An Overview Analysis of AI Divide: Applications and Prospects of AI Divide in China's Society

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ABSTRACT

Artificial intelligence technology is improving in China as technology advances. Artificial intelligence's rapid development as a new type of technology has sparked inequalities in social information technology, worsening regional and inter-generational development imbalances. Carter et al. proposed the notion of the AI divide to explain this occurrence, concluding that the AI divide in the era of intelligence consists of three elements: access gap, capacity gap, and result gap. This essay will examine the potential and applications of the AI divide in Chinese society using Carter's framework. This study found the benefits AI brings to the development of China's society. However, due to wealth disparities in China, as well as people's concerns about privacy leakage, there is still a lack of access. The growth of AI will exacerbate the capacity gap by creating an inter-generational imbalance, while it will easily provoke a disability digital divide for individuals with disabilities. AI technology will exacerbate the social gap by making people with priority access dominant in the outcome gap. The problem of social inequalities arising from the AI divide will continue to reveal along with the maturing of Artificial Intelligence.

Keywords: Al divide, Digital divide, Artificial intelligence, Information inequity, China.

1. INTRODUCTION

The digital divide first appeared in official papers in the United States with the publishing of the report "Bridging the Digital Divide," which first brought the issue to the public's attention. In Falling Through the Net: Defining the Digital Divide, the US National Telecommunications and Information Administration defines the digital divide. The digital gap, according to the NTIA, is the distinction between the information wealthy and the information underprivileged of different countries, regions, and populations [1].

Later, Power Shift also defines the digital divide, pointing out that with globalization and digitization, there are considerable differences in the development and application of communication technologies in different countries, regions, and industries. There are also gaps in people's capabilities, most obviously in the degree of possession and application of information and the ability to innovate and transform Internet technologies. These gaps and inequalities in information resources lead to the unbalanced development of society [2].

According to previous scholar's definitions, the performance of the digital divide can be summarized in the following four aspects: (1). In this section, economic differences are the dominant factor leading to the creation of the digital divide because the cost of construction of information infrastructure, hardware, software, etc., limits access to the Internet, thus leading to the digital divide. (2). Basic Skills refer to the information divide in the way people use information technology. (3). Content describes the digital divide in the content of information people receive; (4). Desire, the motivation and interest of different Internet users in accessing information, also influences the digital divide's expansion [3].

The development of artificial intelligence is leading to instinctive innovations in information technology, and people's lifestyles are changing with the development of information technology. In recent years, Artificial Intelligence has penetrated human life, from

intelligent robots and voice recognition to the development of Big Data and recommendation engines that have influenced the trajectories of human life. Exploring algorithms based on big data and Artificial intelligenceis increasingly becoming a prevalent concern for researchers in the information era [4].

Artificial intelligence is the study of human intellect through the creation of a mind within a computer, as well as technology that develop and perform jobs requiring some level of human intelligence [5]. The first technology path of artificial intelligence refers to the hardware that provides the computing power necessary for artificial intelligence computation, which includes two phases: data training and data inference, specifically applied to machine learning; data collection and processing. The second technological path in artificial intelligence is driven by breakthroughs in processors and algorithms, which are backed up by massive volumes of data from continuously updated inventories. This path is a technology area created for applications, with the three primary technical paths being computer vision, speech recognition, and natural language processing.The third technological path is the combination of humans and technology, i.e., intelligent robots [5].

Artificial intelligence has begun to impact social relationships and commercial operations as it is applied to various domains in society. Artificial intelligence-related efforts are attracting a rising amount of financial and human resources from a variety of enterprises. China has launched a $15.7 billion AI fund to support projects and activities connected to AI [6]. Artificial intelligence might add 13-15 trillion dollars to global economic production between now and 2030, according to a recent estimate from the McKinsey Global Institute (MGI) [7].

The development of artificial intelligence has actually reinvented and extended the concept of the digital divide. With the development of artificial intelligence, a new technological divide has been created. Currently, many scholars have studied this new technological divide, which was remodeled by ICT and artificial intelligence, including Carter, who started a research on the AI divide and concluded that in the age of intelligence AI divide consists of three elements which are access, capability and outcome [8]. Although digital advances have benefited society and humanity in many ways, they have also had detrimental consequences. What happens when technical progress creates imbalances between those who have access to technology (people, businesses, and governments) and those who do not[9]. As a rapidly growing developing country, China's economy is currently leading the world, but its technological development still suffers from regional and inter-generational development inequalities. Therefore, a study of the smart divide in

China can effectively contribute to solving the social problems caused by the smart divide and advance the further development of Chinese technology. Therefore, the main purpose of this article is to discuss the artificial intelligence divide on the digital divide.

