

Research on the Protection of Rights and Interests of the Elderly from the Perspective of Digital Justice

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Abstract: In the digital society, the concept of justice has transcended physical boundaries and extended into virtual spaces composed of data and algorithms. Due to the digital divide, algorithmic black boxes, and lack of ethical norms, the elderly are becoming a “digitally vulnerable group,” and the rights dilemmas they face are essentially a multidimensional digital injustice. This study uses digital justice as the analytical framework to reveal the composite violations suffered by the elderly in terms of data justice, algorithmic justice, and intergenerational justice, specifically manifested as the loss of information rights in data collection, technological exclusion in algorithmic decision-making, and structural imbalances in intergenerational resource allocation. In response, a stepwise protection system should be established from “relief” to “empowerment” and then to “reshaping.” At the relief level, traditional services should be preserved, and channels for rights protection should be kept open; at the empowerment level, differentiated digital literacy education should be implemented; at the restructuring level, algorithmic ethics review should be promoted, and intergenerational compensation mechanisms should be established. Through this stepped protection pathway, we can correct the unjust patterns in the digital realm, ensure that technological achievements fairly benefit all people, and ultimately achieve the grand goal of digital justice.

Keywords: Digital justice; Digital vulnerable group; Elderly; Algorithmic black box; Intergenerational justice

Online publication: July 14, 2026

1. Introduction: The question of justice obscured by digital dividends

Emerging technologies are developing at a rapid pace. Big data, artificial intelligence, and cloud computing lead this wave. People’s ways of working and living are changing profoundly. New digital lifestyles have spread into every corner of society. Online shopping, mobile payments, and online healthcare are now everyday realities. These trends appear unstoppable. They bring huge digital dividends to the whole society. Yet these dividends are not shared equally. Young people, with their natural advantage in information technology, have disrupted traditional generational relations, leaving many elderly people uneasy and anxious. As a result, a digital divide is widening, and the older generation often finds itself left behind. This divide grows more serious against the backdrop of China’s aging population. By the end of 2024, 310.31 million people were aged 60 and

above, accounting for 22.0% of the total population; among them, 220.23 million were 65 or older, or 15.6%^[1]. The nation is experiencing deepening population aging. At the same time, internet penetration among those aged 60 and above stood at just 54.2 percent in December 2024. The national average was 78.6 percent. The gap is considerable and stark^[2]. Older adults face severe technological constraints. As a digitally vulnerable group, they encounter difficulties in travel, medical care, and personal information protection. Limited family support, lower educational attainment, and declining learning capacity leave many unable to access the benefits of digitalization. They are being pushed to the margins of an intelligent society. Resolving this marginalization is urgent. Digital technology has undeniably improved social efficiency. But we must pause and ask a harder question. Has it distributed its benefits fairly across all social groups? The euphoria of digital dividends obscures a critical question of justice that demands a clear response.

2. Theoretical connotation and analytical framework of digital justice

2.1. Theoretical connotation of digital justice

Justice is a fundamental concept of social development. It forms the base for social progress and justice. In his work *A Theory of Justice*^[3], John Rawls says justice is the first virtue of any social institution. Each individual has a claim to justice, according to him. Not even the well-being of society can override it^[4]. The digital era has come upon us. The scope of justice is no longer limited by geography. It transcends into digital spaces that have been constructed using information and algorithms. Thus, we have the notion of digital justice. Digital justice is an ideal state where digital technologies completely integrate themselves with human rights, equality, and law. It requires the regulation of issues brought about by digital technologies. It also entails the determination of whether the technologies are contributing to social justice or otherwise. It is still an issue of social justice. The objective is to facilitate individuals in living improved lives. To comprehend this notion more comprehensively, one could consider its three essential dimensions^[5]. Digital justice is a composite idea. It is based on three interconnected aspects. They are data justice, algorithmic justice, and intergenerational justice. Together, these three aspects cover the entire lifecycle of digital technologies. The lifecycle of digital technologies starts with information gathering and ends with institutional allocation. Through these aspects, we gain a holistic perspective that helps to look at the issue of digital injustice towards elderly people.

