Research on the Communication Ethics of Algorithm Black Box and Intelligent Emergence in the Context of Data-Driven Existence

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Abstract: In the context of data-driven existence, people and communities rely increasingly on algorithms that analyze and make sense of vast data. While these algorithms have been beneficial in increasing effectiveness, backing customized services, and aiding intelligent decision-making, they have also brought about several ethical concerns, notably the algorithm black box. The black box of algorithms reflects the fact that the workings of today's intelligent systems often lack transparency that makes them understandable to the outside world, making it impossible for external regulators, including users, to fully disclose how these algorithms affect the display of information, user interactions, and even public decision-making. As a result, these problems are not only limited to the technical field but also closely related to social ethics and legal norms. This paper investigates how algorithmic black box and intelligent emergence challenge traditional communication ethics, thus affecting information accuracy, transparency, fairness, and accountability. It also analyzes the motivations behind these challenges and proposes coping strategies. By analyzing specific cases and the latest research findings, we aim to propose strategies and suggestions for creating a more just, transparent, and sustainable digital social environment.

1. Introduction

In the context of data-driven existence, algorithms increasingly influence and control our lives and behavior. As crucial parts of artificial intelligence and big data technology, these algorithms play a vital role in social media recommendation, news distribution, online shopping, medical diagnosis, and financial credit. However, the algorithm frequently operates in a manner that is opaque, and its decision-making process lacks transparency. This makes it challenging for users and regulators to comprehend the algorithm's internal logic and has the potential for bias. This phenomenon is referred to as the "algorithm black box." Additionally, the rise of algorithmic intelligence challenges traditional communication ethics as systems can display unexpected intelligent behavior through self-learning and continuous adaptation. The emergence of intelligence may lead to unpredictable social outcomes and pose more complex challenges to ethical issues such as individual rights, privacy protection, and social justice. This paper begins with an introduction that lays the groundwork for the discussion of the study. It explains key concepts such as data-driven existence, the algorithmic black box, and intelligent emergence. Additionally, it analyzes the challenges of communication ethics and outlines the coping strategies explored in the subsequent chapters.

2. Data-driven Existence and Algorithm Black Box

2.1 The Definition and Features of Data-Driven Existence

Data-driven existence is the interaction between individual life and society in the digital age, which is increasingly influenced by data. The trend indicates the widespread importance of data in contemporary society. It concentrates on numerical data while incorporating various behaviors, routines, and preferences converted into data using digital technology. The main features of

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data-driven existence include the following aspects:

Most of an individual's activities and behaviors can be recorded and converted into data points, such as steps, location information, and purchase history. Using wearable devices and mobile applications, individuals can track and quantify their behavior and health status and promote a culture of self-monitoring and optimization. The system offers personalized services ranging from content recommendation to product design by utilizing data generation, analysis, and application for a person. At enterprise and government levels, data-driven approaches inform decision-making processes through big data analytics and algorithms, encompassing areas from marketing to urban management [1].

2.2 The Connotation and Performance of Algorithm Black Box

The black box signifies the lack of transparency in the algorithm's decision-making and constraints on user comprehension. Professionals often use proprietary complex algorithms in decision-making, which need more visibility and interpretability for general users due to the specific mechanism of algorithm operation and data processing [2]. Here are the performances of the algorithm black box.

(1) Users often need help understanding how algorithms process personal data, make recommendations, or make decisions.

(2) Users frequently struggle to understand the hidden algorithm logic behind results that have important impacts, like credit approval or content filtering.

(3) When the algorithm causes a problem, determining responsibility is challenging because multiple links and entities may involve the decision-making process. As shown in Figure 1:

