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Review Article

Ethical Considerations on Some Issues of Medical Artificial Intelligence Applications

Guo Hong[1*]

[1]Binhai New Area Hospital of Traditional Chinese Medicine, Tianjin; The Fourth Affiliated Hospital of Tianjin University of Chinese Medicine, China

[*]**Corresponding Author:** Guo Hong, Binhai New Area Hospital of Traditional Chinese Medicine, Tianjin, China, Binhai New Area Hospital of Traditional Chinese Medicine, Tianjin, China.

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Abstract

Artificial intelligence has been widely applied in the medical field recently, such as medical imaging, pathological diagnosis, mental health, rehabilitation medicine, and home health support have progressed, which also triggered extensive ethical thinking. Under the perspective of medical ethics, this paper explores the controversial status of moral subjects of AI machines, the definition of multiple relationships arising from machine use, value judgments and trust considerations of AI technologies, data accessibility and privacy protection. It further points out the potential injustice, discrimination and risk liability arising from AI, and calls for the establishment of an ethical review and collaborative governance mechanism for AI that is deeply integrated with technology.

Keywords: Artificial intelligence; Ethics; Medicine.

Introduction

Artificial Intelligence (AI) has been researched and applied in many medical fields, including mental health, imaging pathology, home care, online psychological counselling, crisis intervention and suicide prevention, etc. [1-4], but there are still many ethical and moral limitations.

The ethical considerations of AI for the betterment of AI development were proposed in this paper.

The creation and definition of multiple relationships

With the development of artificial intelligence, the new technological revolution will not only impact on the relationship between man and man, man and machine, but also put forward new propositions on the relationship between machine and machine.

In the medical field AI will cause profound changes in the doctor-patient relationship. Artificial intelligence assists medical

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decision-making through algorithmic analysis of accurately readable medical information, providing treatment recommendations and thus freeing up doctors' time [5]. However, it has also led to problems for the doctor community, such as doctors feeling disrupted and offended when patients consult their doctors with online knowledge of disease diagnosis and treatment [6]. The traditional doctor-patient relationship is thus rapidly being alienated into a patient-machine-doctor pluralism. The use of artificial intelligence to extract specific semantic terms from online communities and to proactively find and intervene with people at risk of suicide is all applications that are deeply integrated with the support of artificial intelligence algorithms.

The disconnectedness of everything in the information age raises the question of the relationship between artificially intelligent machines. What rules are used or how are commands prioritize in the event of a conflict between machines? Is the information on vital signs collected by various sensors admissible according to the hierarchy of evidence or other principles? Can the human relationship model be applied to the relationship between machines? Questions such as these need to be critically examined.

The algorithmic techniques of artificial intelligence are still opaque, and the resulting effects on inter-subjective, inter-subjective and inter-object relations will be far-reaching. These changes will give rise to issues such as the re-establishment of relational boundaries, changes in moral responsibility, and the reconfiguration of dispute and conflict mechanisms.

Uncertainty and the decision paradox

How can artificial intelligence cope with the great uncertainty of both the healthcare environment and living systems, and does it have a procedural self-consistent and ethical decision-making system? How can various types of healthcare data be integrated into an integrated dataset? The study of machine learning and data mining techniques in complex environments is of great importance for the development of artificial intelligence [7]. In the face of uncertainty, Artificial intelligence for good health: a scoping review of the ethics literature objectively points out that AI development is unpredictable in terms of both depth and breadth [8]. This difficulty is not only uncertainty in the development on a technical level, but also in life support and medical application scenarios. As published in Lancet Gastroenterol Hepatol 2019 on the challenges of machine learning in artificial intelligence and computer-aided diagnosis: e.g., learning data based on retrospective studies, deep machine learning requires the construction of databases with larger sample sizes to meet the challenges of uncertainty in clinical practice [9].

How can artificial intelligence produce relatively deterministic action decisions through a non-stationary model construction and learning? On what ore-determined value systems are decisions based to conform to the moral code of bioethics? The answers to these questions require context-based moral codes to be embedded in the algorithm, as some researchers have suggested, to include explicit ethical dimensions in the machine to give it an ethical decision-making function and a social helper function [10].

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Moral subject confusion

The legal sense is clear in defining human beings as legal subjects, but as humans evolve from pure nature to the era of gene editing and human intelligence simulation, the boundaries of the traditional civil law conventions of subject and object are being shaken [11]. For the issue of ethical subjects of artificial intelligence, MOOR [12] classifies machines into four types of artificial moral subjects according to the degree of autonomy of intelligent machines: subjects with moral influence, implicit moral subjects, explicit moral subjects, and fully moral subjects. Others argue that artificially intelligent subjects do not meet the characteristics of moral subjects due to their lack of autonomy, consciousness, and motivation [13].

Kant argues that reason and free will are important characteristics for determining the subject of moral action [14], and Artificial intelligence for good health argues for the non-free will property of the autonomous consciousness of artificial intelligence [8], i.e., the moral subject status of artificial intelligence is not recognized. The development of artificial intelligence raises the question of the boundaries of the living individual, and when the predicted "singularity" appears, artificial intelligence, which is smarter than human beings, will really impact the ontological existence of human beings [15].

Value positions and trust considerations

Shevlin argues that the value-neutral stance of AI is still valid, especially as intelligent algorithms increasingly impact on human autonomy, making AI machines more and more moral-like subjects with logical reasoning capabilities [16]. Shevlin argues that the morality of artificial intelligence is more of an 'operational morality', but with the increased interactivity of artificial intelligence, there will be a 'functional morality', or even fully moral behavior, and the question of value is bound to become a new ethical challenge [16]. Taddeo proposes three conditions for trust in AI [17]:

1. the interaction of actors
2. the interaction is based on shared norms and ethical guidelines; and
3. the parts of the interaction are distinguishable.

