 3D human model that uses the vivid effects of external images and motion calculations [15].

Urban areas are widely recognized as key social and technological, political, and economic patterns, and as key to national and international competitiveness [16]. Urban areas are in the process of political restructuring to rebalance as nation-states, and even change the driving force between geo-economy and geo-democracy [17][18]. Therefore, the urban area is neither a static territorial entity nor an isolated geographical area within the country [19]. Urban area is not only a manifestation of globalization but also a fundamental change in the process of urbanization [20]. The current

algorithmic revolution is changing the framework that affects the daily lives of numbers and citizens by adopting new forms of real-time technology. The diversity of cities and the fragmented and diverse characteristics of urban groups are also manifested in different forms [21]. With the rapid development of Chinese cities, the problems of cities and communication have gradually emerged. The media technology revolution brought by new technologies has brought new possibilities to the study of urban communication in China [22]. With the development of 5G information technology and the construction of online virtual space, the original geographical scope of urban areas has been broken, and a broader and conceptual definition of cities has been reconsidered. The regional and relational nature of the city blurs the original urban boundaries and pushes the city forward [23]. A series of virtual technologies behind virtual digital humans enter the physical space, extending and expanding the 'urban space'. At the same time, the cultural symbols represented by virtual digital humans spread a variety of 'urban culture' in a changeable and innovative form [24]. Therefore, to understand the current urban communication problem, it is difficult to see its rapidly changing development and diverse heterogeneous composition from a constant and binary opposition perspective.

The concept of assemblage from Deleuze and Guattari provides a variety of perspectives to understand the complex relationship between things and the state of potential change. It attempts to explain the process by which the historical identity of any whole, from molecular and biological organisms to species and ecosystems, is created and stabilized [25]. The term assemblage itself refers to the act of configuring or assembling a set of components (agencer), and the result of that act. The assemblage is at the intersection of the content and expression of the established layer at the same time, and the intersection of any layer and the solid plane. They are not only layered vectors, but also delaminated vectors, which can absorb different heterogeneity and energy from different levels to form a new flow layer by changing the established layer. The flow of change at different levels is considered to be a process of territorialization construction, territorialization resolution and re-territorialize [26]. As one of the main interpreters of the theory, Delanda, while developing the potential changes in the continuity of the theory, critically uses theorized assemblage thinking to understand and explore the complexity of society, and believes that assemblage applies to a wide range of wholes, such as the social entities generated by heterogeneous parts [27]. Different relationship combinations will form different assemblage identities, and these external relationships will characterize the assemblage as different wholes [28][29]. Therefore, starting from Delanda, assemblage theory is used to explore the complexity of social space and the relationship between urban space and social relations [30].

Because of the development and application of cutting-edge technology in the current social environment and the rapid development and change of technology, this study establishes the 'assemblage of digital human and urban communication', and puts forward the following research questions: First, how digital human is applied to urban communication, through what kind of expression to combine, and how to spread. Second, how to grasp the development direction and effective way of urban communication itself in the rapidly developing society. At the same time, this study puts forward the following research questions given the virtual space construction brought by the current virtual reality technology and the conflict tension with the real space: Third, the relationship between digital humans and human beings in urban communication, whether human beings are replaced by digital human. Fourth, whether the extensive use of digital human and new media platforms will reduce human dependence on real urban space.

3. Assemblage ethnography

3.1. Method

As a method of assemblage ethnography, it aims to study the diverse composition of space, time, relationship, main characters, subjective emotional order, and so on in current urban communication. Instead of focusing on the symbolic meaning of these parts, this study focuses on the relationship between these specific parts and how to form a relatively stable and cross-assemblage to form a new meaningful different assemblage. At the same time, these complex elements should be understood as flowing and in the relationship, rather than static or independent elements. To avoid the assemblage of elements as a separate static list of elements, but a whole formation or formation type. Therefore, when using assemblage ethnography to analyze materials, the focus is on the relationship between motion and flow and heterogeneous elements, as well as their multiple meanings and potential, to study their persistence and motion type, and to study the continuous splitting and reorganization of assemblage [31][32].