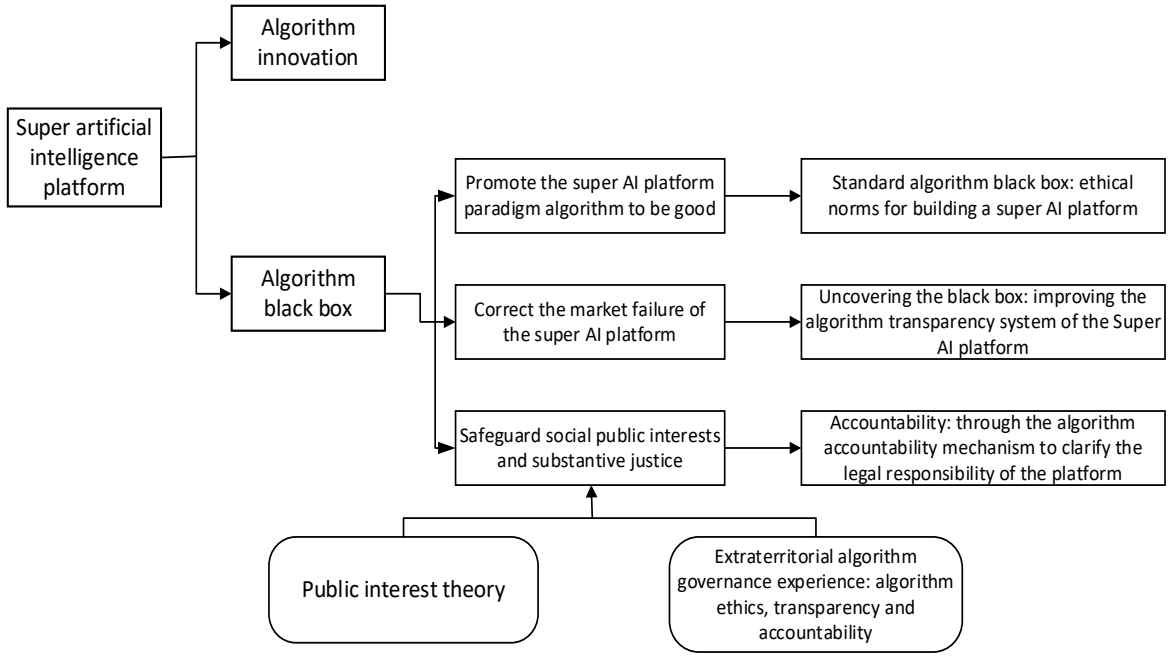

Figure 1 The connotation of algorithm black box

2.3 The Challenges of Algorithm Black Box to Communication Ethics

Algorithms may aggravate information asymmetry because some users or social groups may be marginalized or ignored by specific algorithm logic. Users need complete autonomous control over their behavior choices in the digital environment, and the filtering and recommendations preset by the algorithm may limit their free choice.

The extensive use of algorithms in deep mining personal data may violate users' privacy, and they are unable to adequately monitor and manage the use of their data. The algorithm's lack of transparency hinders users from assessing decision-making fairness and ensuring algorithm transparency in design and usage.

In light of these challenges, we must adopt various strategies. These include improving algorithm

transparency, ensuring accountability, strengthening legislation and policy oversight, and promoting ethical algorithm design. By doing so, we can work towards creating a more fair and just digital society.

3. Intelligent Emergence and Communication Ethics Reforms

3.1 Definitions and Trends of Intelligent Emergence

Intelligent emergence refers to an artificial intelligence system's ability to learn from a large amount of data, adapt, and develop new behaviors or functions continuously. It is not predetermined by prior programming but emerges from complex algorithms and machine learning processes, often yielding non-intuitive results.

The trend of emergent ability indicates that intelligent systems can optimize themselves using algorithms, learn from their experiences, and adjust their behaviors accordingly. This emergence allows the system to adapt to new environments and challenges, demonstrating the capability to surpass its initial design. The system may produce unpredictable behaviors, which sometimes do not conform to the designer's original intention. The emergent nature of an intelligent system greatly improves the complexity and unpredictability of its behavior, which brings challenges to analyzing and controlling its behavior [3].

3.2 The Impact of Intelligent Technology on Communication Ethics

As artificial intelligence becomes increasingly incorporated into communication tasks, it alters the conventional perspective on communication ethics. Intelligent technology impacts the precision of data, the protection of intellectual property, the preservation of privacy, and the freedom of users to know and choose.

Whether the content recommended by the algorithm is accurate, contains prejudice, and will aggravate social differentiation has become the focus of ethical discussion. Content created by artificial intelligence, such as automatically generated articles, music, or works of art, has created new problems regarding copyright ownership. Personal data may be collected and analyzed without consent, which might infringe on personal privacy. Additionally, automated decision-making may limit users' choices and ignore users' preferences, thus affecting users' autonomy. Table 1 shows the impacts of intelligent technology on communication ethics.

Table 1 The Impact of Intelligent Technology on Communication Ethics

Impacts	Specific performances	Relevant data or cases
Information accuracy	There may be deviations in the content recommended by the algorithm	A study found that algorithmic recommendation systems on social media may worsen the effect of information cocooning, leading to a more one-sided and extreme set of information presented to users.
Copyright of creative content	Copyright ownership dispute of AI-generated content	In 2021, the U.S. Copyright Office registered the copyright of the artwork generated by AI for the first time, triggering extensive discussions on the copyright ownership of AI creations.
Privacy protection	Data collection and analysis may violate individual privacy	Statistics show over 80 % of Internet users worldwide worry about their data being abused or leaked.
Users' right to know and the right to choose	Automated decision-making may limit user's choice	A survey reveals that over 60% of users feel their choices are limited when using the intelligent recommendation system, preventing them from browsing content freely according to their preferences.