Data justice has to do with equality in the entire lifecycle of data. It is all about who is datafied, why, and the impact thereof. Linnet Taylor adopts the rule of law approach when discussing data justice. The author puts forth three major principles. They include visibility, prior consent, and freedom from abuse^[6]. Algorithmic justice involves a few considerations. First, procedural legitimacy is needed. Secondly, equitable distribution of benefits is a necessity. Thirdly, accountability in the algorithmic decision-making process is necessary. Algorithmic justice aims at combating discrimination, which mostly goes unseen by hiding within algorithmic black boxes. Intergenerational justice focuses on generational issues of rights, duties, and resources^[7]. A very important contribution in this regard comes from Rawls. As he rightly points out, birth is a lottery. Hence, justice needs to be concerned equally with all generations. This helps balance the interests of generations^[8].

2.2. The superposition logic of triple digital injustices

The three dimensions create a sequential and interconnected chain. Collectively, they help us create a comprehensive approach to analyzing digital justice. From the perspective of senior citizens, digital injustices should not be seen as single acts of discrimination. Instead, they should be viewed as a synergy. This includes

data injustices, algorithmic injustices, and intergenerational injustices, which collectively marginalize senior citizens from digital existence. Allow me to explain each dimension individually. The data injustice is the first step of this chain of injustice. Senior citizens become victims of massive data gathering beyond the acceptable limits and its exploitation in an unjust manner. This becomes the basis for further exploitation of senior citizens in the digital sphere. They turn the biases embedded in passive data into concrete exclusionary actions. Such actions aim at the elderly in particular. They put seniors into information cocoons. They also subject the elderly to big data price discrimination. Algorithms tend to present themselves as technologically neutral. However, their effect is to reinforce the value bias against the elderly ^[9]. Intergenerational injustice is the structural cause of exclusion. The allocation of digital resources as well as institutional architecture is built without considering senior citizens. Such a condition leads to a structural context that perpetuates and exacerbates data injustice and algorithmic injustice.

These three dimensions form a self-reinforcing structure. A sole viewpoint can address only one level, which cannot demonstrate how different levels overlap and consolidate with each other. In this paper, we use the triple lens of digital injustice to explore the injustice that takes place on the data, algorithmic, and generational levels one after another. This is more than just a description of an occurrence.

3. Three-dimensional practical dilemmas of digital justice anomie

Perhaps the most noticeable aspect of digital injustice is the phenomenon of the silver-hair digital divide. It is the problem faced by older people. The phrase was coined by Peter Millward. He used it to describe barriers that older people may encounter in their attempts to gain Internet access and use. Another important contribution comes from Pippa Norris, who formulated a well-known classification of this issue. In her scheme, the older generation experiences an integrated digital divide ^[10]. In addition to being at a disadvantage regarding access to the Internet, they suffer from systematic discrimination regarding digital literacy, information filtering, and social interaction. Due to limited knowledge and low adaptability, many old people fear and are marginalized by society. This section analyzes these harms directly. It uses the three dimensions of digital injustice as its lens.

3.1. Data injustice: Infringement of personal information rights

A breach of personal information rights is what gives rise to data injustice. Then there comes algorithmic injustice and intergenerational injustice. Let's understand how this domino effect starts. In the digital world, information availability is highly dependent on algorithmic suggestions. Such algorithmic suggestions usually imprison older people in information cocoons ^[11]. A large number of older people usually reside alone and have great social needs, but low awareness about risks, making them vulnerable targets for the perpetrators of fake caring messages. One such scam involved a square dance application on their smartphones. In the criminal activity conducted via that application, illegal absorption of public deposits amounting to 870 million yuan occurred. This scam attracted over 1,200 senior citizens. Such a trend is evident in an extensive screening conducted by researchers who found 213 applications for the elderly from five different categories ^[12]. The reason behind all these injustices is the abuse of data justice. Too much personal information like names, ages, contact numbers, health conditions, consumption data, and more is collected by such platforms without any proper consent, just for better service improvement or other malicious reasons, without proper notice and approval from users. This is how data injustice operates, setting the stage for wider digital exclusion.

