



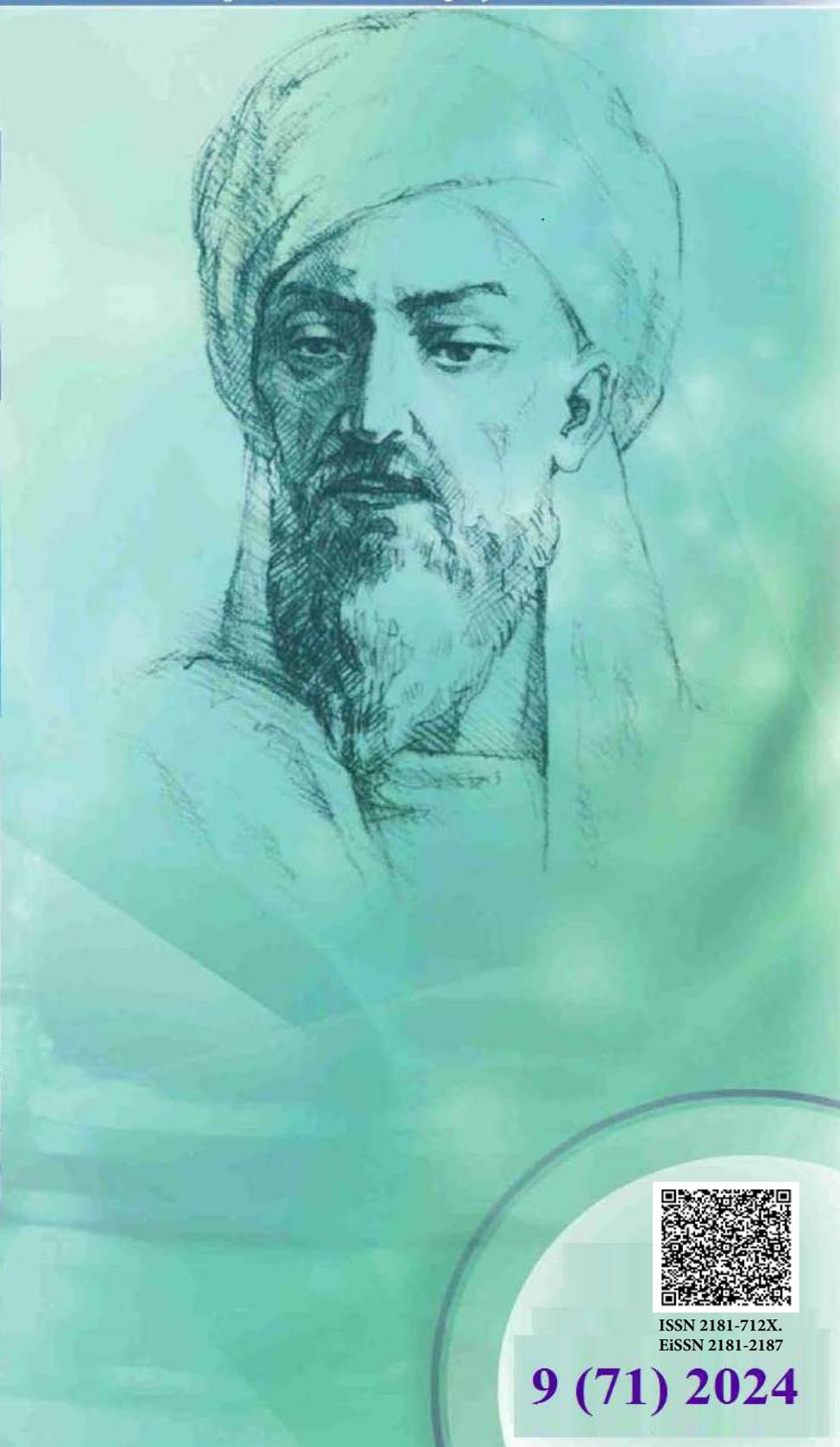
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**ТИББИЁТДА ЯНГИ КУН
НОВЫЙ ДЕНЬ В МЕДИЦИНЕ
NEW DAY IN MEDICINE**

