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ARTIFICIAL INTELLIGENCE AS A TOOL FOR MODELLING THE EDUCATIONAL ENVIRONMENT

This article provides an in-depth exploration of the intricate relationship between artificial intelligence and the educational landscape, particularly in higher education settings. It contends that AI plays a pivotal role by furnishing educational institutions with invaluable insights into their operations that were previously inaccessible. Notably, AI excels in tasks requiring meticulous attention to detail, such as analyzing extensive documents to ensure accuracy, thus expediting processes while minimizing errors. In the context of higher education, AI's versatility is showcased through its applications in data analysis and predictive modeling, enabling educators to anticipate future trends and adapt accordingly. The discourse delves into various perspectives on AI, ranging from its resemblance to human cognition and behavior to its role as a facilitator of efficiency and innovation in educational practices. The article underscores the transformative potential of AI in enhancing teaching quality and optimizing learning experiences. By leveraging AI-driven analytics, educators can gain deeper insights into student performance, pedagogical methodologies, and administrative functions, thereby facilitating informed decision-making and resource allocation. Moreover, AI's capacity for rapid data processing empowers educators to personalize learning experiences, tailoring content and delivery methods to suit individual student needs and preferences. This personalized approach not only fosters student engagement but also cultivates a deeper understanding of subject matter, ultimately leading to improved learning outcomes. In conclusion, the article advocates for the strategic integration of AI into higher education systems as a means of enhancing efficiency, effectiveness, and adaptability. By harnessing AI's capabilities, educational institutions can navigate the complexities of modern education with greater agility and insight, thereby positioning themselves for continued success in the evolving educational landscape.

Key words: *repetitive tasks, higher education, data analysis, management, chatbot, neural network.*

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ШТУЧНИЙ ІНТЕЛЕКТ ЯК ІНСТРУМЕНТ ДЛЯ МОДЕЛЮВАННЯ ОСВІТНЬОГО СЕРЕДОВИЩА

У статті досліджуються особливості штучного інтелекту як інструменту для формування освітнього середовища. В статті стверджується, що штучний інтелект відіграє ключову роль, надаючи освітнім установам невартісні інформаційні висновки про їхню діяльність, які раніше були недоступні. Зокрема, штучний інтелект відмінно справляється з завданнями, які потребують ретельної уваги до деталей, таких як аналіз обширних документів для забезпечення точності, що сприяє прискоренню процесів при мінімізації помилок. У контексті вищої освіти гнучкість штучного інтелекту виявляється через його застосування у аналізі даних та прогнозуванні моделей, що дозволяє освітнім працівникам передбачати майбутні тенденції та адаптуватися відповідно. Описано різні погляди на штучний інтелект, починаючи від його подібності до людського мислення та поведінки і закінчуючи його сприянням до краще ефективності та введення інновацій в освітніх практиках. Стаття підкреслює трансформаційний потенціал штучного інтелекту у покращенні якості навчання та оптимізації навчальних досвідів. Завдяки аналізу, що базується на штучному інтелекті, викладачі можуть отримати краще уявлення про успішність студентів, педагогічні методики та адміністративні функції, сприяючи таким чином обґрунтованому прийняттю рішень та розподілу ресурсів. Більше того, здатність штучного інтелекту до швидкої обробки даних надає викладачам можливість персоналізувати навчальні матеріали, в залежності індивідуальних потреб та вподобань студентів. Цей індивідуалізований підхід не лише сприяє залученню студентів до освітнього процесу, але й сприяє глибшому розумінню предмету, що в кінцевому підсумку призводить до покращення результатів навчання. В кінці, стаття виступає за впровадження штучного інтелекту в системи вищої освіти як засобу підвищення ефективності та адаптивності. За допомогою можливостей штучного інтелекту навчальні заклади можуть орієнтуватися в складнощах сучасної освіти з більшою гнучкістю і розумінням, тим самим позиціонуючи себе для подальшого успіху в мінливому освітньому ландшафті.

Ключові слова: повторювані завдання, вища освіта, аналіз даних, управління, чат-бот, нейронна мережа.

Problem statement. Artificial intelligence technologies hold immense promise for revolutionizing education management, offering personalized learning experiences, streamlined assessment processes, and enhanced educational outcomes. However, several key challenges must be addressed to ensure the effective implementation and maximize the benefits of AI in education.

Research analysis. One crucial challenge is ensuring accessibility and inclusivity for all learners, particularly those with special needs. AI-driven educational platforms must be designed to accommodate diverse learning requirements, such as providing tailored content for individuals with visual or hearing impairments, to promote equitable access to education.

