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THE POTENTIAL OF ARTIFICIAL INTELLIGENCE TECHNOLOGIES IN AUTOMATING REHABILITATION PROCESSES

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Annotatsiya: Ushbu maqolada reabilitatsiya jarayonlarini avtomatlashtirishda sun'iy intellekt texnologiyalaridan foydalanish imkoniyatlari va ularning ahamiyati yoritilgan. Bemorlarning harakat faolligini baholash, reabilitatsiya mashqlarini nazorat qilish va tiklanish dinamikasini kuzatishda intellektual tizimlarning qo'llanilishi tahlil qilingan. Shuningdek, sun'iy intellekt texnologiyalarining reabilitatsiya samaradorligini oshirish, individual yondashuvni ta'minlash va tibbiy mutaxassislar faoliyatini qo'llab-quvvatlashdagi istiqbollari ko'rib chiqilgan.
Kalit so'zlar: reabilitatsiya, sun'iy intellekt, avtomatlashtirilgan tizimlar, tibbiy axborot texnologiyalari, intellektual tahlil.

Аннотация: В данной статье рассматриваются возможности и значение использования технологий искусственного интеллекта в автоматизации реабилитационных процессов. Анализируется применение интеллектуальных систем для оценки двигательной активности пациентов, мониторинга реабилитационных упражнений и отслеживания динамики восстановления. Также рассматриваются перспективы технологий искусственного интеллекта в повышении эффективности реабилитации, обеспечении индивидуального подхода и поддержке деятельности медицинских специалистов.
Ключевые слова: реабилитация, искусственный интеллект, автоматизированные системы, медицинские информационные технологии, интеллектуальный анализ.

Abstract: This article examines the potential and importance of using artificial intelligence technologies in automating rehabilitation processes. It analyzes the use of intelligent systems for assessing patient motor activity, monitoring rehabilitation exercises, and tracking recovery progress. It also explores the potential of artificial intelligence technologies to improve rehabilitation effectiveness, provide a personalized approach, and support the work of medical professionals.
Key words: rehabilitation, artificial intelligence, automated systems, medical information technology, intelligent analysis.

INTRODUCTION

Today, the implementation of digital technologies in the healthcare system, the improvement of medical service quality, and the enhancement of patient recovery processes are among the most important scientific and practical challenges. In particular, the use of modern information technologies is becoming increasingly important for effectively organizing rehabilitation processes, assessing patients' physical capabilities, and regularly monitoring

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recovery progress. In traditional rehabilitation methods, the assessment of a patient's condition, supervision of exercise performance, and analysis of treatment outcomes largely depend on the experience of medical professionals and direct observation. Automating these processes makes it possible to process medical data rapidly, reduce certain errors associated with human factors, and adapt rehabilitation interventions to individual needs.

The development of artificial intelligence technologies is creating new opportunities in the field of rehabilitation. These technologies enable the analysis of patients' movements, physical activity, and exercise performance, as well as the identification of changes in the recovery process based on the collected data. In particular, machine learning algorithms, computer vision, smart sensors, and digital monitoring tools play an important role in supervising rehabilitation procedures and systematically evaluating their outcomes. For example, computer vision technologies can identify key points of the human body in video recordings and help assess movement sequences and execution accuracy. Sensor-based devices make it possible to collect data on patients' physical activity and certain physiological parameters.

The relevance of automating rehabilitation processes is primarily determined by the need to improve the effectiveness of medical services, optimize the workload of healthcare professionals, and continuously monitor patients' recovery. At the same time, implementing such systems requires careful attention to data accuracy, the protection of patients' personal information, the reliability of technical equipment, and the suitability of algorithms for different patient populations.

The aim of this article is to explore the potential of artificial intelligence technologies in automating rehabilitation processes, analyze their practical applications, and substantiate their importance in improving rehabilitation effectiveness. The findings of this study may contribute to the development of scientific and practical recommendations for the targeted implementation of these technologies in healthcare practice.

LITERATURE REVIEW AND METHODOLOGY

The use of artificial intelligence technologies to automate rehabilitation processes is one of the promising areas of modern medicine and biomedical engineering. The educational and methodological manual entitled *Artificial Intelligence in Medical Rehabilitation* by S. A. Litovkin and E. Yu. Kostyuchenko examines the application of intelligent models in the rehabilitation of patients with neurological and oncological diseases, as well as the development of individualized recovery programs. Furthermore, the textbook *Machine Learning and Artificial Intelligence in Medicine*, published in 2025 by A. L. Zolkin, V. D. Munister, and P. M. Podolko, discusses the theoretical foundations of machine learning algorithms, medical data analysis, and individualized treatment approaches.

Among Uzbek scholars, the educational literature by M. M. Rustamov, devoted to computer-assisted analysis of medical data, focuses on technologies for collecting, storing, and processing digital information. In addition, V. A. Yepifanova's textbook *Medical Rehabilitation* serves as a theoretical resource for studying the clinical foundations of organizing rehabilitation interventions for various diseases.

The research methodology is based on systematic analysis, comparative analysis, the review of scientific literature, and conceptual modeling. These methods are used to investigate the applications of artificial intelligence in rehabilitation, including automatic movement assessment, data collection through sensors, and monitoring patients' recovery progress. The advantages and limitations of existing approaches are also compared, while issues related to data security, algorithm reliability, and the development of individualized rehabilitation programs are evaluated. Based on the synthesis of the findings, the study aims to formulate scientific and practical

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conclusions regarding the implementation of artificial intelligence technologies in rehabilitation practice.

DISCUSSION

The use of artificial intelligence technologies to automate rehabilitation processes introduces a new approach to assessing patients' functional status and managing their recovery. Intelligent systems assist healthcare professionals in making evidence-based decisions by analyzing data on physical activity, exercise accuracy, and physiological indicators. In particular, computer vision algorithms make it possible to assess human movements using video recordings, identify movement deviations, and monitor the performance of rehabilitation exercises.

Automated platforms integrated with sensors enable the continuous collection of information about patients' physical activity and the monitoring of changes over time. One of the major advantages of these technologies is their ability to adapt rehabilitation programs to patients' individual needs and recovery rates. This approach can reduce the workload of healthcare professionals and shorten the time required to analyze data.

However, the effectiveness of artificial intelligence systems depends on the quality of the data used, the accuracy of the algorithms, and the reliability of the technical equipment. Incomplete or inaccurate data may negatively affect analytical results. When implementing intelligent technologies in rehabilitation practice, it is essential to protect patients' personal information, comply with medical ethics requirements, and ensure that system outputs are reviewed by qualified professionals.

Therefore, artificial intelligence should not be regarded as a replacement for physicians or rehabilitation specialists, but rather as a technological solution that supports their professional activities. In the future, testing these systems in clinical settings and evaluating their performance using objective indicators will help determine their practical value.

CONCLUSION

The use of artificial intelligence technologies in automating rehabilitation processes creates significant opportunities to improve the effectiveness of medical services and individually assess patients' functional recovery. The integration of computer vision, intelligent sensors, and machine learning algorithms helps analyze physical activity, monitor rehabilitation outcomes, and adapt exercise programs to patients' needs.

The practical value of these solutions depends on data reliability, information security, and clinical validation. In the future, further development of intelligent rehabilitation systems, their adaptation to local conditions, and their implementation under professional supervision will contribute to the advancement of digital healthcare.

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