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ARTIFICIAL INTELLIGENCE IN MEDICINE: GENERAL OVERVIEW, ADVANTAGES AND LIMITATIONS

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✓ *Resume*

Artificial intelligence (AI) is a subfield of computer science concerned with the creation of algorithms that attempt to replicate human intelligence. The present article discusses an overview of the fundamental AI principles that are critical to understanding AI and its application in health care. It also provides a descriptive overview of the current state of artificial intelligence (AI) in many domains of medicine. Moreover, some advantages were examined along with potential limitations and challenges associated with the development and implementation of this new technology were discussed.

Keywords: artificial intelligence, automated transportation, healthcare industry, surgery robots, medical technology.

ИСКУССТВЕННЫЙ ИНТЕЛЛЕКТ В МЕДИЦИНЕ: ОБЩИЙ ОБЗОР, ПРЕИМУЩЕСТВА И ОГРАНИЧЕНИЯ

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✓ *Резюме*

Искусственный интеллект (ИИ) — это раздел информатики, занимающийся созданием алгоритмов, пытающихся воспроизвести человеческий интеллект. В настоящей статье обсуждается обзор фундаментальных принципов ИИ, которые имеют решающее значение для понимания ИИ и его применения в здравоохранении. В нем также представлен описательный обзор текущего состояния искусственного интеллекта (ИИ) во многих областях медицины. Кроме того, были рассмотрены некоторые преимущества, а также потенциальные ограничения и проблемы, связанные с разработкой и внедрением этой новой технологии.

Ключевые слова: искусственный интеллект, автоматизированный транспорт, отрасль здравоохранения, хирургические роботы, медицинские технологии.

TIBBIYOTDA SUN'IY INTELTEKT: UMUMIY TA'SHIRI, AVZUVLARI VA CHEKLANISHLARI

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✓ *Rezyume*

Sun'iy intellekt (AI) - bu inson aqlini takrorlashga harakat qiladigan algoritmlarni yaratish bilan shug'ullanadigan kompyuter fanining bir bo'limi. Ushbu maqolada sun'iy intellektni tushunish va uni sog'liqni saqlashda qo'llash uchun muhim bo'lgan AIning asosiy tamoyillari haqida umumiy ma'lumot ko'rib chiqiladi. Shuningdek, u tibbiyotning ko'plab sohalarda sun'iy intellektning (AI) hozirgi holati haqida qisqacha ma'lumot beradi. Bundan tashqari, ushbu yangi texnologiyani ishlab chiqish va joriy etish bilan bog'liq ba'zi imtiyozlar, shuningdek, mumkin bo'lgan cheklovlar va muammolar muhokama qilindi.

Kalit so'zlar: sun'iy intellekt, avtomatlashtirilgan transport, sog'liqni saqlash sanoati, jarrohlik robotlari, tibbiy texnologiyalar.

Introduction

John McCarthy first used the term Artificial Intelligence (AI) in 1956 at a symposium on the subject. However, Alan Turing, who created the Turing test to distinguish between people and machines, highlighted the potential that machines would be able to imitate human behavior and thinking. Since then, processing power has increased to the point where it can now perform calculations instantly and evaluate fresh data in real-time light of previously evaluated data [5]. AI is now present in many aspects of our daily life, such as automated mass transportation, aircraft, and computer gaming. Recently, AI has begun to be used into medicine to improve patient care by speeding up processes and attaining greater accuracy, paving the way for improved healthcare overall.

We keep seeing technology being used in many aspects of medicine as it develops. Organized digital clinical data are now simpler to collect and retain than they were with the nonstandard paper charts, as electronic medical records become more common and image acquisition and data storage grow. Now we have an opportunity to apply artificial intelligence (AI) to assist in the diagnosis and treatment of disease as computer processing speeds increase. We now have greater access to patient data and images than ever before, and AI enables thorough analysis and pattern identification of this clinical data at quantities and speeds that are difficult for a single physician to achieve.

