

ETHICS OF ARTIFICIAL INTELLIGENCE IN CANCER DIAGNOSTICS: PHILOSOPHICAL, EPISTEMOLOGICAL AND BIOETHICAL ANALYSIS

Kurbanov Chinpulat Minasidinovich

University of Tashkent for Applied Sciences, Senior Lecturer

Shakhlo Jalaliddinovna Kurbanova

Tashkent Kimyo International University Associate Professor

Abstract. This paper provides a comprehensive philosophical analysis of the use of artificial intelligence in cancer diagnostics. The article examines the ontological, epistemological, and ethical transformations of medical knowledge arising from the algorithmization of malignant neoplasm diagnostics. Particular attention is paid to the "black box" problem, the crisis of responsibility, changing patient status, and the transformation of clinical thinking. It is shown that the introduction of artificial intelligence leads to the formation of a new type of medical knowledge—predictive, but not always interpretable. The need to preserve the humanistic paradigm of medicine and develop an integrative model of interaction between physician and algorithm is substantiated.

Keywords: artificial intelligence, oncology, cancer diagnostics, bioethics, epistemology, philosophy of medicine, responsibility, algorithms.

Annotatsiya. Ushbu maqolada saraton diagnostikasida sun'iy intellektdan foydalanishning keng qamrovli falsafiy tahlili keltirilgan. Unda xavfli o'sma diagnostikasini algoritmlashtirishdan kelib chiqadigan tibbiy bilimlarning ontologik, epistemologik va axloqiy o'zgarishlari o'rganiladi. "Qora quti" muammosiga, mas'uliyat inqiroziga, bemorning o'zgaruvchan holatiga va klinik tafakkurning o'zgarishiga alohida e'tibor qaratilgan. Sun'iy intellektning joriy etilishi yangi turdagi tibbiy bilimlarning paydo bo'lishiga olib kelayotgani ko'rsatilgan - bashoratli, ammo har doim ham talqin qilib bo'lmaydigan. Tibbiyotning gumanistik paradigmasini saqlab qolish va shifokor va algoritm o'rtasidagi o'zaro ta'sirning integrativ modelini ishlab chiqish zarurati asoslanadi.

Kalit so'zlar: sun'iy intellekt, onkologiya, saraton diagnostikasi, bioetika, epistemologiya, tibbiyot falsafasi, mas'uliyat, algoritmlar.

Аннотация. Настоящая работа посвящена комплексному философскому анализу применения искусственного интеллекта в онкологической диагностике. В статье рассматриваются онтологические, эпистемологические и этические трансформации медицинского знания, возникающие в условиях алгоритмизации диагностики злокачественных новообразований. Особое внимание уделяется проблеме «чёрного ящика», кризису ответственности, изменению статуса пациента и трансформации клинического мышления. Показано, что внедрение искусственного интеллекта приводит к формированию нового типа медицинского знания — предиктивного, но не всегда интерпретируемого. Обосновывается необходимость сохранения гуманистической парадигмы медицины и разработки интегративной модели взаимодействия врача и алгоритма.

Ключевые слова: искусственный интеллект, онкология, диагностика рака, биоэтика, эпистемология, философия медицины, ответственность, алгоритмы.

Introduction

Cancer remains one of the leading causes of death worldwide, making early and accurate diagnosis particularly important. In recent years, artificial intelligence has become increasingly used in medical image analysis, including mammography, histopathology, and computed tomography. Deep learning algorithms have demonstrated the ability to detect malignant tumors at early stages, often outperforming humans in visual pattern recognition.

Research by Google Health and IBM Watson Health demonstrates the emergence of a new paradigm—data-driven medicine. However, this transformation affects not only the practical but also the philosophical foundations of medical knowledge.

Breast Cancer Diagnosis Using AI (Google Health) One of the most well-known examples of the use of artificial intelligence in oncology was a Google Health study on mammography image analysis.

