Theory and Practice of Science and Technology
2025, VOL. 6, NO. 9, 90-92
DOI: 10.47297/taposatWSP2633-456918.20250609

Ethics of Artificial Intelligence Technology: A Three-Dimensional View of Data, Algorithm and Computing Power

Junqiang Kou

School of Humanities and Communication, University of Sanya, Sanya, Hainan, 572022, China

ABSTRACT
The transformative power of technological advancement in driving socioeconomic development has sparked profound aspirations for humanity. From the perspective of dialectical duality and the general logic governing new developments, the inherent contradictions and dialectical unity in technology require continuous balance – a principle equally applicable to artificial intelligence (AI) technology. This journey begins with human-technology interactions and culminates in the emergence of AI ethics. The purpose and significance of creating AI technology lie in its service to humanity. Therefore, the value orientation of technology should be human-centered, whether in data governance, algorithm design, or computational power. Humans are both the architects of AI technology and bearers of ethical responsibility, obligated to balance commercial interests with ethical considerations, fairness with justice, and guide AI technology with compassion to serve the pursuit of a better life.

KEYWORDS
Artificial intelligence; Ethics; Algorithm; Data

1 Overview of artificial intelligence and artificial intelligence technology

In the 1950s, computers emerged to handle complex numerical computations. As challenges were overcome and humanity's exploration of the unknown deepened, Alan Mathison Turing—the father of computer science—proposed the possibility of machines possessing consciousness and introduced the "Turing Test" in 1950 [1]. In 1955, John McCarthy collaborated with Norbert Wiener, Marvin Minsky, and John L. Rochester to launch the Dartmouth Project, which officially began the following year with minimal funding from the Rockefeller Foundation. It was in 1956 that McCarthy first coined the term "artificial intelligence."

What is artificial intelligence? What is AI technology? Literally, artificial intelligence refers to machines that think and process problems like humans, while AI technology represents the methods to achieve this goal. From a semantic perspective, artificial intelligence can be broken down into two components: "artificial" and "intelligence". "Artificial" contrasts with "natural" existence, emphasizing human-led and purposeful intervention to achieve desired objectives; "intelligence" contrasts with "consciousness", focusing on machines' ability to accomplish tasks without emotional or subjective considerations [2]. Essentially, artificial intelligence is the capability to achieve predetermined goals under human guidance, following the will humans impart to machines. AI technology, however, serves as the methodology to realize this artificial intelligence, being straightforward and goal-free. With advancements in computer technology, AI has evolved through stages including symbolicism, expert systems, machine learning, deep learning, and generative AI. Fundamentally, AI technology represents an extension of computer science and a biological mimicry of human capabilities. Currently, AI technology is primarily applied in fields such as computer vision, speech recognition, natural language processing, machine learning, and big data.

2 Ethics and ethics of artificial intelligence technology

Ethics, as defined in Chinese dictionaries, refers to the principles of human ethics and morality, encompassing various moral guidelines for interpersonal relationships. The Five Relationships—between ruler and subject, father and son, elder and younger brothers, husband and wife, and friends—correspond to ethical principles: loyalty, filial piety, fraternal duty, forbearance, and trustworthiness. Essentially, it represents the moral principles and standards people should follow when interacting with others, society, and nature [3]. Artificial Intelligence Technology Ethics focuses on researching and regulating the moral principles, values, and behavioral norms that humans should adhere to during the development, deployment, and application of artificial intelligence (AI).

In essence, ethics represents the subjective perception of humans as the dominant force in their interactions with society and nature. It prioritizes human welfare and interests above all else, while emphasizing fairness, safety, harmony, and sustainability between humanity and its environment. As a dynamic system of mutual influence and equilibrium, ethics embodies the scientific social order and natural laws mastered by Homo sapiens. Neither isolated individuals nor artificial intelligence itself poses ethical dilemmas.