2. LITERATURE REVIEW

2.1. Overview of Digital divide research

A review of the literature on the Digital Divide can be divided into four main research topics:

The first path focuses on Information and device. This category discusses the definition of the digital divide from early to modern society and its connection to ICT. One of the critical factors proposed for bridging the digital divide is developing digital technology availability. There are two main directions of research, one focusing on the link between ICT infrastructure levels and digital levels [10]. The other is research related to the gap between Internet technology devices and access [11].

The second path is related to research on skill and literacy. The academic researchers on this topic have focused on the lack of ICT skills and experience, as they consider this a fundamental factor in broadening the digital divide [12]. Some researchers believe that education and knowledge have a crucial role in narrowing the digital divide[13]. Also, scholars have discussed the impact of literacy levels on the digital divide [14].

The third path, the geographic view, suggests a correlation between geographic location, demographic factors, and communication information technology. There is a link between population density and access to ICT [15]. Scholars have also studied the divide between developed and developing countries, the global digital divide, the regional digital divide, and the inter-country digital divide [16].

The fourth path suggests that the digital divide is influenced by various factors including age, gender, occupation, culture, content, and attitudes toward ICT. Finally, it is suggested that a cheerful outlook towards communication technologies is conducive to improving communication efficiency and reducing the digital divide.

2.2. Artificial intelligence and Digital divide research

In recent years, the discussion of the impact of artificial intelligence technologies on the digital divide has gradually increased, with academic researchers providing insightful research into this area.

Luttrell et al. examine the impact of artificial intelligence on the expansion of knowledge in education, exploring how emerging technologies can address the digital divide within education. They consider the emergence of AI as an essential addition to modern education, which helps to improve the quality of people's lives and fosters ethical ways of using AI. However, the combination of education with artificial intelligence is an approach that needs further in-depth study. This is because of the negative impact, which can lead to increased variability in resources from one region to another. As artificial intelligence continues to develop, combining traditional teaching methods with future technology will have further implications, and human-led decision-making will be essential in achieving positive developments for both [17]. Scholars such as Ragnedd and Gran et al. have systematically argued for the current state of the digital divide in the age of algorithms, proposing and constructing and theorizing the academic concept of the Algorithms Divide. In this article, Ragnedd discusses the inequalities that the development of algorithms has produced in society. Through three dimensions linking digital technology to digital disparities and social inequality, it is shown that algorithms lead to social hierarchization [18]. Gran et al. discuss the impact of algorithms on people's daily lives, explore the new digital divide increasing as a result of the creation of algorithms, and provide new directions for subsequent research aimed to advance the rational and practical use of algorithms to bridge the digital divide [19]. Abboud reviews previous literature on the digital divide to redefine and analyze the intelligent divide in the age of artificial intelligence. Explore new issues and ideas arising from modern society through the user's role. The digital divide in the 21st century has changed dramatically due to modern technology, and the digital divide of the past is no longer suitable for contemporary society. Criticism and reflection on the past will further shape the new framework to avoid its negative impact on the public user [20].

3. THEORETICAL FRAMEWORK

Carter et al. introduced the concept of AI Divide and developed a Comprehensive Framework for AI Divide Research (Figure 1) [8]. Carter's framework of AI Divide offered a bridge to analyze the Applications and prospects of AI Divide in China's society. This paper will use the framework proposed by Carter et al. to investigate three specific divides in the AI Divide, which are the access divide, the capability divide, and the outcome divide. In the access divide, In terms of the access divide, this paper will focus on the current situation and disparities in access to smart devices among different groups in China, and explore the socioeconomic and cultural factors that shape the access divide; in terms of the capability divide, this paper will