3.2. Algorithmic injustice: Technical exclusion from information cocoons to data-driven price gouging

Algorithms are everywhere in the era of big data and artificial intelligence. They can improve efficiency. They can help realize the vision of a better life. But their underlying logic can also be exploited. Developers may undermine that very vision. We can see this clearly through the concept of the black box. The term “black box” symbolizes uncertainty. It also represents opacity. Frank Pasquiel first introduced this concept. He did so in his book *The Black Box Society* ^[13]. The term explains how users face an unknown state. They cannot see the logic inside algorithmic systems. They do not understand the operating mechanisms. This hidden logic has real consequences for the elderly. Algorithms construct user profiles to boost engagement. The elderly often have limited social interaction. Their information sources are narrow. This combination leaves them stranded in information cocoons ^[14]. Algorithmic bias also leads to more insidious harms. It enables data-driven price gouging. Media reports have revealed a troubling practice. Identical products are priced differently. They depend on user profiles. Long-term loyal customers are frequently charged more. The same is true for the elderly. They are less inclined to shop around. They become less active online. They tend to be called “low-sensitivity users.” And therefore, they get charged more money. The process is done without them realizing anything about it. It undermines all three core principles of algorithmic justice: procedural transparency, non-discrimination, and accountability. Again, such practices are rarely done out of intentional ill will, yet they reveal the ways in which age-related stereotypes can be reproduced and amplified in algorithmic decisions aimed at maximizing profit. The phenomenon of discrimination gets particularly ugly when it assumes a technological guise, in pursuit of greater efficiency or even customization on behalf of companies. In this way, the older customers become nothing more than “customers that have low consumption potential” or those that have “high churn risk.” This categorization might appear perfectly rational, but it amounts to age discrimination, one that is not based on intentions alone, but rather on outcome.

3.3. Intergenerational injustice: Structural intergenerational imbalance in digital resource allocation

Online registration, e-government, and digital appointment systems are now mainstream. Yet many elderly people find themselves excluded. Their digital literacy is simply too low. CNNIC data from December 2024 show that while instant messaging, online video, and short video usage all exceeded 90%, ride-hailing (48.7%), online medical care (37.7%), and online audio (30.3%) lagged far behind. With only 54.2% of those aged 60+ online, the services most critical to elderly well-being—travel and medical care—are precisely the hardest to master, revealing a deep intergenerational usage gap. A deep intergenerational usage gap clearly emerges here. This gap becomes painfully visible in daily life. Many hospitals now prioritize online registration. Elderly patients without digital skills cannot access timely care. Some restaurants mandate QR-code ordering. They refuse cash payments altogether. This practice violates the right to choose how to pay. Elderly people also struggle with real-time transport information. They face barriers with ride-hailing apps and ticketing platforms. Their basic right to travel is undermined. These problems share a common root. They arise from the absence of intergenerational justice in digital governance. Digital resource allocation and institutional design remain youth-centered. The elderly suffer systemic neglect as a direct result ^[15]. This is more than a simple usage gap. It is a form of intergenerational distributive injustice. Society, in its digital transition, has failed to provide adequate alternatives. It has also failed to allow proper transition periods for those left behind. This breaches intergenerational fairness and social justice. I bring extensive academic experience and professional knowledge

to precisely these questions.

4. A stepwise path for protecting elderly rights guided by digital justice

Consistent with Rawlsian principles, justice must apply equally to all. In response to the compound digital injustices in data, algorithms, and structural distribution, this paper constructs a three-tiered protection system: from ex-post basic relief to ex-ante subject empowerment and finally to systemic institutional reshaping. Basic relief addresses intergenerational injustice and safeguards minimum fairness; subject empowerment strengthens the capacity of the elderly to resist data and algorithmic injustice; systemic reshaping targets the institutional and ethical roots of triple injustice.