3 Analysis of ethical issues of artificial intelligence technology

Artificial intelligence technology fundamentally comprises three dimensions: data, algorithms, and computational

power. The sophistication of such technology depends on three critical factors: the scale of data resources, the advancement of algorithmic frameworks, and the availability of computing infrastructure. These elements must synergize effectively to achieve technological excellence, with none being dispensable. While technology itself possesses no inherent ethics, its ethical implications emerge through human interaction. Techno-ethics refers to the societal impacts of technology on human-led societies, where positive or negative outcomes are judged through human-centric perspectives – essentially reflecting humanity's reflection on and demands regarding technology's role in our existence [4]. Currently in the general artificial intelligence phase, humans have already recognized the threats and challenges posed by AI technologies. As we approach the era of super-intelligent systems, humanity should proactively develop governance strategies to coexist harmoniously with technological progress while preventing ethical conflicts and uncontrollable consequences. Ethical considerations should be analyzed through the lens of technological logic, revealing that AI ethics ultimately revolves around three core dimensions: data governance, algorithmic design, and computational infrastructure.

3.1 "Data Ethics" of artificial intelligence technology ethics

Data acquisition forms the foundation of artificial intelligence technology, serving as the starting point for analysis and modeling where the reliability and diversity of samples are paramount. Acquisition channels primarily include open datasets, web crawlers and open-source content, user-generated data, third-party data providers, sensor and IoT devices, as well as synthetic data generation and collaborative sharing mechanisms. The selection of acquisition channels, methods, data reliability, and usage practices directly impact "data ethics".

Breaking it down: First, data acquisition channels and methods. Whether the data sources are legal, whether they involve undisclosed information or backdoor access; whether the acquisition processes are formalized and user consent is obtained. Data acquisition forms the foundation and origin of usage. Securing the first line of defense and controlling the source are the primary priorities of "data ethics." Second, data accuracy. As the cornerstone of artificial intelligence technology, data primarily comes from online sources. While official data remains relatively reliable, other acquired sources—especially third-party data and synthetic data—are less trustworthy. Balancing quantitative needs with qualitative assurance is crucial, as data quality directly impacts modeling and decision-making directions. We must reject biased or discriminatory data in algorithmic applications. Third, data utilization. On the basis of data reliability, how data is used fundamentally determines outcomes—much like how weapons are deployed. Justice dictates the direction.

"Data ethics" serves as the foundational and crucial component of AI technology ethics, primarily addressing data privacy protection and misuse. From a systems theory perspective, it involves designing comprehensive technical ethical strategies to ensure transparent origins, prevent risks of user data abuse, and establish transparent, dynamic regulatory mechanisms for enhanced governance. To achieve this: 1) Implement blockchain technology to create a data traceability mechanism that tracks the entire lifecycle, ensuring data traceability and auditable usage processes; 2) Develop automated data bias detection systems to evaluate fairness in training datasets; 3) Integrate differential privacy (Differential Privacy) and federated learning (Federated Learning) privacy-enhancing technologies to unlock data value while protecting privacy.

3.2 Algorithmic ethics of artificial intelligence technology ethics

As a core concept in computer science, algorithms are defined as instructions or procedures designed to solve specific problems. They possess fundamental characteristics including input, output, clarity, finiteness, and validity. Specifically, when an algorithm receives inputs, it produces results within a defined timeframe with unambiguous processes, then terminates upon completion. The essence of AI algorithms lies in feeding collected data into developed models. These models identify patterns within datasets, while the system continuously iterates and optimizes to achieve predictive capabilities and decision-making services. The core strength resides in the synergy between data, models, and computational power. The success of major models relies on massive data inputs, advanced mathematical modeling, and supercomputing cluster support. Platforms like ChatGPT and DeepSeek exemplify this approach.

Analysis of the issue: First, technical abuse under algorithmic black boxes. The term "black box" refers to opaque mechanisms that obscure internal workings. Algorithmic black boxes describe systems where decision-making processes from data input to outcome presentation remain opaque and poorly explainable. These black boxes arise from two fundamental issues: the inherent complexity of machine learning mimicking human cognition, and the inherent limitations in algorithmic design that compromise interpretability. However, it must be acknowledged that algorithms are human creations, with human factors being the primary cause of black box issues – algorithms being merely tools. Algorithmic discrimination represents technical abuse driven by private interests, while algorithmic black boxes provide legal loopholes for tracing algorithmic responsibilities and absolving accountability [5]. Second, algorithmic "value alignment". This principle requires human-defined standards, shared objectives, and protection of human rights. Specifically, enterprises must not prioritize profit maximization at the expense of public welfare [6]. For example, recommendation algorithms that exploit users or amplify harmful content not only neglect youth protection but may

even trigger racial tensions or combat-related violence. Third, the dilemma of liability attribution. When AI causes harm – such as traffic accidents or medical errors – should responsibility be placed on developers, service providers, or users?