3.3 Challenges and Opportunities Brought by the Emergence of Intelligence to Communication Ethics Norms

When the behavior has negative consequences, it is difficult to determine whether the responsibility belongs to the algorithm designer, user, or the algorithm itself. In other words, the intelligent system's decision-making process has grown intricate, making it challenging to offer a straightforward explanation to users or those impacted. Emergence can sometimes amplify the prejudice in the information, resulting in unfair treatment or imbalance. For instance, intelligent technology may be misused to control misinformation in public opinion and propaganda. On the other hand, the emergence also presents chances to enhance content accessibility, foster new forms of creativity, and help individuals make more informed decisions. Coping with these challenges requires policymakers, industry practitioners, and scholars to collaboratively develop strategies ensuring that communication ethics can adapt to the changes brought about by artificial intelligence.

4. Strategies and Suggestions

4.1 Enhance Algorithmic Transparency and Regulation

4.1.1 Specific Measures to Improve the Transparency of Algorithms

First, it is necessary to strengthen the interpretability of the algorithm. It involves algorithm developers considering how to explain their operating principle to the end users when designing algorithms. It involves simplifying the model, designing visual aids, and building user interfaces to display the algorithm's decision-making process in a clear manner, such as expanding decision trees or showing weight distributions. In addition, we can help users understand why the algorithm makes specific decisions by interpreting human language output. Furthermore, implementing algorithm audits is essential. This process requires an independent third party, including academic institutions or regulatory organizations, to assess the algorithm's fairness, accuracy, and variance regularly. The audit should focus on evaluating the quality of the data set used by the algorithm, as well as monitoring any biases and influences in the results.

Guidelines and checklists must be developed and implemented. They can offer companies guidance on the best approaches for creating and implementing algorithms, guiding them to prioritize transparency and fairness from the inception of their design process. Furthermore, raising public awareness about the influence of algorithms on their everyday lives and choices is essential. It may involve carrying out public information activities and educating consumers and citizens about algorithms, data use, and protection methods.

4.1.2 The Importance of Government Supervision of Algorithms

The importance of the government's supervision of algorithms is reflected in the data-driven existence because the government has key functions such as maintaining fair competition in the market, safeguarding people's rights and interests, and ensuring social justice. Due to the rapid development of technology, algorithms now manage how information is distributed and the quality of services and influence how citizens think and behave. Therefore, the government needs to create a new supervision system to handle the responsibilities of technological advancements and societal changes, surpassing traditional law enforcement.

First, legislation should clarify the appropriate use of algorithms and define the ethical boundaries in the algorithm's design and implementation process. Second, the policy should advocate the fairness and transparency of the algorithm by requiring developers to disclose key aspects of the algorithm's logic and ensure that the decision-making process is transparent to regulators and the public [4]. Government departments should be capable of effectively reviewing the algorithms used in the market, identifying and correcting prejudice and injustice, and protecting users from data discrimination. Third, the government fosters cross-departmental cooperation by integrating data science, information technology, and legal expertise to address challenges posed by algorithms, ensuring that formulated policies and regulatory measures are

practical and encourage technological advancement [5]. In the context of globalization, international cooperation is crucial, and it is necessary to coordinate legislation and technical standards among countries to form a joint force to manage cross-border data flow and the algorithm use of multinational technology companies.

Government oversight aims to guarantee the practical use of algorithms and safeguard the public from intentional and unintentional manipulation of algorithms. Implementing a thoughtful and forward-looking supervision policy for algorithms promotes the healthy advancement of science and technology, enhances citizens' trust, and upholds social justice and order.

4.2 Improve the Communication Ethics System

4.2.1 Analysis of the Shortcomings of the Existing Communication Ethics Norms

The existing norms of communication ethics demonstrate low adaptability to the new challenges the digital era poses, particularly with the rise of intelligent technology. Even though conventional standards offer direction on safeguarding sources of information, honoring rights of intellectual property, and guaranteeing the legitimacy and impartiality of information. Yet, these requirements appear insufficient given the rapidly changing issues like algorithm transparency, data privacy, and ownership of content innovation rights from artificial intelligence [6].

Traditional communication ethics norms often fail to comprehensively consider the information filtering bubble and echo chamber effect caused by algorithm recommendation systems, which may limit the diversity and transparency of information. More targeted guidance and constraints are needed, which harms the accuracy, neutrality, and non-discrimination of the content processed by the algorithm. Due to the extensive collection and use of personal data, traditional privacy protection measures are inadequate for addressing the risks posed by new methods of utilizing data. The current standards often fail to address the ethical dilemmas arising from artificial intelligence in content creation, such as determining copyright ownership of algorithm-generated music and articles and assigning accountability for controversial content. Simultaneously, with the emergence of intelligent technology, communication ethics lacks measures to prevent, monitor, and address unforeseen outcomes.