discuss the actual capability differences arising from the use of devices by different age groups and different populations. In terms of the outcome divide, this paper will discuss the divide in terms of the different social benefits generated by the use of smart devices by different groups of people.
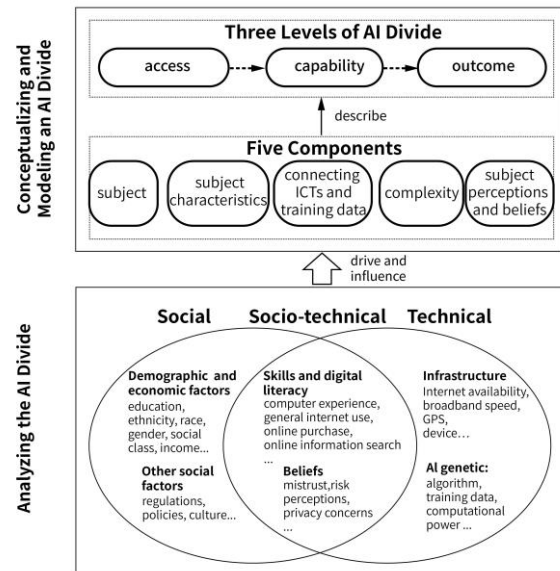

Figure 1. Three Levels of AI Divide

4. AN ANALYSIS OF AI DIVIDE IN CHINA

Although China is late in maturing in the field of artificial intelligence, the development of AI in China is growing at a rapid pace. Preliminary estimates suggest that in 2020 China's AI core industry size has reached 151.25 billion yuan, with a growth rate of 38.94%. Its development industry is extensive, mainly involving customer service, finance, education, drones, intelligent robots, unmanned vehicles and health care. At present, Chinese enterprises and the government are gradually increasing the development of the AI field, pushing Chinese society into the era of an intelligent economy [21].

4.1. Access gap

The rapid development of the Internet has provided indispensable information resources for human beings to conduct social activities. It has a profound impact on people's daily life. the "access gap" toward internet in most nations has been mostly filled or gradually reduced. The number of Chinese Internet users will reach 1.032 billion by December 2021, up 42.96 million from December 2020, according to Beijing's 49th Statistical Report on the Development Status of the Internet in China. The current Internet penetration rate is 73.0%. In terms of network infrastructure resources, China's total number of domain names reached 35.93 million in December 2021, a growth of 9.4% year on

year. In mobile communication networks, the proportion of IPv6 traffic has increased by 35.15 percent. China developed and opened a total of 1.425 million 5G [22] in the information and communications industry as of December 2021.

With the internet generating and collecting massive amounts of data stored on cloud platforms, then through extensive data analysis and artificial intelligence to provide better services for human production activities and life needs, this is a future development trend. The divide in people's access to the internet has decreased, but there is still a divide in people's access to devices and facilities equipped with AI technology. Some of the commodities that have been applied with AI technology are less expensive, such as intelligent voice robots or algorithmic social media software, which most people can access. However, there is a cost associated with purchasing the facilities and equipment that come with high levels of AI, which the wealthy can afford. Still, for the average person, the financial pressure to pay for them is more significant—for example, AI medical robots. As an emerging invention in the medical system, its powerful applications can help people manage their body functions and provide more valuable guidance and feedback on their health. But AI robots have already spent well over $100 billion investing in the development and innovation of their products. Therefore, the average person will not pay a high price for such AI products that are relatively immature and not available in mass production.

Meanwhile, for some specific groups there may be subjective reasons to reject accessing AI technology. They may be concerned that the technology is not mature, or that the technology itself will impact on their privacy, etc [23].

4.2. Capability gap

Artificial intelligence technology is inherently complex. Understanding the technology itself can be difficult, and using the appropriate equipment and facilities equipped with AI technology requires certain competence. However, there is a gap between groups such as children, the elderly, or special groups (less educated, disabled) who can use this equipment and those who can master the rules of use more quickly. The first group to consider is the elderly. The number of older people in China is also snowballing, and the aging of society is increasing. According to the National Office for the Aging forecast, the number of older people aged 60 and above in China will reach 370 million in 2023, accounting for 25.3% of the population. Only 23% of China's population aged 60 and above have access to the internet. Many older people do not know how to use smartphones, so they encounter inconveniences in their daily lives, such as traveling, consulting doctors, or spending money, and the elderly

cannot fully enjoy the convenience brought by intelligent services [24].

