

## APPLICATION OF NEURAL NETWORKS IN EDUCATION

**Jamilova Maftuna**

*student of TUIT*

**Beknazarova Saida**

*Research Supervisor: Head of Department of the TUIT*

### **Introduction**

One of the directions in the development of information technologies is systems built on the basis of artificial intelligence theory, whose algorithms are far from the level of human thinking, but already surpass classical solutions that do not contain elements of artificial intelligence. Artificial intelligence technologies are becoming more and more deeply ingrained in our lives, and the modern world is unlikely to ever exist without their use. The increased attention to the problem of developing and using artificial neural networks based on artificial intelligence technologies is related to the successful use of neural networks not only to solve theoretical scientific problems, but also various specific applied tasks.

Modern trends in the development of informatization and the onset of the fourth industrial revolution have affected even the most conservative areas. The solution to tasks of identifying a person's identity, implemented through artificial neural networks, finds practical application in solving such tasks as protecting state and corporate information resources, robotics, access control systems, information retrieval, control systems, etc., and is already beginning to find application in the field of education.

The response of the education sector has been the emergence of the possibility of using neural networks. This rapid pace of development is driven by the fast pace of development in computer technology and the 2.0 industry. At this stage of human society's development, education faces a major task of producing specialists of a new formation: people with critical thinking skills and skills in working with large amounts of data, as well as motivated to the concept of continuous learning. In order to meet this requirement of the times, teachers have begun to search for new forms, methods, and concepts of learning that undoubtedly correspond to the principles and pace of work in new information realities. Considering the prospects for the growth of data volume, their processing and preparation for intelligent solutions have been entrusted to machines. The machine, being a complex hardware and software system, has its own characteristics, which are applied to varying degrees of success in the field of education.

### Main part

Neural networks are one of the most promising and rapidly developing areas of artificial intelligence. Neural networks are machine learning algorithms that model the workings of the human brain. They are used to solve various tasks, including in the field of education. Modern neural networks solve a wide range of tasks, such as visualization, decision-making, classification, and many others, whose methods of solution can be compared in complexity to the mechanisms of the brain's operation.

The main properties of neural networks are:

- Training of the network, generalization;
- Parallelism;
- Representation of information in a distributed form and further calculations;
- Adaptability;
- Moderate energy consumption;
- Contextual processing of information;
- Processing of erroneous situations.

Initially, the use of neural networks found its application in the analysis of large data sets and in solving problems of classification and clustering. However, with the development of technology and the increase in computing power, neural networks have become a promising tool in the learning process. This technological process allows for new heights to be reached in the creation of interactive and adaptive learning systems.

The use of neural networks in education allows for innovative methods of information processing. In this case, not only textual but also audio, graphic, and video information can serve as learning objects. This enables the creation of individual learning programs, analysis of individual problems of each student, and the creation of specific tasks to solve individual problems.

Currently, there are many systems for creating educational structures, among which artificial neural networks occupy a leading position. So, how is artificial intelligence used in education now? Several main directions can be distinguished:

**Personalized learning.** Neural network technologies allow solving the problem of personalizing education, which is relevant for modern education. They make it possible to create a learning system that can analyze data about each student and provide them with a personalized study plan based on this information. This helps students acquire knowledge at a pace that corresponds to their individual needs, taking into account their level of knowledge, learning speed, professional interests, and more. For example, the CogBooks application

uses neural networks to adapt educational plans to the level of knowledge of each student; the Carnegie Learning platform's MATHiaU algorithm tracks students' actions and progress, provides feedback on assignments, alerts the teacher in real-time when the student needs help. All of this helps identify where difficulties arise for a particular student or class and correct the situation. Other algorithms show where improvements can be made to the curriculum. For example, Coursera tracks frequently answered questions incorrectly and transmits this information to course authors who can modify phrasing or provide additional explanations. Students receive hints for the correct answer.