With regard to the system of communication ethics, we need to conduct an in-depth analysis of the challenges brought by digitalization and intelligence so as to progress and adapt to the new communication environment and ensure that we can provide sufficient guidance and solutions for emerging dilemmas. This task is highly important in upholding the credibility of spreading information, safeguarding consumers' rights, and advancing the sustainable growth of technology.

4.2.2 Recommendations on Improving the Communication Ethics Regulatory System

Several key suggestions must be considered to improve the communication ethics standard system and adapt to the new communication environment centered on data and artificial intelligence. First, we should emphasize data transparency and personal privacy protection to ensure that users know how, why, and by whom their data is used and can effectively control them. It is recommended that the specification be updated to address the intellectual property rights of content generated by artificial intelligence. Appropriate standards for ownership and usage of these rights should also be established.

Second, communication ethics norms need to guide how to detect and address bias within algorithms, advocate for developing an unbiased information-sharing atmosphere, and establish a process for rectifying any mistakes or harmful material. This specification should support research and application to evaluate the long-term effects of artificial intelligence technology on ethics and society and encourage the advancement of algorithms designed for interpretability.

Furthermore, communication ethics pursues international cooperation and standardization. In a globally interconnected world, cross-border information dissemination and data flow require the international community to reach a consensus on communication ethics and cooperate in formulating standards. To sum up, it is necessary to realize the innovation in education so that communicators, algorithm developers, and general users can thoroughly understand the

requirements of new communication ethics. It can be achieved through formal education, vocational training, and public awareness activities [7].

4.3 Improving Public Awareness of Communication

4.3.1 Discussion on Ways and Means of Raising Public Awareness of Communication

Improving public awareness of communication is the cornerstone of building a healthy communication environment. In the current era, characterized by the abundance of data and the importance of intelligence, it is essential to consider many dimensions when undertaking this task. The education system must be integrated into the curriculum of communication ethics. At all levels, from primary school to higher education, there should be an emphasis on the ethical and responsible aspects of communication, as well as on the ability of students to identify and comprehend potential forms of prejudice and misleading information. The government and non-governmental organizations should popularize the knowledge of communication ethics through seminars, public service advertisements, and social media, thereby improving public awareness and guiding them to critically analyze and consume information.

In addition, media organizations uphold their societal obligations through regular special reports, columns, and public lectures to educate the public on ethical considerations in content production and manage the delicate balance between privacy and transparency. The gradual popularization of intelligent communication technology requires special education for the general public, such as training courses on personal data protection, online fraud prevention, and false information identification skills, to help people improve their digital literacy and ability to address challenges.

4.3.2 The Responsibility and Role of Media in Communication Ethics Education

Media plays a vital role in the education of communication ethics. The media serves as the primary avenue for disseminating information, impacting public awareness and social concepts while setting an example for upholding communication ethics. Therefore, the media should consciously adhere to and promote high standards of journalistic ethics and professionalism, including fair reporting, accurate information transmission, respect for intellectual property rights, privacy protection, and rejection of false news.

Media organizations should actively participate in or initiate discussions and educational activities on the importance of communication ethics and use their strong influence and information dissemination power to publicize the core values of communication ethics. Relevant personnel can realize them by making special programs, creating media literacy columns, and holding public lectures and seminars. These activities help the public realize the importance of communication ethics and offer tools for evaluating and analyzing information, promoting the development of critical thinking skills. Additionally, it is suggested that the media show how to embody communication ethics in specific news events, deal with ethical dilemmas, and provide a clear and practical reference for the public through example teaching. Transparent practices enhance public understanding and trust in media, encouraging active engagement in upholding communication ethics.

5. Conclusion

With the rapid development of digital products and data, the algorithm black box and emergent ability pose new challenges to communication ethics in contemporary society. The continuous evolution of media and algorithms urges us to re-examine and improve the existing communication ethics specification system. To address these challenges, we need to enhance algorithm transparency, optimize supervision mechanisms, improve ethical standards, and promote public education to collaboratively build a healthy, fair, and transparent information dissemination environment. The media holds crucial responsibilities and is instrumental in education as the leader of public opinion and information dissemination. The government, the media industry, educational institutions, technology developers, and the public all play an active role in raising awareness and collaborating

towards this goal. Only in this way can we better understand and use the great potential brought by digital technology to mankind while reducing the possible risks caused by technology.

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