Ethical considerations also loom large in the integration of AI in education management. Issues surrounding data privacy, algorithmic bias, and responsible AI use must be carefully navigated to safeguard students' rights and ensure fairness and transparency in educational practices.

Moreover, teacher training and support are essential for empowering educators to effectively utilize AI tools in their pedagogical practices. Comprehensive training programs and ongoing support are necessary to equip teachers with the skills and confidence needed to leverage AI technologies for improved learning outcomes.

Customization and personalization pose technical challenges in delivering tailored learning experiences to individual students. Developing AI algorithms capable of accurately analyzing diverse learning data and delivering personalized recommendations requires robust infrastructure and algorithmic refinement.

Furthermore, integrating AI technologies into existing educational infrastructures and management systems presents logistical hurdles. Interoperability issues, data compatibility, and system scalability must be addressed to ensure seamless integration and maximize the efficiency of education management processes.

Purpose of the article. This article delves into the obstacles impeding the seamless integration of AI technologies in education management and offers practical solutions. By addressing concerns regarding accessibility, ethics, teacher training, customization, and integration, it endeavors to unlock AI's full potential in creating inclusive, efficient, and effective learning environments for all students.

Presentation of the main material. A neural network is a mathematical model that replicates the functioning of the human brain to solve artificial intelligence tasks. It consists of a large number of interconnected neurons that process information and generate responses based on input data.

The main components of a neural network are neurons, connections between them, and activation functions. Neurons receive input signals, process them, and pass the results to the next neurons through connections. The activation function determines how a neuron reacts to input data and transmits the signal further.

Neural networks are used in a wide range of applications, including question answering, image recognition, machine translation, autonomous driving, and medical diagnostics. They have demonstrated impressive achievements in many fields and continue to evolve to tackle more complex artificial intelligence tasks.

The term "artificial intelligence" combines several narrow concepts, such as neural networks, computer vision, and machine learning. In the last decade, artificial intelligence has become increasingly prevalent in various fields, including higher education. Artificial intelligence is widely considered an inter-disciplinary field that encompasses knowledge and methods from disciplines such as computer science, psychology, neurobiology, and philosophy. Thus, artificial intelligence is perceived as the ability of a machine or computer to demonstrate the imitation of human intelligence (García-Martínez, I., Fernández-Batanero, J. M., Fernández-Cerero, J., & León, S. P., 2023), (LeCun Y., Bengio Y., Hinton G., 2018), while in other cases, emphasis is placed on the capabilities of machines and computers to tackle complex tasks using algorithms and data analysis (Chaka, C., 2023).

From an educational perspective, artificial intelligence is seen as a tool to enhance teaching methods and processes, accelerating and simplifying educational, production, and communication processes.

In accordance with the cybernetic approach to management, it is considered a process of transforming information to achieve a specific result (Dean J., Ghemawat S., 2010), (Ding, J., Akiki, Ch., Jernite, Ya., Steele, A. L., & Popo, T., 2023). In the context of education, the pedagogical process is perceived as managing the learning process, rather than just the transfer of knowledge. The teacher designs, directs, and adjusts the educational and cognitive activities of students to achieve educational outcomes. Managing the learning process involves a set of measures aimed at ensuring the effective functioning of the educational system. This is achieved through the analysis of the initial state of students and the results of their learning, the development of individual educational trajectories, and adjustments to the curriculum. Quality management is possible only with complete information about the subjects and the nature of the learning process, both at the initial stage and throughout the entire educational process.

Artificial intelligence has become a cornerstone of modern higher education, revolutionizing various aspects of teaching and learning. By analyzing extensive datasets and simulating future scenarios, AI enhances educational practices and outcomes. The term "artificial cognitive system" is often used synonymously with AI within the scientific community, highlighting its capacity to mimic human thinking and behavior.

One of the primary benefits of AI in higher education is its ability to facilitate personalized learning experiences. Through machine learning techniques and data analysis, AI tailors educational programs to suit the unique needs and learning styles of individual students. By analyzing students' learning data and progress, AI can provide customized recommendations and assignments, ensuring a more balanced and effective educational journey for each learner.

Moreover, AI streamlines the assessment and feedback processes, automating the evaluation of students' work with remarkable precision. Neural networks and machine learning algorithms analyze assignments against predefined criteria, offering objective feedback and minimizing human bias in assessment. This automation liberates educators to focus on fostering creativity and interactivity in their teaching methods, ultimately enriching the learning experience.

AI also facilitates the creation of intelligent educational resources, such as virtual and augmented reality simulations. These immersive environments enable students to practice and apply their skills in realistic settings, fostering deeper understanding and engagement. Furthermore, AI-powered intelligent assistants and chatbots provide continuous support and guidance to students, offering timely assistance and problem-solving solutions.