GENERAL OVERVIEW OF AI

Since AI is an umbrella term that covers a variety of topics, the concentration will be on how machine learning and deep learning are used in the field of medicine. Natural language processing, which is used to extract information from unstructured data like clinical notes, is another aspect of AI.

The term "Medical Technology" is frequently employed to refer to a variety of instruments that can help medical practitioners diagnose patients earlier, prevent problems, optimize therapy and/or offer less invasive options, and shorten hospitalization for patients and society as a whole. Prior to the advent of smartphones, wearables, sensors, and communication systems, medical technologies were primarily known as traditional medical devices (such as prosthetics, stents, and implants). However, with the ability to contain artificial intelligence (AI)-powered tools (such as applications) in very small sizes, these devices have revolutionized medicine [3].

According to Collins dictionary, artificial intelligence is "the capability of computers or programs to operate in ways believed to mimic human thought processes, such as reasoning and learning; and, the branch of computer science dealing with this" [2].

According to Merriam-Webster dictionary, artificial intelligence is "a branch of computer science dealing with the simulation of intelligent behavior in computers" and another second meaning of it is "the capability of a machine to imitate intelligent human behavior". At the same time artificial intelligence is "a constellation of many different technologies working together to enable machines to sense, comprehend, act, and learn with human-like levels of intelligence" [6].

Oxford dictionary defines artificial intelligence as following: "the theory and development of computer systems able to perform tasks normally requiring human intelligence, such as visual perception, speech recognition, decision-making, and translation between languages".

Computer approaches are mostly used in medical artificial intelligence (AI) to make clinical diagnostics and suggest therapies. AI can find important associations in a data collection and has been used to diagnose, treat, and predict outcomes in a variety of clinical circumstances.

Great changings and improvements have been happening since the term “artificial intelligence” came into being. We can easily observe them in all the subbranches of medicine. While medical technologies were mostly known as classic medical devices (e.g., prosthetics, stents, implants) before the mobile era, the emergence of smartphones, wearables, sensors, and communication systems has revolutionized medicine by allowing artificial intelligence (AI) powered tools (such as applications) to be contained in very small sizes [3]. AI has transformed medical technology and is usually understood as a branch of computer science that can solve complicated issues with multiple applications in fields with a lot of data but little theory [4].

Although AI is undoubtedly altering the healthcare business, it is still a relatively new technology. As AI usage spreads throughout the healthcare industry, issues regarding the technology's benefits and drawbacks become increasingly pressing.

ADVANTAGES OF ARTIFICIAL INTELLIGENCE

If to speak about the benefits of AI, acquiring correct information in a timely manner is an important part of identifying and treating medical problems. Doctors and other medical professionals may use AI to use real-time, precise data to speed up and improve important therapeutic decisions. Improved preventative measures, cost savings, and patient wait times can all be achieved by producing more quick and realistic outcomes.

Improved physician-patient connections can be aided by real-time analytics. Patients can be more engaged in their treatments if important health data is made available via mobile devices. Doctors and nurses can be alerted to critical changes in patient status and crises via mobile notifications.

Artificial intelligence in medicine has already had a significant impact on healthcare practices throughout the world. Appointment scheduling, translation of clinical facts, and patient history keeping are among the innovations. Artificial intelligence is allowing healthcare institutions to automate more time-consuming and exacting operations. Intelligent radiology equipment, for example, can recognize important visual signals, saving hours of intensive study. Appointment scheduling, patient tracking, and treatment recommendations may all be automated with other automated systems [2].

Medical professionals have more time to examine patients and identify sickness and condition as more critical processes are automated. Artificial intelligence (AI) is speeding up processes at medical facilities, allowing them to save valuable production hours. Time is money in every industry; thus, AI has the potential to save a lot of money.

The healthcare sector is estimated to spend a lot of money every year. Administrative burdens, such as filing, evaluating, and settling accounts, account for a large amount of these needless expenditures. Another area where there is need for improvement is determining medical necessity. To correctly determine medical necessity, hours of analyzing patient history and information are typically required. New natural language processing (NLP) and deep learning (DL) algorithms can aid physicians in the assessment of hospital cases and the avoidance of rejections.