Subcontinental, et al. analyze Moor's classification of trust levels and propose three characteristics for determining trust levels in different scenarios: autonomy (associated with independent machines), risk/vulnerability (associated with machines in human-machine systems), and interactivity (direct or indirect interactivity between human subjects and machines) [13].

Data security and privacy protection

Personal information and identifiability Zhang, et al. define personal information as "any information relating to an identified or identifiable person" [18]. That is, when a person is identifiable, any information related to that person is personal information, and confidentiality is the basis for the empowerment of personal information. For data in AI databases, to ensure data security and privacy protection, it is necessary to eliminate the confidentiality of AI data, especially for AI software development organizations and developers, and remove

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them from the category of identifiable personal information.

Privacy protection programme

Prior to AI data collection, initial informed consent should be given by the AI database manager and staff to the patient, and the operation should be carried out with respect for the patient's wishes. The processes of data collection and preservation, data extraction and use are closely related to privacy protection and require effective protection measures [19]. For example, one should abide by the EU General Data Protection Act, improve the revocation mechanism of personal data authorization, and crack down on any theft, tampering, disclosure and other illegal collection and use of personal information to protect personal information [19].

Data collection and retention

Privacy protection is carried out using de-identification and anonymity measures right in the data collection process. De-identification is the process of making it impossible to identify the subject of personal information without the help of additional information through appropriate processing of personal information [20].

For de-identification of AI data, identity information can be represented by one-to-one unrelated code names, where AI software developers only have access to the code names and the database owner holds the key to associate the code names with the identity, while decoding must be stipulated accordingly.

The anonymization process, on the other hand, is irreversible. In contrast, about data preservation, both de-identified and anonymized preservation methods can also be used.

Data extraction and use

For data extraction required by AI software development companies and R&D staff, the purpose of their research must be for the public good and subject to a confidentiality agreement with the AI database. For example, not to attempt to identify any personal information from the data, not to connect with other databases, not to reproduce, transform and destroy the data, not to disclose the data to third parties, and to assume legal responsibility for data leakage and privacy violations caused by individuals and organizations. The purpose of this public interest research shall be assessed and evaluated by an ethics committee, and the process and results of the research shall be ethically reviewed and monitored. If the above-mentioned scheme for data collection, preservation, extraction, and use can be established, the secondary use of AI data can be achieved for the benefit of human health while ensuring patient privacy and data security. With the development of AI technology, the implementation of de-identification is not static, and the boundary between absolute anonymity and identifiable information is becoming increasingly blurred [18]. It is indeed difficult to achieve zero risk of identification as well as absolute and permanent anonymity. This requires AI database managers to keep up to date, to regularly assess risks, to select appropriate de-identification and anonymity models and technical measures, to assess the adequacy

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and suitability of controls over identification risks, and to monitor and identify new identification risks in a timely manner. If new identification risks are identified, they need to be anonymized, etc. [21].

Injustice, discrimination and risk liability

Artificial intelligence needs to uphold fairness and objectivity and discard biased data and algorithms to eliminate potentially discriminatory outcomes, but it is already a fact that precise marketing and price discrimination policies are achieved through algorithmic identification, offering specific products and different prices to specific consumers [22]. Discrimination due to data mining is not only limited to maximization commercial profits, but also unfairness due to differences in ethnicity, religion, and horticulturalist practices. The proliferation of software applications that profile and label users and push information in a targeted manner through back-end information collection has led to an information cocoon effect [23], where the dissemination of information selected by machines biases those who are pushed precisely to receive only information relevant to their values and preferences, leading to information blocking. Another is the so-called filter bubble problem, where information that does not match the user's preferences and is not in line with group or individual values is automatically filtered [24].

Artificial intelligence helps to improve the efficiency and effectiveness of the use of medical resources, such as the development of machine learning algorithms through data mining of electronic medical records, for the treatment of inpatients and the prognosis of disease progression [25]. Medical data integration requires different data-generating sectors to form a data system with effective interaction, such as patients, healthcare providers, insurance companies and government administrations, to analyze and optimism patient treatment through data and improve the fairness of medical treatment in the era of artificial intelligence [26].

The inherently uncertain nature of the act of medical decision-making, as well as the black box nature of AI learning (black box) [27], and even sometimes the programmers themselves are not fully aware of the processes inherent in machine algorithms, makes AI-assisted medical decision-making risky and affect the interests of patients.

Ethical review and supervision

Having explored the technical principles of safeguarding data security and privacy protection above, the following argue for ethical safeguards. A proactive strategy of pre-emptive assessment and prevention by an ethics review committee is preferable to a reactive strategy of post-facto criticism and sanctioning of breaches [28]. Ethical review of AI requires consultation and review by experts from different fields such as medicine, computer science, law, and ethics. To date, a sound AI ethical review system has not been established [29]. This is because much AI research and development is conducted in private companies and has not yet been evaluated in a multidisciplinary manner [30]. These research and development institutions are bound to engage in data monopoly to ensure the uniqueness of data and the market value of AI software, thus preventing the sharing of AI data among institutions and

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making it more difficult to achieve sharing among different disciplines, which to a certain extent hinders the simultaneous development of AI among multiple disciplines.

Conclusion

Therefore, there is a need to build an AI social-ecological system that establishes a good AI social-ethical infrastructure and rules for its rationalist within a high degree of self-consciousness about the ontological existence of human beings within the ethical context. Efforts are made to evolve AI as a life-supporting technology or towards having human free will. This paper provides a sound ethical framework for this vision, which contributes to better human health.

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