According to the purpose of the study, the selected research objects were subjected to participatory observation of the development of the network platform of the digital human theme content for nearly one year, and the platform account registration was performed. The keywords with the theme of 'digital human' were searched in a wide range, and the digital person information since 2023 was selected as the research object. Click on the platform information as a digital enthusiast to collect data talk to its audience, and organize, encode, and analyze the collected data.

3.2. Research Materials

This study first determines that the main new media platforms for the study are China's current mainstream information acquisition and social platform Weibo and the platform Xiao Hong Shu with female positioning as the main target and the youth audience as the main target. Search the subject words of 'digital human' in the above two platforms, select the representative and authoritative account content to extract the content of the subject entry, and classify and analyze it.

Urban cultural tourism and characteristic card publicity have become one of the main manifestations and application forms of digital humans. For example, on the Weibo platform, the Xinhua News Agency published a video micro-blog of the Xinhua News Agency digital human, Chinese culture recommendation officer Xiao Zhu came to the ancient town of Jiangnan, and learned the new skill - bao zongzi with the inheritor of the non-genetic inheritance of zongzi skills, and promoted the image and non-heritage skills of the ancient town of Jiangnan with the image of a digital human on 21st June, 2023. As a social media platform with a large number of young audiences on the Xiao Hong Shu platform shares more distinctive digital images, such as 'Liu Yexi' has gained more than 1.07 million fans' attention and more than 2.5 million likes for its digital human with the theme of publishing fashion, beauty makeup, city scene images and so on. The digital human form combined with the distinctive propaganda content has become the main combination form of its development and dissemination in the new media platform. Under this classification, there are many representative digital content. For example, Hangzhou cultural tourism virtual spokesman 'Hang Xiaoyi', Shanghai cultural tourism promotion ambassador 'Zhi', and so on. As a representative digital person of cultural tourism in Meizhou City, 'Su Xiaomei' not only established a social account from the first-person perspective in the current new media platform, but also shared the daily local folk culture and food culture in Meizhou. At the same time, she also went out of the virtual space of the social platform and carried out offline activities. In the 2023 CCTV May 4th Party Running Youth - 2023 May 4th Youth Festival Special, she and the host of CCTV and young actors jointly realized the cross-dimensional integration program Fenghuajian. In the program, the Chinese nation's tea

culture scene in the Song Dynasty and several national style elements such as Peking Opera, Hanfu, and paper-cut were presented [33]. The digital person 'Su Xiaomei' has become one of the cultural and tourism digital humans, breaking through the mainstream IP creation of network virtual space and real space.

Digital human employees and a wide range of life practice applications have become a new impetus for the continuous development and promotion of digital humans. The text and video microblog of “The number of digital human's live studios increased by 400 % - since the opening of the first AI online store” released by CCTV financial account on 18th June, 2023 lists digital human as a new choice for e-commerce live broadcast, with its low cost and simple operation. The advantages have achieved high returns and given the new development and application direction of digital humans. It breaks through the original time barrier of e-commerce operation and expands the boundary of e-commerce in the way of virtual humans. On Weibo, there is an account of 4.1million fans named Western decision-making. On 27th June 2023, the text video microblog “Doctor Digital Human Help Drug Instructions Aging” was released. By scanning the two-dimensional code and watching the digital human to explain the details, it effectively solved the problem of the elderly for drug use. The top 10 high praise comments under this microblog are also positive comments such as 'technical convenience' and 'elderly assistant'. Digital staff have continued to develop in various professions, forming a hot topic of concern at present. For example, the digital new employee 'Ai Wenwen' launched by the National Museum of China. The virtual person 'Gu Xiaoyu' permanently stationed in the Cultural Museum has realized the permanent introduction of Song Yun culture to tourists and guided tours in the museum. Digital employees have achieved a breakthrough in the distance between the professional knowledge field and the public, giving professional help and knowledge to the public in a more people-friendly and convenient way, and becoming an indispensable part of future economic and other fields.

In addition, there is also the use of digital humans as personal entities in the Xiao Hong Shu platform to carry out some daily content sharing or purposeful publicity and simple work. At the same time, some audiences carry out personal digital separation production to satisfy curiosity and understand the development and progress of current science and technology. Although the use of platforms and mobile phone APPs to collect personal voice and facial information to generate digital humans has caused the public to discuss personal privacy security, it is undeniable that technological development brings ordinary audiences the opportunity to contact technology and algorithm development.