Medical practitioners are given more time to help and engage with patients by freeing up valuable productivity hours and resources.

One more advantage of AI is that it allows researchers to collect enormous amounts of data from a variety of sources. More efficient analysis of fatal illnesses is possible because to the capacity to rely on a large and expanding data set. In terms of real-time data, research may profit from the vast amount of data accessible, as long as it can be simply translated.

Medical research organizations such as the Childhood Cancer Data Lab are creating tools that will help medical practitioners better traverse large data sets. Artificial intelligence has also been used to analyze and diagnose symptoms early in the course of a disease. In addition, AI may reduce physician stress. According to recent study, more than half of primary care doctors are pressured by deadlines and other job circumstances. AI aids in the streamlining of procedures, the automation of activities, the rapid sharing of data, and the organization of operations, all of which relieve medical personnel of the burden of juggling too many duties.

LIMITATIONS OF AI

In spite of a prevailing number of the use of AI in medicine, some limitations can be observed as well. In the medical field, AI has gone a long way, yet human supervision is still required. Surgery robots, for example, act rationally rather than empathically. Important behavioral insights that might assist identify or avoid medical problems may be seen by health practitioners.

Yang explains, “AI has been around for a few decades and continues to mature. As this area advances,

there is more interaction between healthcare professionals and tech experts” [4]. To be used successfully, AI requires human input and assessment. As AI advances, the disciplines of technology and medicine are increasingly collaborating to improve the technology. According to Yang, “Years of education are required for medical professionals to operate in their fields. Essential information gathered from Subject Matter Experts (SMEs) enriches the data available and improves explainable AI (XAI) to provide healthcare workers with trusted and valuable insights” [4].

The demands of patients frequently go beyond their acute physical ailments. Appropriate suggestions for specific patients might be influenced by social, economic, and historical circumstances. For example, an AI system could be able to assign a patient to a certain treatment center based on a diagnosis. However, this approach may not take into consideration the patient's financial constraints or other personal preferences.

When an AI system is used, privacy becomes a concern. When it comes to gathering and using data, companies like Amazon have complete control. Hospitals, on the other hand, may encounter difficulties while attempting to transmit data via Apple mobile devices. These legal and societal constraints may limit AI's ability to aid medical procedures.

One of the most essential drawbacks of artificial intelligence is leading to unemployment. While AI may help save expenses and relieve clinician stress, it may also eliminate certain employment. This variable may result in the displacement of healthcare professionals who have invested time and money in their education, posing equitable issues [2].

According to a research published by the World Economic Forum in 2018, AI will generate a total of 58 million employment by 2022. However, according to the same research, AI would displace or eliminate 75 million employment by the same year. The main reason for the loss of job prospects is that as AI becomes increasingly integrated across industries, occupations that need repetitive activities will become obsolete.

Though AI has the potential to enhance many aspects of healthcare and medicine, it is critical to examine the social implications of its implementation.

Another limitation of AI is that inaccuracies are still possible. Medical AI is highly reliant on diagnostic data available from millions of instances. A mistake is totally feasible when there is inadequate data on specific illnesses, demographics, or environmental variables. This is especially essential when prescribing a certain medication [2].

To accommodate for data shortages, AI is continually developing and improving. It's worth noting, though, that certain groups may still be left out of domain knowledge.

Conclusion

There is no doubt that AI has the potential to improve healthcare systems. Time-consuming tasks can be automated to free up clinicians' schedules and allow them to spend more time with patients. By making data more accessible, healthcare professionals are better able to take the necessary measures to stay healthy. Diagnoses can be made more swiftly and precisely with the aid of real-time data. Administrative errors are being reduced, and money is being saved, through the application of artificial intelligence. As SMEs get more involved in AI development, the technology becomes more relevant and well-informed. With the fast adoption of AI in healthcare, new problems and challenges are being encountered and solved. AI still need human control, may overlook social factors, has data gaps, and is vulnerable to more advanced cyberattacks. Despite some of the challenges and constraints that AI faces, the medical industry has enormous potential for this breakthrough technology. It is vital to say categorically that AI is enhancing people's lives worldwide.

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