THE ROLE OF AI ALGORITHMS IN SHAPING A STUDENT'S INDIVIDUAL TRAJECTORY

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Annotation. This article examines the role of artificial intelligence in education and its possibilities for implementing personalized learning. In the modern education system, one of the important issues is taking into account the individual characteristics of students. The role of artificial intelligence algorithms in shaping a student's individual learning trajectory is also considered. Personalization of learning in the modern education system is becoming one of the most important areas. In this context, algorithms based on artificial intelligence can improve the effectiveness of student learning by analyzing learning data, adapting learning content, and making individual recommendations. The article scientifically analyzes the types of artificial intelligence algorithms, their main functions, advantages and limitations in building an individual learning trajectory. In addition, the pedagogical and ethical aspects of introducing artificial intelligence into the educational process will be described.

Keywords: artificial intelligence, personalized learning, digital education, educational technologies, knowledge quality, individual learning trajectory, adaptive learning, Machine learning, educational algorithms.

Introduction

Currently, the education system has entered a new stage of digitalization and technological renewal. In this process, artificial intelligence (AI) is becoming one of the main factors radically changing the field of education. In particular, the capabilities of artificial intelligence are of particular importance in the development of a personalized learning model. While the traditional learning system often offers the same content and pace for all students, personalized learning focuses on the individual characteristics, abilities, interests, and learning pace of each student.

Artificial intelligence is a set of computer systems capable of performing actions characteristic of human intelligence. It includes the ability to analyze data, recognize patterns, make predictions, make decisions, and improve oneself. In the field of education, artificial intelligence is used to optimize the learning process, analyze students' academic achievements, and adapt the learning content.

Artificial intelligence-based systems can process large amounts of learning data and accurately determine a student's level of knowledge. As a result, the learning process will be organized efficiently and purposefully.

Personalized learning is a way of organizing the educational process in accordance with the individual needs, abilities and learning style of each student. In this model, the student is considered as an active subject of learning. Here, the content of the training, the level of difficulty of the tasks, the pace of learning and feedback vary depending on the individual student's performance.

Personalized learning increases the motivation of students and contributes to a deeper assimilation of educational material. However, since this approach is difficult to implement using traditional methods, artificial intelligence technologies are becoming an important tool.

Results and discussion. Artificial intelligence is used in several key areas in the implementation of personalized learning.:

First, the analysis of training data. Artificial intelligence determines students' level of knowledge by analyzing test results, task completion rate, errors, and learning activity.

Secondly, adaptive learning content. Artificial intelligence systems can automatically adjust the difficulty by offering tasks according to the student's level. For example, a student suffering from a certain topic will be offered additional explanations and easy tasks.

Third, personal feedback and support. Virtual assistants and chatbots based on artificial intelligence promptly answer students' questions and provide support during the learning process.

Fourth, teacher support. Artificial intelligence facilitates the work of teachers and allows them to plan and monitor the educational process.

The combination of artificial intelligence and personalized learning has several advantages:

* The effectiveness of the educational process increases;
* Students' individual abilities are taken into account;
* Motivation and interest in learning increases;
* Improves the quality and effectiveness of knowledge;
* Teachers' time resources are saved.

Materials and methods: The integration of artificial intelligence and personalized learning is not just a technological innovation in the education system, it is a strategic step that fundamentally changes the learning paradigm.

1. Improving the effectiveness of the educational process

In traditional teaching, the teacher is focused on the level of the average student, which leads to boredom of strong students and lagging behind of weak ones. Artificial intelligence systems detect a student's mistake at this point and suggest ways to fix it. This increases the efficiency of the "error handling" stage several times. Artificial intelligence breaks down large information into small, easily digestible blocks and optimizes the student's cognitive load.

