Research on the Humanistic and Ethical Risks of Algorithmic Recommendation in AI Social Tools and the Mechanism of User Trust from the Perspective of Different Age Groups

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Abstract: In the digital era, AI social tools, relying on algorithm recommendation technology, provide personalised social experiences for different age groups. However, with their wide application, the humanistic and ethical risks caused by algorithm recommendation have gradually emerged, and the impacts on different age groups also vary. Against this background, it is of great practical significance to carry out research on the humanistic and ethical risks of algorithm recommendation of AI social tools and the user trust mechanism from the perspective of different age groups. This study first analyses the usage characteristics of AI social tools among adolescents, young and middle-aged adults, and the elderly, and elaborates the basic principles of algorithm recommendation and its strategic differences for different groups, supplemented by application case analysis. Then, it discusses in detail the humanistic and ethical risks faced by each age group in algorithm recommendation. Finally, it analyses the factors influencing user trust among different age groups, and puts forward strategies and practical suggestions for constructing user trust mechanisms. The research helps to gain a deeper understanding of the impact of algorithm recommendation of AI social tools on different age groups, and provides theoretical support and practical guidance for reducing ethical risks and enhancing user trust.

1. Introduction

1.1. Research Background

AI technology is rapidly advancing, and social tools are integrated into interpersonal communication environments with the help of algorithm systems, changing the forms of information dissemination and social interaction [1]. Globally, social platforms such as Meta and TikTok generally adopt AI algorithms to provide personalised content, with their user groups covering all age groups from teenagers to the elderly. People of different age groups show obvious differences in technology acceptance, demand orientation, and risk perception. Teenagers' minds are not yet mature and are easily disturbed by the algorithmic "information cocoon," leading to emotional dependence or deviation in values. Middle-aged and young users have stronger technical operation ability, but they have to face the problem of declining decision-making power caused by the abuse of privacy data and algorithmic bias. Elderly users, due to the prominent problem of the digital divide, are more easily misled by false content when passively receiving information from algorithms. The non-transparent operation of algorithms makes it difficult for users to discern their principles, intensifies ethical controversies, and weakens social trust. Generative AI tools such as ChatGPT have once faced legal sanctions for infringing privacy and algorithmic discrimination. Against this background, it is urgent to study the humanistic and ethical risks in algorithms from a multi-generational perspective, and to seek trust restoration solutions that meet the needs of different age groups.

1.2. Research Significance

At the academic level, it adds new content and further improves the theoretical knowledge

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system in the field of AI social tools. Research on the use of AI social tools by different age groups is relatively limited, with attention focused on the characteristics of different age groups. It analyses the humanistic and ethical risks of algorithms and the construction mechanism of user trust, providing a new observation perspective and theoretical support for future related research work. From a practical perspective, the achievements provide targeted guidance for developers and operators of AI social tools. With the help of understanding the risks and trust needs faced by different age groups, developers improve algorithm strategies, enhance the safety performance and reliability of products, and strengthen users' trust in them. This is also conducive to relevant regulatory institutions formulating scientific and reasonable policies to guide the AI social tools industry towards a healthy and standardised direction, safeguard the legitimate rights and interests of different age groups, and promote the harmony and stability of digital society.

1.3. Main Research Content

It mainly focuses on the cognitive differences of people of different age groups regarding the humanistic and ethical risks contained in AI social tool algorithms and their user trust mechanisms. It examines the behavioural characteristics of teenagers, middle-aged and young adults, and the elderly when using AI social tools, covering usage frequency, motivation, and preferences. It explains the core operating logic of AI social tool algorithms, compares the similarities and differences of their strategies for different age groups, and combines specific application cases for analysis. It discusses the algorithmic ethical challenges encountered by each age group when using such tools, explores the key factors affecting the trust level of different age users, and proposes specific measures and practical suggestions for constructing a trust assurance system, aiming to provide comprehensive and feasible solutions to the practical difficulties of AI social tools in cross-age group applications.

2. Usage Characteristics of AI Social Tools by Different Age Groups

2.1. Teenager Group

Teenagers show unique behavioural patterns in the use of AI social tools. In terms of application frequency, they are in a growth period with strong social willingness and abundant energy, and frequent use of such platforms is a common phenomenon [2]. During leisure time, they tend to deeply engage in communication and interaction with peers through diversified media such as text, audio, and video.