Additionally, AI's prowess in data analysis and forecasting empowers educators to make informed decisions and adapt their teaching strategies effectively. By analyzing large volumes of learning data, AI can predict students' outcomes and achievements, guiding educators in devising tailored interventions and optimizations.

Despite its immense potential, the integration of AI in higher education presents various challenges. Ethical considerations regarding data privacy, the need for educator training, and compliance with regulatory frameworks necessitate careful navigation. However, the overall trajectory of AI in higher education is promising, with the potential to enhance education quality, efficiency, and alignment with industry demands.

In conclusion, AI stands as a transformative force in higher education, offering unparalleled opportunities for personalized learning, assessment automation, immersive experiences, and data-driven decision-making. While challenges persist, the benefits of AI in education are undeniable, heralding a future where learning is more adaptive, efficient, and tailored to individual needs.

The digital environment and artificial intelligence technologies are integral parts of modern education. They provide unique opportunities for accessing information, advanced tools for analysis and data processing, and enable the automation and optimization of learning management processes. The integration of artificial intelligence into education management offers a wide range of new possibilities for enhancing educational processes and identifying the potential of each student.

Despite significant breakthroughs in scientific research and the development of artificial intelligence technologies at both the international and domestic levels, there is currently a universally recognized definition of the concept of artificial intelligence. This is due to various technically complex and programmatically implemented characteristics and qualities of artificial objects endowed with artificial intelligence for problem-solving.

For students, a key segment is monitoring performance and forecasting results of interim assessments. An analytical system tracks performance in the completion of the educational program and provides recommendations for additional study of certain topics. Digital intelligent assistant services, built on predictive analytics, can offer situational recommendations depending on the context in which the student finds themselves: from a list of recommended literature to an invitation to an open lecture on a topic related to the student's professional interests.

Gradually, artificial intelligence offers new opportunities for student learning and development. Adaptive learning has become a noticeable trend in education. Systems developed using artificial intelligence can analyze student progress data, identify their weaknesses, and offer individually tailored materials and support. Thus, each student receives education that is most effective for their personal needs and abilities. Virtual assistants and tutors working on artificial intelligence become valuable resources for students. They can answer questions, explain complex concepts, and assist with tasks.

In the realm of digital educational environments, the concept of learning management encompasses a multifaceted approach to orchestrating the educational process with the aim of attaining specific learning outcomes tailored to individual students. Delving into the intricacies of learning management reveals several pivotal facets:

Firstly, the planning phase sets the groundwork for learning endeavors by meticulously crafting educational programs, curricula, and instructional materials. This stage entails delineating clear learning objectives, discerning appropriate pedagogical methodologies, and identifying requisite resources to realize these educational aspirations.

Subsequently, the organization of learning involves judicious resource allocation, faculty deployment, venue selection, and the formulation of a cohesive class schedule. A well-structured learning environment is paramount in fostering an atmosphere conducive to effective pedagogy and student engagement.

Integral to the process is the continuous monitoring and evaluation of learning outcomes, which serve

as barometers of educational efficacy. This ongoing assessment enables educators to track students' progress, gauge the effectiveness of educational initiatives, and make agile adjustments as warranted by evolving pedagogical exigencies.

Furthermore, the adaptability and refinement of educational strategies hinge upon the insights gleaned from data amassed through monitoring and evaluation. This iterative process of introspection and adjustment facilitates the refinement of educational programs, thereby fortifying their resonance with the dynamic needs of students.

Incorporating students as active stakeholders in the educational milieu is another hallmark of effective learning management. Empowering students through participatory decision-making processes and soliciting their input in educational planning fosters a sense of ownership over their learning journey.

Lastly, adept resource management is indispensable in orchestrating successful educational endeavors. Maximizing the utilization of financial, human, and material resources ensures the optimization of learning opportunities and the attainment of desired educational outcomes.

In essence, learning management embodies a comprehensive framework that intricately interweaves planning, organization, evaluation, adaptation, student involvement, and resource management to cultivate enriching educational experiences conducive to student success and holistic development.

From the above, it can be concluded that such models should consider not only the academic characteristics and preferences of students but also their level of knowledge, skills, educational environment, and feedback. Educational management allows for active interaction between teachers and learners, ensuring progress monitoring, adaptation of content and teaching methods, as well as feedback and support. However, to guarantee quality educational management, it is necessary to have comprehensive information about the subjects (students) and the nature of the learning process. This includes obtaining information about students' prior experiences, analyzing their academic achievements, assessing their motivation and interests, and considering the specifics of the educational environment and available resources. Continuous feedback between teachers and students is an integral part of successful managed learning.