Therefore, according to the basic materials selected in this study, digital humans are basically divided into three function types: digital humans with the nature of publicity and entertainment; digital human with professional fieldwork functions; and personal digital person. This study analyzes the content published on the social media platforms Xiao Hong Shu and Weibo in the past year, mainly the image data as the research material, focusing on the combination of digital human and urban communication in what forms, the application practice of different types of digital human and the main platform of communication and the potential changes and development trend.

3.3. Assemblage

According to the classification of different digital humans, this study analyzes the setting of related assemblages. Digital humans have broken the limitations of urban geographical space and established a non-negligible connection with the image construction of the current city. It establishes the assemblage of physical, space-digital, platform, human, non-human, and diverse cultural changes. Based on the transformation of digital human functions, the assemblage territorialization will change and de-territorialize, and combine with other elements to re-territorialize, forming a new assemblage with special functions. As shown in table 1.

Table 1: Digital human function assemblage

Human member	Digital human function classification	Digital platform	Application field	Application mode
Cultural tourism practitioners	Publicity, entertainment digital human	Internet / traditional media	City culture and tourism	Update the way of regional cultural tourism publicity The audience of traditional culture has expanded.
E-commerce practitioners, practitioners in various professional fields	Professional field, digital staff	Internet / traditional media	City economy	The urban economic model has changed. The field of professional technology to the public
Individual urban residents	Personal digital divide	Internet/social media	City life	City characteristic life sharing Personal identity to achieve spatial transformation

Represented by cultural tourism, the assemblage of concretization is Meizhou city cultural and tourism attractions—Xiao Hong Shu platform (on behalf of the social platform)-human subject (operation publisher / content expression character)-virtual digital character-festival culture. Through the virtual digital person, the inherent space of reality and virtual is broken, and the assemblage with current characteristics is established. Although the city itself exists as an inherent territory, through the addition of non-human factors, the assemblage of its urban communication has been gradually de-territorialized, breaking the existence of the main body of the characters in the urban space [34]. On the basis of the above assemblages, due to the development of technology and the promotion of the image of digital humans, the traditional cultural elements have developed into a more familiar 'Internet celebrity' dot punch card and trend culture display for contemporary young people. The original assemblage of the setting is under the expansion of the content of the performance, and the territorialization is continuously delocalized and de-territorialized to form an assemblage with new practical significance.

4. Analysis and discussion

The development of 5G technology and virtual reality media technology has made 3D virtual digital human attract the attention of market capital and a large number of young users. Especially in the hot period of virtual reality and universe development in 2022, it has attracted a large number of audiences and implanted its concept into young audiences. With the significant progress of AI generation technology in 2023, a large number of digital human with the characteristics of urban extraction elements have entered the audience's field of vision, and are displayed on various platforms in a way that is closer to human aesthetics and personality color. Therefore, the current application of digital human is mostly displayed in the form of combining with reality, rather than in the form of safely entering the virtual space of the meta-universe before, so as to be close to the audience. At the same time, the new media platform still exists as an important medium of communication. Through

the combination of the mass media platform and the mainstream new media platform, the spread of digital human to the construction of the city image is increased.