For some intelligent medical robots, although they will bring convenience to the lives of the elderly, they can also have problems if they are unable to use them or do not recognize some of the information in them. Children may also be misused in using facilities corresponding to AI technology. Children may become addicted to intelligent robots, affecting their education and development. The creation of artificial intelligence will affect the socialization and lives of children, but digital development will also lead to an intergenerational imbalance. The inequalities created by this digital divide can further affect children's development and negatively impact them. Parents are inexperienced in dealing with the issue of children and artificial intelligence when it comes to educating their children. They fear that children will lose specific skills and fear failure, which undoubtedly contributes to parents' concerns about this issue [25]. At the same time, for some disabled people, there is a gap in the use of AI technology. For example, visually disabled people are largely unable to use the internet without the help of screen readers, voice synthesis technology, etc., in terms of Internet access. Due to some of the skills deficits of disabled people, they cannot use the internet to manage the full range of information, communicate, transact, create and use the internet to solve problems. Meanwhile, the lack of information equivalence among people with disabilities and their ability to bridge knowledge can make it more difficult for disabled people to take advantage of the new opportunities of the digital society, creating a more significant disability digital divide.

Currently, AI technology development can help people improve some kinds abilities more quickly and efficiently. For example, many countries have developed algorithms and programming education at the K12 level. A new generation of children can use AI technology to create products that can help people's lives in driverless, intelligent machine learning and intelligent robotics that will affect the future. One example of K12 AI education in China focuses on six areas, including AI concepts, application directions, and principles; mathematics-related subjects; sensing, motion and control; programming languages; algorithms and related aspects of engineering thinking. To design the content that needs to be learned in different learning stages. Through AI exploration, children are equipped with more curiosity and a more exciting approach to presenting theories and principles from books. Combining AI with education will further cultivate diversity and specialization in its field. The combination of AI and data technology will enable humans to process more and more complex data and improve the efficiency of people's work, thus narrowing the digital divide due to information processing problems. Big

Data and AI will enable faster and more efficient information collection, optimize operations, increase revenue, and reduce costs. More optimized solutions will be available for users to consider in real-time analysis.

The combination of artificial intelligence and robotic technology, and the increasing maturity of intelligent robotics, can help humans in various activities. For example, intelligent robots can help humans in dangerous operations (explosive demolition, subsea exploration research, etc.), medical robots can help care for patients, and financial robots can help companies make decisions. For instance, the development of robots for underground corridors alleviates the need for regular manual inspections of traditional underground passageways. It prevents workers from also encountering dangerous gases during pipe spraying operations. At the same time, underground corridor robots operating 24 hours a day will complete a range of functions, not only changing the environment for underground workers but also improving particular efficiencies. The development of medical robots is currently being used in several medical fields such as diagnosis, treatment, surgery, rehabilitation and nursing. For example, doctors can use AI robots to perform basic operations such as precision cutting and suturing to help doctors better perform delicate and complex operations. The creation of surgical robots for use in areas such as surgical image guidance and minimally invasive surgery overcomes the shortcomings of traditional surgery, enables high precision for modern scientific medicine, shortens surgery times and helps to shorten patient recovery times. The development of AI contributes to the transformation of the banking and finance industry.

4.3. Outcome gap

Different groups have differences on the purpose for using AI products, also ability, and compete level of use of AI technology, resulting in a considerable difference and divide in the results produced by using the technology. Applying AI technology will impact employment and, thus, real life. Regarding the impact of AI on employment, different scholars have different views. The first focuses on the positive effects of AI technology on employment from the perspectives of job creation, increased labor productivity and job cooperation. In terms of job creation, they believe that technological advances will not lead to mass unemployment and that the development of AI will positively affect future job growth in healthcare, education, and other areas. In job cooperation, artificial intelligence can effectively improve human work efficiency, and AI technology can collect and process data to achieve human-machine interaction and collaboration in education and healthcare. The second view is that the job-disrupting effects of AI far outweigh

previous technological advances. The use of intelligent machines reduces relative salaries. The related jobs gradually decrease, and technological unemployment is inevitable [26].

People with higher capital resources will be able to use AI technology to increase productivity, but those in repetitive, non-creative jobs will suffer severely, further widening the gap in real life [27].