**Adaptivity of the learning program.** During the learning process, the neural network collects information about the performance and learning pace of a specific student. Based on this information, the neural network can suggest certain materials and tasks to help the student better cope with their current educational problems, provide more effective feedback, and reduce the time spent on testing. It may also include intelligent tutor technologies used to teach programming skills, programming languages, or mathematical problems. These tutors adapt to the individual level of students' learning achievements and learn from them using contextual data such as their abilities and learning style.

**Predictive analytics:** Neural networks can be used to predict future student outcomes based on their historical data. This allows teachers to identify which students need additional support and which performance levels need to be focused on.

**Natural language processing:** Neural networks can be used to create systems that can analyze natural language and help students with questions and answers in real-time. Another example is the use of natural language processing in automated essay grading systems, where neural networks are used to analyze the content and quality of student essays.

**Automated assignment grading:** Neural networks can also be used for automatic checking of assignments and tests. For example, the Gradescope program allows for automatic grading of typical assignments across different subjects in schools and universities, saving significant time for teachers.

**Identifying student abilities and talents:** Neural networks can be used to identify unique abilities of students and adjust learning according to those abilities. For example, the TALENT project uses neural networks to determine student talents in music, sports, and other areas. This can be helpful for teachers in choosing teaching methods and developing educational programs.

**Analyzing students' emotional state:** Neural networks can be used to analyze the emotional state of students and adjust the learning environment.

accordingly. The Emotion Sensor application uses neural networks to determine the emotional state of students during learning.

**Automatic translation:** Neural networks can be used for automatic translation of different languages. This helps students to learn a language without the cost of lessons with a teacher. For example, Google Translate and Yandex.Translate services use deep neural networks to translate text, sound, and images.

**Development of soft skills.** Scientists believe that such technologies help to improve creativity, critical thinking, and even communication skills. Students can draft essays with the help of neural networks, and then write the essays themselves by hand - this helps to better understand the literary work.

Finally, neural networks can be used to analyze large volumes of data in order to identify trends in education and improve learning systems as a whole. This can be useful for developing new teaching methods and improving the quality of education overall.

### **Conclusions**

In general, the use of neural networks in the educational process has significant potential to improve student outcomes and create a more personalized and effective learning experience. It can significantly enhance the efficiency of learning and provide students with a more individualized approach to education.

Currently, artificial intelligence is one of the main topics in the information world. Neural networks can draw, compose poetry, and even help write a thesis. The use of neural networks allows for the creation of effective learning programs that can reduce the time required for learning. This increases the efficiency of learning and retention of material. Students, schoolchildren, and everyone who learns and teaches are given tools that can change the entire field of education.

In conclusion, it should be noted that currently there are no conceptual solutions for the use of neural networks in the educational process, but the problem statements that we have provided for the use of neural networks in this area are a weighty basis for their future application.

However, it is necessary to take into account that the use of neural networks in education also has its limitations and disadvantages. For example, they can be expensive to develop and require highly skilled specialists to create and maintain them. Additionally, some students may prefer more traditional methods of learning and not have access to modern technologies.

## REFERENCES:

1. Гусев, М. А. (2018). Применение нейронных сетей для анализа и классификации многомерных данных. Компьютерные исследования и моделирование.
2. Чупакова, А.О. Разработка и обучение модели искусственной нейронной сети для создания систем поддержки принятия решений // Вестник АГТУ. Серия: Управление, вычислительная техника и информатика.— 2020.
3. Л. Л. Высоцкий, В. А. Охонин, Н. А. Садовская —Нейросетевые методы анализа и коррекции результатов аттестации|| <http://www.bytic.ru/cue99M/etb5uiyy.html>
4. А. Н. Салов —Вопросы практического применения интеллектуальных систем на основе нейронных сетей|| <http://www.bytic.ru/cue99M/cdhil7yijd.html>
5. И.А. Вагеник, М.Ю. Мартынов, А.А. Пивоваров —Использование нейронных сетей в образовании и науке||
6. Вай Ян Мин. Применение нейронных сетей для контроля и прогнозирования результатов учебного процесса в вузе [Электронный ресурс] / Вай Ян Мин. – Режим доступа: <https://elibrary.ru/item.asp?id=32532190>.