4.1. 'Dehumanization' in urban communication

First of all, the realization of 'dehumanization' in the form of expression. The spokesperson of urban cultural tourism represented by 'Su Xiaomei' has realized the 'dehumanization' link in the propaganda assemblage. Through the excavation of urban characteristics, firstly, the urban characteristic elements are extracted, and the shape design of digital characters with representative elements is added. The name "Su Xiaomei" comes from the folk stories related to Su Dongpo in Meizhou City. Its image is dominated by the characteristics of Song Yun and creates a virtual human image that is closer to the audience's aesthetics. The original urban communication assemblage with a human image ambassador as the main body has been re-encoded, and the urban cultural communication assemblage of Meizhou City has been shaped, which represents the landscape of Meizhou City-social new media platform-digital virtual spokesperson-traditional / modern culture-human audience. In the inherent urban space of Meizhou City, the physical space is re-encoded in the form of digital human representation, which brings new vitality to the humanistic propaganda of Meizhou City. Secondly, the 'dehumanization' risk is embodied in the control of communication risk. When using virtual digital humans, it can give digital humans different positioning and scene settings according to the focus and stage of publicity, and more targeted content creation. It effectively reduces the uncertain factors in the current human-oriented communication, such as the collapse of human idols and the influence of negative news. In the assemblage of digital humans, digital humans replace human beings to carry out complicated but basic work and replace manual labor with intelligent algorithms, which improves work efficiency and reduces labor costs. At the same time, it brings more knowledge and application possibilities to more ordinary audiences in non-professional fields. It is a physical business or professional field that originally has a regional nature that enters a wider space, breaks through the boundaries of physics and human physical fitness, and provides more possibilities for the economic development of the city. Taking human beings as the assemblage center, the direction of urban development is diversified, from the inherent geographical space to a wider range.

However, in the above assemblage, it is found that although the digital human body replaces human beings in the form of expression, it can combine the traditional culture with the digital technology of the current young audience through the image of digital virtual representation, so that the audience has a sense of substitution for the virtual image in the assemblage. With the help of digital representation, digital twins and digital self-symbionts are generated, rather than simply superficial cognition of their content [35], attracting more audiences. At the same time, it can reduce potential risks, but human beings are still irreplaceable. Whether it is from its production and communication link or the audience acceptance link, human beings are an indispensable part of the assemblage, but they have established a new relationship with the heterogeneous elements around them.

4.2. 'Breakthrough' in urban communication

Break the boundary between virtual and reality. In traditional urban communication, the propaganda of urban physical space is the focus, mainly based on the actual physical space and character entities. Although the concept of meta-universe highlights the virtual realm, it requires human beings to enter the space built by virtual technology through the medium of brain-computer interface. However, the media promotion and operation of brain-computer interfaces have been limited by market acceptance and technical acceptance, and have not been effectively promoted for the time being. Digital humans, rooted in the technical basis of virtual reality and the algorithm basis of AI algorithm, extend the

characters in the virtual world to the real world, break the strict restrictions of the virtual world technology setting in the form of reverse interface media, and move towards the real world, making it easier for more people who do not have access to technical media to accept. Therefore, according to the 2022 China Virtual Digital Human Influence Index Report', the virtual digital human will develop rapidly in the market with the support of local policies and enter all walks of life in the form of digital human [36]. The application of virtual digital humans in the new media platform breaks the boundary between the real physical space and the virtual space in the city. It spreads through multiple channels with the specific content of the city's propaganda needs and strong output style and establishes a new change relationship with the audience in reality. The audience constantly enters the urban assemblage composed of real space punch cards from the urban assemblage with virtual space as the element. Through image substitution, and behavior imitation, the personal expected effect is completed, and the next communication assemblage of interpersonal communication is extended. Therefore, virtual space will not reduce the dependence of human beings on real space, but further attract human beings to enter different real spaces and realize their self-worth.

Break the boundary between mainstream culture and minority culture. At the beginning of the setting of urban digital spokespersons, based on basic restrictions such as technical thresholds, it is mostly based on the spread of mainstream urban culture. In the current assemblage, traditional mainstream culture propaganda is the main one. For example, 'Su Xiaomei' s propaganda of Meizhou culture and Song culture, as well as the propaganda form based on CCTV, are all based on the mainstream culture coding. However, in the development of digital humans, its huge market potential and the trend of transformation and development are obvious. It is necessary to dare to push the development of digital humans into more industries and establish a relationship with consumers. Form a variety of physical space-virtual digital human diverse scenes-digital media platform business culture content-multi-stage audience assemblage, in the original urban space and urban communication assemblage, expand its development path. For example, 'Su Xiaomei' is combined with different representative physical spaces, such as cafes, bookstores, and food stores, forming a new commercial communication assemblage in order to create more practical economic benefits.