The application of AI technology will also impact China's urban and rural income disparities. According to Wei and Xu, the rapid development of AI technology in China has also widened the income gap between urban and rural areas [28]. A concern to consider is how those workers who rely on manual labor are to be replaced by intelligence robots, how they are to be qualified for the jobs created by AI, and how they are to improve their skills to adapt to the technical requirements of the new jobs. In addition, the development of AI technology has created a particular class of technological capital elite. This minority creates enormous value, while most ordinary people find it difficult to create material value as AI technology matures. This will allow a group of people who have preferential access to AI technology to be more creative and capable of working than ever before with a sophisticated algorithm system and becoming the dominant society behind the algorithms, thus widening the social gap.

But for social vulnerable groups, such as the blind and the hearing impaired, AI technology can help them make amends of their information shortage. For example, disabled people can use intelligent voice technology and robotics to help them make their lives easier. Nowadays, students' knowledge of Braille can be enhanced by speech recognition with Braille displays that allow them to practice independently or in distance learning. Artificial intelligence also brings special abilities to deaf people, helping them achieve more communication. For people with cognitive impairments, attention deficit disorders and weak literacy abilities, the development of artificial intelligence also brings additional benefits. For example, Google released a model in 2016 for TensorFlow, a Google open-source machine learning framework that enables news articles to generate single-line summaries automatically. A machine-learning algorithm developed by Salesforce can summarise articles, emails, or lengthy documents into a clear and straightforward paragraph, further addressing all cognitively challenged people and giving them more assistance.

5. DISCUSSION

In terms of technology development, artificial intelligence is a fringe discipline at the intersection of natural and social sciences, involving philosophy, sociology, computer science, neuropsychology and

many other fields. In terms of technical application, AI is the science of simulating human thought processes and intelligent behavior through computers. Due to the complexity of its technical mechanisms and logic, it requires a certain level of basic knowledge and a long period of study to master, which raises the barrier to entry. Those members of the public with a certain level of expertise and financial means can more quickly grasp the concepts and skills of applying intelligent technology. They can quickly transform online information resources into their knowledge base, transforming new knowledge into economic gain. And as AI technologies become more rapidly updated, the gap between people's levels of access to information and their ability to access it will grow, thus exacerbating the existing digital divide.

On the other hand, AI technologies make information dissemination easier and services more personalized, increasing people's dependence on the Internet and their tendency to generalize to entertainment. The purpose of the Internet is different depending on the social status of the public, the level of knowledge and the availability of communication devices, e.g. people with higher economic and social status prefer to work and study through the convenience of technology. In contrast, people with lower economic and knowledge levels are more likely to be addicted to the Internet and engage in online recreational activities. The capital will continue to innovate to gain a competitive edge in the market for technology products and find the broadest markets for investment and consumption to add value to the capital. Artificial intelligence companies will choose economically developed areas with a concentration of talent and a well-developed industrial region and infrastructure to reduce research, development, and production costs. But this will further contribute to the trend of a growing digital divide between regions, rural and urban areas, and between the rich and the poor.

6. CONCLUSION

The growth of artificial intelligence technologies is both growing and decreasing different information divide.

In terms of technology access, the large amount of data analysis and artificial intelligence to provide better services for human productive activities and life demands is a future trend. Although the gap in Internet access has shrunk, the gap in access to AI-enabled products and facilities has not. Some AI products that have grown at a lesser cost can also help to bridge the knowledge gap.

Furthermore, there is still a knowledge and application gap in terms of technology services. Artificial intelligence is by its very nature complicated.

Understanding the technology can be difficult, and deploying proper AI-enabled equipment and facilities necessitates expertise. Children, the elderly, and special groups (the less educated, individuals with impairments) can utilize such equipment, although there are gaps for those who can acquire the rules of use more rapidly. However, some people with impairments may be able to use AI technology to help them in the beginning.

Moreover, there are variances in the aim, capacity, and level of application of AI technology by different groups, resulting in huge differences and divergences in the outcomes produced by the technology's use. AI applications may have an impact on work and, as a result, on daily living. However, verifying this influence will take time. The deployment of AI technology will have an impact on China's urban-rural economic disparity.

In the future, the impact of artificial intelligence will gradually expand as it develops. Currently, artificial intelligence is already having an impact on all age groups and different segments of society, and it is gradually penetrating into all areas of society. The impact on the digital divide in society under artificial intelligence will produce further changes, the final outcome will depend on how people use it. The access gap; the capability gap; and the outcome gap proposed in the paper will become the key factors that people need to consider in order to narrow the digital divide and sustain the development of artificial intelligence. How to narrow the digital divide while developing artificial intelligence will be the central focus of future research.

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