From the perspective of application purpose, social entertainment is the core demand. They use AI social platforms to meet new friends, exchange interesting anecdotes and personal hobbies in life, such as game strategies, anime works, etc. Teenagers are particularly inclined to join various social topic discussions and interactive projects, to demonstrate individuality and gain others' recognition.

In terms of preference, they favour social features that combine fun and innovation. Social applications with virtual images, personalised filters, and special effects are very popular. Teenagers have strong acceptance of new things and are willing to experience new interactive methods launched by AI social platforms, such as AI voice interaction and intelligent chat companions. Their minds are not yet fully developed, and they often lack self-protection awareness in the process of use, making them easily disturbed by harmful information.

2.2. Young and Middle-aged Groups

The young and middle-aged groups show distinct characteristics different from teenagers in the use of AI social platforms [3]. Although their daily work is busy, they still use fragmented time to operate social tools during free time. Whether on the commute or during lunch breaks, they will take out their mobile phones to browse information and join social interactions.

The main purpose is to expand social circles and professional communication. In the advancement of their careers, they use AI social platforms to get to know peers in the industry, obtain valuable information and resources, and provide support for work. They will also show their

professional level and work achievements on social networks to enhance personal influence.

In terms of orientation, people pay more attention to the practical value and professional level of social tools. Social platforms that provide industry information and business communication are often more popular with them. They also use social tools to meet the needs of consumption and leisure in life, showing a relatively rational attitude. They will select suitable social functions according to their own needs, such as online shopping sharing, audio-visual entertainment, etc.

2.3. Elderly Group

The elderly show their uniqueness in the use of AI social platforms. In terms of usage frequency, the popularisation of digital technology has enabled more and more elderly people to begin to contact and use AI social tools, but the overall usage frequency is still not high [4]. They often need a period of adaptation to familiarise themselves with new technologies and operation methods.

The main purpose is to keep in touch with relatives and friends. With the help of video calls, voice chats, and other ways, they break the limitations of time and space to communicate with family members and alleviate their longing for relatives. Some elderly people will also use social platforms to obtain political news, health care information, etc.

In terms of operating habits, users prefer social applications that are simple and easy to use, with clear interfaces. Complicated functions and design elements are easy to make them feel confused and at a loss. Larger font sizes, intuitive navigation menus, and clear operation prompts can better meet their usage habits. The elderly group has higher standards for the authenticity and credibility of information, and their ability to identify false information and fraud tricks is relatively limited. Therefore, more thoughtful guidance and security guarantees are needed in the process of use.

3. The Recommendation Principle of AI Social Tool Algorithms and Their Application in Different Age Groups

3.1. The Basic Principle of Algorithm Recommendation of AI Social Tools

User behaviour data and machine learning technology constitute the cornerstone of the algorithm system of AI social tools. This system operates in a dynamic closed loop of "data collection—feature extraction—interest prediction—content matching." Its core technologies cover collaborative filtering, natural language processing (NLP), and deep learning models (Transformer) [5]. Collaborative filtering analyses users' historical interactive behaviours (such as likes, comments), identifies similar user groups, and accordingly provides highly relevant content. NLP technology parses user text input (chat records, keyword searches), generates semantic vectors, and refines the granularity of interest tags. Taking the Douyin system as an example, its algorithm continuously optimises strategies with the help of real-time feedback mechanisms (such as video viewing duration), and finally realises a "thousand faces for a thousand people" content distribution model.

The core of the system operation lies in the pursuit of "precision" and "maximisation of user engagement." Data show that users on average trigger 20 interactive behaviours per minute, and algorithms use reinforcement learning to continuously improve their strategies to extend usage time. This process has caused controversy. First, because of the "path dependence" characteristics of algorithms relying on historical data, the effect of the information cocoon is aggravated, and teenagers continuously come into contact with homogeneous short video content. Second, the boundaries of data collection are unclear, and in voice interactions, voiceprint information is collected without authorisation, which violates personal privacy rights. The operating mechanism of generative AI (such as ChatGPT) relies on training on large-scale corpora, with hidden dangers of spreading bias and false information. The unexplainability of algorithms intensifies the imbalance between users' right to know and right to control, planting the seeds of ethical risks.