At the same time, in addition to the digital person IP with brand and official effects, there are still a large number of personal digital humans in the network platform. Through the establishment of simple digital human, they can share their unique urban life, so as to attract audiences with the same characteristics and preferences to punch in and visit the city. Increase the intimacy with the general audience, so that the original distance of the algorithm technology and regional characteristics of life, in a more diverse and interesting way into the general audience's life. In addition, the production of personal digital humans has also broken the boundary between traditional ordinary audiences and algorithm technology. It is the interaction between ordinary audiences and algorithm technology through simple web page operations or mobile APPs.

Therefore, the boundary between virtuality and reality, mainstream and niche is blurred, which is realized in the assemblage of digital human elements. The rapid development of technology, the change of market aesthetics and the change of demand, and the construction of urban space are all potential factors that continue to change in the assemblage of heterogeneous elements in the city. Breaking away from the current inherent assemblage boundary and understanding the relationship between various elements in urban communication with a developmental perspective will promote the development of technology and better explain the current communication phenomenon.

5. Conclusion

At present, urban communication has entered a complex stage due to the development and renewal of various technologies. The composition of multi-heterogeneous elements makes many audiences and practitioners confused about the judgment of the market. Understanding from the perspective of

traditional representation form and content will simplify complex problems, but not deeply understand the trend of its change and development. Based on the dynamic and static image content of digital humans in the new media platform, this paper discusses the necessity of integrating and using digital humans in the current urban communication through the method of assemblage ethnography and sees the larger scope of its future development. Establish a relationship with more elements in the real world and promote the development of digital humans and the real economy. However, at the same time, we should also see the dilemma of the application of digital humans not mentioned in this study. For example, the current lack of technical support for digital humans may cause the failure of digital human feedback, and the appearance and action of digital humans cannot reach the standard, resulting in the horror valley effect. At the same time, in the context of a large expansion of the consumer market, the competition of digital humans homogenization and the lack of pertinence of service specialty are caused. Therefore, in future development, it is necessary to interpret the allocation crisis and development prospects in urban communication from the perspective of continuous change.

References

- [1] Hermann,E.(2022).Artificial intelligence and mass personalization of communication content—An ethical and literacy perspective. *New Media & Society*, Vol. 24(5) 1258–1277.
- [2] Nah K, et al. (2022). A Study on the User Experience to Improve Immersion as a Digital Human in Lifestyle Content. *Applied Sciences*. 12(23):12467.
- [3] Huynh-The et al.(2023). Artificial intelligence for the metaverse: A survey. *Engineering Applications of Artificial Intelligence*, Vol117. 105581.
- [4] Nah K, et al. (2022). A Study on the User Experience to Improve Immersion as a Digital Human in Lifestyle Content. *Applied Sciences*. 12(23):12467.
- [5] IDC. (2022). Current Situation and Analysis of Chinese AI Digital Human Market, 2022. <https://www.idc.com/getdoc.jsp?containerId=CHC48744822>. (accessed on:2023,04,26).
- [6] Xinhua News Agency. (2023). Yuan Mao - Human Chapter, AIGC helps "digital human freedom", what does Xinhua Zhiyun rely on?http://www.xinhuanet.com/gongyi/20230228/4dbfff1e53534b3bb081e02947c581_0c/c.html (accessed on: 2023.04.26).
- [7] Leach, N. (ed.) (2002) *Designing for a digital world*. Wiley-Academy, Chichester.
- [8] Alexander, C. (1964). A City Is Not a Tree. *Architectural Forum*, 122, 58-61.
- [9] Kamalipour, H., & Peimani, N. (2015). Assemblage Thinking and the City: Implications for Urban Studies. *Current Urban Studies*, 3(4), pp. 402-408.
- [10] De Landa, M. (2010). *Deleuze: History and Science*. New York: Atropos.
- [11] Anderson, B., & McFarlane, C. (2011). Assemblage and Geography. *Area*, 43, 124-127.
- [12] Nah K, et al. (2022). A Study on the User Experience to Improve Immersion as a Digital Human in Lifestyle Content. *Applied Sciences*. 12(23):12467.
- [13] Hwang, J.I. (2021) Trends in Digital Human Technology and Its Application in Culture. *Sport. Tour. Cult. Inf. Issue Rep.* 7, 4.
- [14] Silva, E.S. & Bonetti, F. (2021) Digital humans in fashion: Will consumers interact? *Journal of Retailing and Consumer Services*, Vol60,102430.
- [15] UneeQ. What Are Digital Humans? Available online: <https://www.youtube.com/watch?v=rF2u7RTPsHI&t=30s> (accessed on 28 October 2022).
- [16] Calzada,I.(2018) 'Algorithmic nations': seeing like a city-regional and techno-political conceptual assemblage. *Regional Studies, Regional Science*.5(1),267-289.
- [17] Jonas, A. E. G., & Ward, K. (2007). Introduction to a debate on city-regions: New geographies of governance, democracy and social reproduction. *International Journal of Urban and Regional Research*, 31(1), 169–178.
- [18] Ohmae, K. (1995). *The end of the nation-state: The rise of regional economies*. New York: Simon & Schuster.
- [19] Harrison, J. (2010). Networks of connectivity, territorial fragmentation, uneven development: The new politics of city-regionalism. *Political Geography*, 29(1), 17–27.
- [20] Soja, E. W. (2000). *Postmetropolis:Critical studies of cities and regions*. London: Wiley-Blackwell.
- [21] Jonas, A. E. G., & Ward, K. (2007). Introduction to a debate on city-regions: New geographies of governance, democracy and social reproduction. *International Journal of Urban and Regional Research*, 31(1), 169–178.