Educational management in the digital era is a dynamic field that demands continual adaptation to evolving technologies and student requirements. Its scope encompasses a range of activities aimed at ensuring the delivery of effective and high-quality education. Here, we delineate the pivotal aspects of educational management within a digital educational environment.

Content Management stands as a cornerstone, encompassing the creation, editing, publishing, and updating of educational materials on online platforms. This facet also involves structuring these resources for optimal student accessibility. Access Management emerges as a critical concern, requiring not only seamless but also secure access to digital resources. Administrators must navigate the intricate landscape of access rights, ensuring confidentiality and data protection. Analytics Management harnesses the power of digital tools to collect and analyze vast datasets pertaining to learning processes. This data-driven approach enables educators to discern trends, evaluate student performance, and refine educational programs accordingly. Feedback Management leverages digital platforms to foster interactive learning experiences and solicit feedback from students. This promotes active engagement and bolsters motivation within the educational milieu. Personalized Learning Management capitalizes on the flexibility of digital environments to tailor learning experiences to individual students. Machine learning algorithms facilitate the delivery of personalized recommendations, catering to diverse learning needs and aptitudes. Communication Management facilitates seamless collaboration and interaction among students and educators, transcending geographical barriers. Effective utilization of digital communication tools is imperative to foster a cohesive learning community.

Artificial intelligence emerges as a potent ally in realizing the aforementioned facets of education management. Its toolkit empowers educators to craft engaging educational content, optimize management processes, and harness advanced features to enrich the learning experience.

In summary, educational management in the digital age embodies a multifaceted endeavor characterized by adaptability, data-driven decision-making, and the judicious integration of technology to enhance teaching and learning outcomes.

Artificial intelligence technologies in education management must meet the needs of students. They are crucial for ensuring quality education and the effective use of modern technologies in the educational sector. At the same time, artificial intelligence is used by educational institutions not only for analyzing user actions, preferences, performance, and competencies, building recommendation systems, and individual learning trajectories but also for optimizing marketing and operational

activities, including student enrollment. Innovative solutions in the field of education will provide a new impetus to the development of modern society. Evidence-based education, microlearning, generative artificial intelligence, virtual and augmented reality technologies will become an integral part not only of education but also of the lives of many people, even those far from the IT sphere. Artificial intelligence systems assess students, track learning progress and engagement levels, recommend related games and simulators, educational videos, and other useful resources, thereby constructing a system of personalized recommendations.

Online assessment platforms based on AI, such as iSpringSuite, "Nearpod," "Glider.ai," and "ProProfs," assist teachers and potential employers in evaluating the level of knowledge and competencies through surveys, testing, and online quizzes. For instance, the TutorAI program enables the automatic creation of comprehensive educational courses using artificial intelligence. Users input a topic, and AI autonomously gathers and organizes information, creates modules, tests, and provides links to additional sources. This is undoubtedly a significant aid for both teachers and students engaged in research activities.

It is essential to pay attention to the educational process for individuals with special needs, which has specific characteristics related to the unique needs of each person. For example, individuals with hearing impairments have diverse educational content needs: people who have lost their hearing can perceive subtitles for educational video content, while for those born deaf, sign language is essential, and providing sign language interpretation is necessary for understanding educational video content. Therefore, utilizing artificial intelligence to create original content for people with disabilities has enormous prospects both socially and economically.

Conclusions. Thus, artificial intelligence is the imitation of human intelligence processes by machines, particularly computer systems. Typically, AI systems operate by assimilating vast amounts of educational data, analyzing it for correlations and patterns, and utilizing these findings to predict future states. For instance, a chatbot that receives examples of text-based chats can learn to generate realistic exchanges with people, and an image recognition tool can learn to identify and describe objects in images by reviewing millions of examples. Artificial intelligence is significant because it can provide educational institutions with insights into their activities that they may not have known before. AI-driven predictive analytics can help educational institutions anticipate future trends and challenges. By analyzing historical data and patterns, AI algorithms can forecast student enrollment, identify at-risk students who may need additional support, and predict outcomes such as graduation rates or academic performance. Moreover, AI-powered analytics can identify trends in student performance, such as common areas of difficulty or factors influencing academic success. This information enables institutions to tailor their teaching approaches, interventions, and support services to better meet the needs of their students. AI can help educational institutions optimize their resources and operations. By analyzing data on course enrollment, scheduling, and resource utilization, AI algorithms can identify inefficiencies and opportunities for improvement. This may include optimizing course offerings, allocating resources more effectively, and identifying areas where additional support or investment is needed.

Moreover, AI can outperform humans in certain tasks, particularly those involving repetitive actions, where AI systems pay attention to details in tasks such as analyzing a large number of documents to ensure accurate field completion. Thus, AI tools often perform tasks quickly and with relatively few errors.

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