4.1. Basic relief

One way to rectify any form of injustice among the different generations would be through retaining traditional modes of service together with intelligent service modes. Technology requires a specific value orientation. The primary objective should be the fulfillment of human requirements. This should happen with full regard for the basic philosophy of total devotion to the service of the masses. There is an illuminating thought in support of this observation^[16]. These include several critical actions. We need to keep specific offline time slots and senior citizen services. This needs to be done in all sectors of governance, health care, transport, and banking. We must ensure stringent action against the refusal of cash payments. We must ban processes that can only be performed digitally. We need to create senior-friendly apps for all smart applications.

4.2. Subject empowerment

It is necessary to have a differentiated digital literacy framework. It addresses the capability gap. It helps to make the elderly capable of using the internet. For the success of the strategy of Digital China, the government needs to strengthen its information infrastructure development. It should reach all rural and distant locations. It helps minimize the urban-rural digital gap^[17]. In this era of digital revolution, there is a need for the government to strengthen these initiatives. There is a need for the government to push for digital development in the countryside. The government should take steps towards integrating cities and rural areas. The government needs to make sure that the income levels of the residents increase. The government needs to plug the information gap in the last mile. On such grounds, specialized training must cater to different requirements such as community-level and university-level training about device operations, logical algorithms, privacy safeguards, and fraudulent schemes for voluntary participants; training at home for the sick or housebound elderly; and dialectic training for speechless individuals. The result is the transformation of older adults into digital citizens who not only know how to operate within the algorithmic system but also how to resist its power. This means that digital critical literacy can be used at a micro level to achieve data and algorithmic justice. Encouraging lifelong learning and the right to learn through law can be effective measures to help mitigate older adults' concerns about technology.

4.3. Systemic restructuring

In order to ensure that there is truly distributive justice, there needs to be an ethical review of algorithms as well as intergenerational digital compensation. While digital platforms earn huge revenues through data and algorithms, such gains should not be confined only to the capital and technology elite; the digital divide is

essentially a societal problem and not an individual one. Digital technology must be people-oriented, treating human rights as the highest value and the standard for defining boundaries and evaluating progress^[18]. First of all, ensure law and ethics governance through an appropriate balance between morality and legal regulations. Law protects social justice and human rights. The relevant national authorities need to enhance their laws, define roles and moral boundaries regarding algorithm design and data management, and avoid artificial information barriers. According to Article 4 of the Interim Measures for Generative AI Services in July 2023, anti-discrimination measures need to be taken^[19]. Enhance accountability mechanisms. Clarify responsibility for any cyberattack causing damage to either person or property, and thus boosting users' trust. Create an intergenerational mechanism of payment. Take the case of a digital equity tax on risk-prone online sites, with proceeds used to fund elderly-centered digital research and literacy campaigns. Thus, the digital benefits would be returned to the disadvantaged groups. Institutional arrangement is the only way forward toward achieving digital justice.

5. Conclusion

Population aging is a global challenge of the 21st century. Technology is a double-edged sword. On one hand, it contributes to modern governing; on the other hand, it presents concrete threats. Among these are the digital divide, the issue of algorithmic transparency, and ethical violations. All these raise questions about justice. In addition, they negatively affect the rights of vulnerable citizens. Digital justice, which involves the protection of elderly people's rights in the technological era, goes beyond just tackling the problem of use. What is needed is a more sophisticated approach, which should include not only relief, but also empowerment and re-engineering of the system as well. This is how we can avoid creating automated inequality, provide all citizens with digital dividends, and improve people's feelings of achievement, happiness, and safety.

Funding

2024 Postgraduate Student of Legal Theory, School of Law, Hunan Normal University, Changsha, China,
2025 Hunan Provincial Graduate Research Innovation Project "Research on the Protection of the Rights of Vulnerable Groups from the Perspective of Digital Justice" (Project Number: CX20250832)

Disclosure statement

The author declares no conflict of interest.

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