- [22] Sun, W. (2013). "Shanghai's Remaking": A Study of Chinese Cities from the Perspective of Communication. *Journal of Hangzhou Normal University*. 3(2),80-86+95.
- [23] Beel, D., Jones, M., & Jones, I. R. (2016). Regulation, governance and agglomeration: Making links in city-region research. *Regional Studies, Regional Science*, 3(1), 509–530.
- [24] Sun, W. (2013). "Shanghai's Remaking": A Study of Chinese Cities from the Perspective of Communication. *Journal of Hangzhou Normal University*. 3(2),80-86+95.
- [25] Deleuze,G.,&Guattari,F.L.(1987). *A Thousand Plateaus: Capitalism and Schizophrenia* (B. Massumi, Trans.). Minneapolis, MN: University of Minnesota Press.
- [26] Deleuze,G.,&Guattari,F.L. (2010). *Capitalisme et schizophrénie II: Mille Plateaux* (Jiang YH, Trans). Shanghai:Shanghai Bookstore Publishing House.
- [27] De Landa, M. (2006). *A New Philosophy of Society: Assemblage Theory and Social Complexity*. London; New York: Continuum.
- [28] Ballantyne, A. (2007). *Deleuze and Guattari for Architects*. London: Routledge.
- [29] De Landa, M. (2006). *A New Philosophy of Society: Assemblage Theory and Social Complexity*. London; New York: Continuum.
- [30] Kamalipour, H., & Peimani, N. (2015). *Assemblage Thinking and the City: Implications for Urban Studies*. *Current Urban Studies*, 3(4), pp. 402-408.
- [31] Youdell, D., & McGimpsey, I. (2015). *Assembling, disassembling and reassembling youth services' in Austerity Britain*. *Critical Studies in Education*, 56(1), 116–130.
- [32] Wickström, A. (2018) *Schoolgirls' health agency: silence, upset and cooperation in a psycho-educational assemblage*, *International Journal of Qualitative Studies on Health and Well-being*, 13:sup1, 1564518.
- [33] Su Xiaomei Appeared on the CCTV stages cross-dimensional cooperation fusion program "Feng Hua Jian". Available online: <https://finance.sina.cn/2023-05-06/detail-imysvrzu3036224.d.html> (accessed on 2023.05.06).
- [34] Sellar, B. (2009). Assemblage theory, occupational science, and the complexity of human agency. *Journal of Occupational Science*, 16(2), 67–74.
- [35] Chen, S.Q. et al. (2022) *Digital Human:An Experiential Medium*. *Press Circles*,7,12-22.
- [36] Communication University of China. (2023) *2022 China Digital Human Influence Index Report*. Available online:<https://mp.pdnews.cn/Pc/ArtInfoApi/article?id=34152748> (accessed on 2023.05.06).