3.2. The Differentiation of Algorithm Strategies for People of Different Age Groups

AI social tools formulate hierarchical methods for the diversified needs of people of different age groups. At the level of teenage users, algorithms pay more attention to interest-driven and instant

response, and improve the interactive experience with the help of gamification elements (achievement badges, virtual rewards). In the virtual companion service of Character.ai, the algorithm dynamically adjusts the personality settings of virtual characters according to the dialogue content, thereby catering to teenagers' inner psychology of pursuing novelty and emotional support [6]. A survey by Fudan University pointed out that 58.5% of users aged 18 to 25 are willing to pay for AI tools, which prompts platforms to adopt a business model of "pay to unlock advanced features" (such as personalised virtual image customisation) to enhance user loyalty.

The strategy for the middle-aged and young group focuses on efficiency and practical utility. Professional social platforms such as LinkedIn use collaborative filtering technology to connect industry-related networks, integrating users' professional identifiers (job titles, skill terms) to improve the accuracy of resource allocation. In terms of privacy protection measures, conflicts exist. Highly educated users disable options such as location tracking to control data collection, while the limitations of ordinary users' technical cognition leak more personal sensitive information. For the elderly group, algorithm design focuses on "ease of use." WeChat's "Elder Mode" uses voice interaction to simplify the operation process, and emphasises content such as health care and family interaction. The low usage frequency of the elderly leads to a lack of behavioural data, and algorithms need to use relatives' account associations to enrich user profiles, bringing hidden dangers of cross-generational privacy information leakage.

Platforms generally use dynamic adjustment strategies to coordinate efficiency and ethical issues. TikTok implements content grading and screening for teenage users to control the scope of dissemination of high-risk information, while AI tools in the recruitment field exclude sensitive attributes such as age and gender to reduce algorithmic bias. Difficulties still exist in the process of strategy implementation. The digital divide of the elderly cannot be compensated only by a single technical means, and it is necessary to integrate offline guidance and intergenerational assistance.

3.3. Application Case Analysis

3.3.1. Virtual Companion Service for Teenagers (Character.ai)

Virtual characters are created by platforms with the help of natural language processing technology. Users can communicate with them according to different personality templates ("confidant friend" or "professional mentor") [7]. The algorithm adjusts the response mode of the characters in real time according to the degree of dialogue, especially increasing the occurrence rate of empathetic expressions in the stage of emotional expression. Statistics show that teenagers talk to virtual characters more than 20 times a day on average, and cases of decreased real-life social ability due to over-reliance have increased by 37%. The values of virtual characters are easily influenced by training data and spread gender stereotypes, which highlights the urgency of correcting algorithmic values.

3.3.2. Health Information Recommendation System for Middle-aged and Elderly Users in Meta

Meta creates a health content framework with the help of users' browsing duration and forwarding behaviour. To cope with the problem of insufficient information discrimination ability of the elderly, the algorithm introduces a credibility evaluation system (increasing the weight of authoritative media), reducing the frequency of false information by 28% [8]. This system improves the profile of elderly users with the help of relatives' account information, which has triggered discussions about family privacy boundaries. When children's searches for medical-related keywords affect their parents' accounts, it causes conflicts in family relationships.

3.3.3. Algorithm Fairness Optimisation of Professional Social Platforms (LinkedIn)

In order to weaken age bias in the recruitment process, LinkedIn uses the method of "anonymisation" to obscure users' age data and introduces fairness metrics to calibrate algorithmic bias [9]. Test results revealed that the interview notification rate of the group over 40 years old increased by 15%, while some companies pointed out that the accuracy of resume matching

decreased by 12%. This reflects the dilemma of trade-off between efficiency and fairness. In similar situations, algorithm planning should integrate the age factor of users for real-time optimisation, and regain trust with the help of open architectures (such as algorithm effect analysis documents).

4. The Humanistic Ethical Risks of Algorithm Recommendation of AI Social Tools from the Perspective of Different Age Groups

4.1. Risks Faced by the Teenage Group

Teenagers are the main user group of the Internet and artificial intelligence social platforms. In their growth process, this group is sensitive to the guidance of algorithms. When using tools, teenagers face multiple challenges on the level of humanistic ethics. The content tendency is significant, and algorithms tend to push content that conforms to teenagers' interests. They are more likely to fall into the effect of the "information cocoon," the information they contact gradually converges, ignoring diverse perspectives, forming a narrow worldview or an extreme value cognition. The situation has a profound impact on their value judgment ability and ideological development process.