2. Taking into account the individual abilities of students (adaptivity)

Each child has a different style of perception of information (visual, auditory, kinesthetic) and speed. If a student has difficulty solving a mathematical problem, artificial intelligence offers them a simplified version or an additional video explanation. According to Vygotsky's theory, artificial intelligence constantly keeps students within their capabilities (not very easy, not very difficult), which accelerates intellectual growth.

3. Increased motivation and interest in learning

Decreased motivation is often due to "misunderstanding" or "curiosity." When a student completes a task corresponding to his level and immediately gets a result, "dopamine" is released in his brain, and the desire to learn increases. Artificial intelligence elements provide learning in a playful way and maintain a high level of student interest.

4. Improving the quality and effectiveness of education

The quality of knowledge is measured by the depth of knowledge, not just the price. Artificial intelligence will definitely find "gaps" in the student's knowledge and will not let him into the next topic until he deletes it. This provides a foundation for fundamental knowledge. The system can predict in advance which topic a student may encounter in the future and suggest preventive tasks.

5. Saving teachers' time resources

The teacher is not a distributor of information, he is a mentor and inspirer. Mechanical work, such as checking assignments, evaluating, and drawing up a lesson plan, is taken over by artificial intelligence. The teacher can devote his free time to the personal development of the child, emotional intelligence and complex project work.

Artificial intelligence does not replace a teacher, it turns him into a "super teacher." Artificial intelligence for a student is a "personal tutor" who understands

its necessity. The combination of these two forces eliminates educational inequalities, allowing each child to reach their full potential.

In addition, there are certain difficulties with the introduction of artificial intelligence into the education system. These include problems of data security and confidentiality, insufficient technological infrastructure, digital literacy of educators, and excessive reliance on artificial intelligence. Therefore, the use of artificial intelligence technologies should be carried out harmoniously and responsibly with pedagogical goals.

One of the main tasks of the modern education system is the formation of a high-quality educational environment, taking into account the individual abilities and needs of each student. In the traditional learning model, students are offered the same content and pace of learning, which does not fully take into account the individual differences of students. In this regard, the problem of personalization of the educational process is becoming more and more urgent.

The development of digital technologies, especially artificial intelligence (AI), has opened up new opportunities for the automatic formation of an individual learning trajectory of a student. Artificial intelligence algorithms are able to provide each student with an individual learning path through the analysis of learning data. This article scientifically examines the role of artificial intelligence algorithms in shaping a student's individual learning trajectory, their types, capabilities, and limitations.

An individual learning trajectory is a way of acquiring knowledge that is built in accordance with the individual characteristics, abilities, interests, goals and learning rates of the student. This concept implies increasing the active role of the student in the educational process and creating conditions for his self-development. The individual learning trajectory includes the learning content, teaching methods, types of assessments, and feedback.

To effectively form an individual trajectory, it is necessary to collect and analyze large amounts of data about the student. It is at this stage that artificial intelligence algorithms play an important role.

Artificial intelligence algorithms are mathematical and logical models used to process data, identify patterns, and make decisions. In the field of education, the following types of algorithms are widely used in the formation of an individual learning trajectory:

Machine learning algorithms analyze the student's past learning outcomes and predict future learning actions;

Adaptive learning algorithms - automatically change the learning content depending on the student's level;

Recommendation Systems-provides students with relevant assignments, resources, and training modules;

Predictive analysis algorithms determine academic performance difficulties and suggest preventive measures.

Education personalization is a dynamic system that adapts to a student's cognitive abilities, pace, and interests. The following algorithmic models serve as the "engine" of this system:

1. Machine learning algorithms

Machine learning is an AI field that finds patterns based on big data and makes decisions based on it. Analyzes every student's action in the system (time spent on a task, error rate, activity time) like a digital footprint. Algorithms (for example, regression models or neural networks) create a "digital profile" of the student. This profile matures over time and can predict with up to 90% accuracy which topic a student will find difficult to master in the future.