In 2020, a group of researchers published the results of a deep learning algorithm trained on thousands of mammograms from the US and UK. The system analyzed breast images and identified signs of malignancy.

The results showed that the algorithm:

- reduced the number of false positive results;
- reduced the number of missed cancer cases;
- demonstrated higher accuracy than radiologists in some cases.

Particularly significant was the fact that the system detected tumors at early stages, when changes are still difficult for specialists to detect.

However, the study sparked serious ethical debate. A question arose: if an algorithm detects a tumor before a physician, should the physician trust the system even when they themselves cannot see the pathology? This raised the issue of the dependence of clinical judgment on algorithmic decisions.

Ontological transformation: disease as an informational object

In classical medicine, disease was viewed as a biological process localized within the patient's body. With the introduction of artificial intelligence, there is a shift toward understanding disease as an informational pattern. A tumor is interpreted through a set of features identified by an algorithm: image textures, tissue density distribution, and molecular markers.

Thus, the ontological status of disease changes: it becomes not only a biological but also a computational entity.

The Epistemology of Artificial Intelligence: Knowledge without Explanation

Classical medical epistemology is based on the principle of explanation. A diagnosis must be not only accurate but also substantiated by pathogenic mechanisms.

Artificial intelligence offers a different type of knowledge—correlational. The algorithm is capable of identifying statistical relationships between features without revealing their causal nature. This leads to the phenomenon of "knowledge without understanding."

The «black box» problem

Most modern deep learning algorithms operate as "black boxes." Their internal logic is inaccessible even to their developers, making it impossible to fully explain their results.

In medicine, this creates a paradoxical situation: a system may be more accurate but less understandable.

The existential dimension of a cancer diagnosis

A cancer diagnosis is not only a medical fact but also an event that touches upon fundamental aspects of human existence. It is associated with the experience of finitude, the fear of death, and a reassessment of life's meaning.

Artificial intelligence is incapable of addressing this dimension. It registers the presence of pathology, but is unable to interpret its significance for a specific individual.

Crisis of responsibility

In traditional medicine, the physician acts as the sole subject of responsibility. With the introduction of artificial intelligence, a situation of distributed agency arises, in which decisions are made collectively: by the algorithm, the physician, and the healthcare system.

However, responsibility cannot be distributed in a similar manner, as it presupposes consciousness and moral choice.

Algorithmic fairness

Training algorithms on limited samples introduces systemic biases. In oncology, this can manifest itself in varying diagnostic accuracy for different patient groups.

This calls into question the principle of fairness, which is central to bioethics.

Patient autonomy

Cancer patients face complex decisions. The principle of autonomy requires that these decisions be conscious.

However, the use of artificial intelligence complicates the process of understanding the diagnosis. The algorithms are opaque, and the patient cannot evaluate their performance.

Philosophy of technology

According to the philosophy of technology, technology shapes not only tools but also ways of thinking. In medicine, this is evident in the shift from clinical reasoning to algorithmic analysis.

Transhumanism and the Limits of Algorithmization

Transhumanist concepts view artificial intelligence as a means of overcoming the limitations of the human mind. However, medicine has not only a scientific but also a humanistic dimension.

Integrative model

The most reasonable model is one in which artificial intelligence is used as a decision support tool. The physician remains the interpreter and moral subject, and the patient is the bearer of values.

Conclusion

The use of artificial intelligence in oncology diagnostics is a complex interdisciplinary phenomenon that touches on the fundamental foundations of medicine. Philosophical analysis shows that, despite the high efficiency of algorithms, they cannot replace the physician, as they do not take into account the existential dimension of the disease. Artificial intelligence has a wide range of applications in malignant tumor diagnostics: tumor recognition and classification, determination of histological tumor type, diagnosis verification after the first biopsy, etc.

However, the training and self-learning base for deep neural networks is insufficient. High quality, large-volume clinical data is required for the development and advancement of artificial intelligence models and algorithms.

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