Teenagers' ability to identify false information is relatively weak, making them more easily misled, indulging in low-quality or even harmful content, affecting their mental health and behaviour patterns. The risk of dissemination of false information and harmful content cannot be underestimated. Cyberbullying, privacy leakage, and improper inducement constitute potential ethical risks. Teenagers, in the situation of immature judgment, suffer harm or are manipulated due to improper exposure of personal information.

Teenagers excessively indulging in the virtual world of personalised algorithms interferes with academic progress and real social interaction, and also causes psychological dependence and feelings of loneliness [10]. If platforms lack effective content screening and guidance measures, teenagers will unknowingly step into potential risks. In order to protect the physical and mental health development of teenagers, it is urgent to implement ethical constraints on artificial intelligence systems, so as to ensure the healthiness, diversity, and safety of information content.

4.2. Risks Faced by the Middle-aged and Young Group

The young and middle-aged group are the core force of society. Their higher digital literacy intertwined with life and work pressure makes them face diversified ethical challenges. Among many issues, privacy leakage and data misuse have become key focuses. When the group uses AI social platforms, personal information is often collected on a large scale, and algorithms analyse user behaviour to achieve precise content recommendation. This improves the relevance of information, but also buries hidden dangers of privacy exposure and data misuse, leading to the impairment of personal privacy rights, and further inducing serious consequences such as identity theft and property loss.

The potential threat of information overload and cognitive bias is becoming increasingly prominent. Technical means promote the formation of the "information cocoon," causing young groups to be limited in a single circle of ideas, weakening their potential for multi-angle thinking, and interfering with social justice and rational judgment. The continuous influence of data bias will consolidate inherent prejudices, deepen social inequality, and cause potential social division and cognitive misguidance.

The middle-aged and young group is prone to face ethical risks, mainly stemming from the spread of false information, excessive pressure of Internet addiction, and long-term indulgence in virtual socialisation and content consumption, which damages mental health and also affects work effectiveness. In the process of pursuing instant satisfaction and social recognition, individuals are easily guided by algorithmic recommendation towards false, extreme, or even unhealthy information, weakening rational thinking ability. To deal with risks, it is necessary to strengthen content review mechanisms, privacy protection measures, and ethical education guidance, to ensure that the middle-aged and young group reasonably utilise network resources and safeguard their

legitimate rights and interests.

4.3. Risks Faced by the Elderly Group

Elderly people encounter multiple unique ethical challenges in the process of using artificial intelligence social platforms. Especially for elderly people with relatively lacking cognition and digital skills, they are more easily deceived by wrong information, such as false advertisements, fraudulent information, and pseudo-health suggestions, which are often provided by algorithms to them, increasing the likelihood of being deceived. Their cognition of the online environment is limited, making it difficult to distinguish the authenticity of information, which leads to economic loss or psychological trauma.

The risks in terms of privacy protection are particularly significant. Many elderly users lack sufficient awareness of personal information protection and often unconsciously accept algorithms, easily leading to the leakage of personal data. Once the information is used by lawbreakers, it causes property loss or infringement of personal privacy. Some elderly people have trust issues when using related services. They worry that platforms have security risks or unreliable content, which affects their positivity and sense of security in participating in digital life.

Over-customised content can cause loneliness. When algorithms only provide familiar or single-category information, elderly people will gradually lose access to diverse information and reduce social interaction, causing negative impacts on mental health. If platforms do not take into account the special needs of the elderly group in design and function, leading to complicated interfaces and inconvenient operations, this will harm their user experience and confidence. Ensuring the rights and interests of the elderly group, improving digital skills, and optimising system design are the core to resolving the ethical challenges of elderly users.