2. Adaptive learning algorithms

These algorithms work on the principle of "feedback" and transform educational content in real time. If the student scores below the test, the algorithm re-presents the same topic in a different format (for example, a video explanation instead of text) without going to the next level. This makes it possible to automate Vygotsky's theory of the "zone of proximal development". The algorithm constantly keeps the student in an intellectual state and ensures that the task is not too easy (tedious) or too difficult (decreased motivation).

3. Recommendation systems

This technology is similar to the offerings of Netflix or YouTube, but the goal here is to deepen knowledge, not to have fun. It works by collaborative filtering. If students of a similar level achieve results quickly with the help of a certain resource, the system also provides this resource to other students. The student filters out unnecessary information and selectively transmits only materials (articles, cases, simulators) corresponding to his level, interests and cognitive style (visual, discreteness, etc.).

4. algorithms of predictive analysis

These algorithms are an "early warning system" in education. Negative dynamics in the student's academic performance (for example, a decrease in attendance, a slowdown in the speed of task completion) are identified from the very beginning. These algorithms help identify students at risk of dropping out. He manages to give the teacher an "alarm" in advance and make pedagogical intervention (assistance).

Artificial intelligence algorithms are the main tool for transforming education from a "standard pipeline" to a "personal workshop." These technologies do not

replace the teacher, but serve as an "intelligent X-ray beam" that allows him to accurately see the inner potential of each student.

Artificial intelligence algorithms perform several important functions in shaping a student's individual learning trajectory.

First, the collection and analysis of training data. AI systems continuously analyze the student's test results, time and errors in completing tasks, and learning activity. This data allows you to determine the exact level of learning of the student.

Secondly, the adaptation of educational content. Algorithms based on the data obtained change the level of complexity, volume and sequence of presentation of educational material. As a result, each student learns at an acceptable pace.

Thirdly, the formation of individual educational proposals. Artificial intelligence provides additional resources and tasks tailored to the student's interests and goals.

Fourth, continuous monitoring and feedback. AI algorithms constantly monitor the learning process, providing instant feedback to both the student and the teacher.

In addition, the use of artificial intelligence algorithms also creates certain problems. These include the confidentiality and security of data, the opacity of algorithms, the lack of digital competence of educators, and the inequality of technological infrastructure. At the same time, full automation of the individual learning trajectory can lead to a weakening of pedagogical communication.

The results of the study showed that artificial intelligence algorithms play a crucial role in shaping a student's individual learning trajectory. They allow you to effectively plan an individual learning path by collecting and analyzing data on the student's learning activities. Adaptive and recommendation algorithms adapt the learning content according to the student's level and needs, increasing the effectiveness of the learning process. However, when implementing artificial intelligence-based systems, special attention should be paid to issues such as data confidentiality, algorithm transparency, and digital competence of educators. It is assumed that in the future, artificial intelligence algorithms will become the main mechanism for personalized learning in the education system.

Artificial intelligence is an effective tool for implementing personalized learning. It allows you to take into account the individual characteristics of each student, optimize the learning process and improve the quality of knowledge. In the future, educational systems based on artificial intelligence will become widespread and take the learning process to a new level. However, when implementing these technologies, it is important to take into account pedagogical, ethical and social aspects.

Artificial intelligence is one of the modern technologies that allows for effective personalized learning. This will make it possible to clearly determine the level of

students' education and create an individual learning trajectory. Systems based on artificial intelligence not only improve the quality of the educational process, but also facilitate the professional activities of teachers. However, when implementing these technologies, it is necessary to take into account issues of data security, ethical standards and digital competence of teachers. In the future, artificial intelligence and personalized learning are expected to become an integral part of the education system.

Conclusion. Thus, artificial intelligence algorithms play an important role in shaping a student's individual learning trajectory. They take the educational process to a new level by analyzing the learning data, adapting the learning content and forming individual recommendations. However, for the effective use of these technologies, it is necessary to comprehensively consider pedagogical, ethical and organizational aspects. It is expected that in the future, individual learning paths based on artificial intelligence will become a key element of the education system.

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