The emergence of algorithmic ethics is an inevitable phase in AI development—it's a developmental challenge, not an ultimate issue. Just as new technologies created by humans inevitably face ethical dilemmas through their application, these will ultimately be resolved by humanity itself—a universal rule governing societal progress [7]. Human superiority dictates the balance between regulation and self-regulation, and algorithmic ethics should not become stumbling blocks for technology to serve humanity.

3.3 The "computing power ethics" of artificial intelligence technology ethics

It is widely recognized that training and inference of large AI models require massive computational power. According to 2020 research, training GPT-3 (175 billion parameters) once consumes approximately 1,287 megawatt-hours (MWh) of electricity, equivalent to the annual power usage of about 120 American households. When considering multiple training iterations (such as hyperparameter tuning and model debugging), total energy consumption could be even higher. It is estimated that the electricity required for a single GPT-4 training session, if converted entirely into thermal energy, could heat approximately 1,000 Olympic-sized swimming pools to boiling point. If powered by fossil fuels, the resulting carbon emissions would be staggering. For nations prioritizing survival, massive electricity consumption represents a betrayal of human ethics through technological advancement. For relatively developed nations, substantial carbon emissions constitute a desecration of humanity's own interests through technological progress.

Regions unable to implement AI projects due to power shortages are widespread. According to statistics, global computing power is mainly distributed in China, the United States, the European Union, and Japan, accounting for approximately 80% of the world's total computing power, while Africa and Latin America account for less than 5%. The emergence of a "digital divide" will not only exacerbate technological monopolies but also lead to the export of ethical standards and fail to reflect local cultural differences.

In this regard, the author believes that, in terms of computing power, we should increase the supply of green energy and algorithm optimization to reduce energy consumption and realize green AI; establish a global computing power collaboration and sharing platform, strengthen global co-management, co-governance and co-use collaboration, bridge the gap and realize humanistic AI.

4 Summary

Recognized as the cornerstone of the Fourth Industrial Revolution, artificial intelligence (AI) is fundamentally transforming productivity and lifestyles. As technological advancements accelerate and practical applications expand, humanity is witnessing AI's revolutionary impact on production and daily life while grappling with how to coexist harmoniously with this new force. When AI enters our established routines through a dualistic lens, beyond its positive transformative effects, we confront growing anxieties and ethical dilemmas. These tensions between technological innovation and societal values—often termed the AI-ethics dilemma—have become a critical focus of contemporary discourse [8]. Humans are the architects of artificial intelligence technology. Ethical dilemmas in AI stem from human-technology interactions, with their origins rooted in humanity. Our fundamental perspectives shape the outcomes we achieve. By upholding human-centered principles and sustainable development, balancing commercial interests with ethical considerations, ensuring safety while maintaining fairness and transparency, and fostering proactive governance with compassion, we can overcome excessive anxiety. This approach enables us to steer technological progress toward creating better living experiences.

References

[1] A.M.Turing. Computing Machinery and Intelligence[J] Mind,1950.

[2] Lin Chongde, Yang Zhiliang, and Huang Xiting. Dictionary of Psychology [M]. Shanghai: Shanghai Publishing House, 2003.

[3] Ethics [EB/OL]. https://baike.baidu.com/item/%E4%BC%A6%E7%90%86/538

[4] Cheng Peng and Gao Siyang. Philosophical Reflections on the Ethical Status of General Artificial Intelligence [J]. Studies in Dialectics of Nature, 2021(07).

[5] Wu Jiaojun and Guo Wan'er. Legal Governance of Algorithmic Black Boxes in the AI Era [J]. Science and Law (Chinese-English Edition), 2021(01).

[6] Liu Hailong. The Humanistic Implications of Marx's View on Science and Technology [J]. Socialism Research, 2011,197(03).

[7] Guo Linsheng and Liu Zhanxiong. "Responsible Innovation in Artificial Intelligence" [J]. Journal of Dialectics of Nature, 2019(05).

[8] Yan Kunru. Do Artificial Intelligence Machines Have Moral Subject Status? [J]. Research on Dialectics of Nature, 2019(05).