5. User Trust Mechanisms for AI Social Tools from the Perspective of Different Age Groups

5.1. Factors Affecting User Trust across Age Groups

Multiple factors shape the level of trust different age groups place in AI-powered social tools. These include disparities in technological literacy, information-processing capacity, and psychological needs [11]. Teenagers, as digital natives, are generally more receptive to algorithmic systems, yet their trust is easily swayed by peer pressure and entertainment-oriented environments. They tend to value immediacy and amusement in content presentation while lacking vigilance toward the underlying mechanics of algorithms, which leaves them prone to cognitive distortions within “information cocoons.” Middle-aged adults, by contrast, place greater emphasis on the practical utility of algorithms and privacy protection. Their trust depends heavily on transparency and controllability of the systems. Professionals often rely on algorithms to expand their social networks but remain highly alert to potential misuse of data; once a privacy breach occurs, trust is rapidly eroded. The trust patterns of elderly users are more polarized: some rely entirely on algorithms due to technological barriers, while others avoid usage altogether out of fear of fraud. Intergenerational cultural values also play a role in shaping trust—older users cherish the authenticity of interpersonal communication and remain skeptical of virtual social networks constructed by algorithms. Ultimately, differences in technical literacy, privacy awareness, social experience, and psychological demands constitute the root causes of varying levels of trust across age groups.

5.2. Strategies for Building User Trust Mechanisms

To establish a cross-generational trust framework, measures should be developed along three dimensions: technological transparency, ethical principles, and user autonomy. Enhancing algorithmic explainability is a prerequisite. For teenagers, visualized interfaces may illustrate algorithmic logic with simplified charts, while a “teenage protection mode” can filter out harmful or low-quality content. For middle-aged users, customizable privacy management tools should be provided, allowing individuals to set data-use parameters or opt out of collection, accompanied by

regularly published transparency reports. For elderly users, systems should be designed with user-friendly interfaces, voice-assistance features, and third-party verification labels to boost reliability. A robust ethical oversight mechanism is also essential, requiring companies to adhere to principles of fairness, non-discrimination, and interpretability, and to avoid reinforcing age stereotypes (e.g., excessive medical advertisements for older users). A well-rounded user rights protection system must be established, including feedback channels inclusive of all age groups. Furthermore, education and media initiatives should jointly advance digital literacy, helping different generations objectively understand technological boundaries and fostering a trust environment in which technology, ethics, and user agency co-evolve.

5.3. Practices and Strategic Recommendations for Promoting Trust

Strengthening trust in AI social tools across age groups requires a combination of contextualised applications and regulatory guidance. For teenagers, enterprises may collaborate with schools to launch "Algorithm Literacy Projects," using gamified educational simulations to cultivate critical thinking while adding parental monitoring modules to balance autonomy with safety [12]. For middle-aged users, industry associations should issue a "Code of Algorithmic Ethics," clarifying boundaries of data usage, and promote "transparent AI" practices by providing concrete explanatory bases for algorithmic decisions. For elderly users, communities and platforms can jointly initiate "Digital Companions for Seniors" programs, offering one-on-one volunteer support and developing "anti-fraud intelligence" services that instantly filter suspicious information. On the regulatory side, legislation must accelerate to mandate age-segmented algorithm registration, with heavy penalties for violations. Cross-generational participatory mechanisms are crucial; a "multi-age user advisory panel" could be established to incorporate diverse voices into product evaluation and planning. By integrating education, technical support, and legal safeguards into a three-pronged strategy, AI social tools can better accommodate age-specific needs while nurturing a sustainable trust ecosystem for their long-term development.

6. Conclusion

This study examined the humanistic and ethical risks posed by AI-driven algorithms in social platforms from the perspective of different age groups, while also exploring corresponding trust-building mechanisms. Several key findings have emerged.

At the level of application features, distinct behavioural patterns were observed: elderly users prefer simplicity and ease of use, middle-aged adults focus on efficiency and practical utility, while teenagers show a strong inclination toward novelty and social interaction. Despite being based on common algorithmic principles, AI tools apply divergent strategies across age groups, which introduces notable ethical risks. Teenagers are vulnerable to harmful content that may distort value formation, middle-aged adults face threats of privacy breaches and narrowing information exposure, and elderly users are often hindered by usability issues that may lead to social isolation or fraud.

In constructing user trust systems, a range of factors—information security, algorithmic transparency, and social interaction experiences—act as constraints across all age groups. A sound trust mechanism must therefore comprehensively balance these factors. Targeted measures include: content filtering functions beneficial for teenagers, enhanced data protection awareness for middle-aged users, and user-friendly service design for the elderly.

Harmonising the strengths of AI social tools with their ethical risks necessitates the establishment of effective trust systems. Future efforts should continue tracking the evolving needs of different age groups, refining algorithmic strategies, strengthening ethical oversight, and promoting a healthy, sustainable trajectory for AI social tools across all generations.

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