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THE WORKING PRINCIPLE OF ARTIFICIAL NEURAL NETWORKS AND THEIR ROLE IN SOCIETY.

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Annotation. *The article analyzes the principle of operation of artificial neural networks and their role in society. Artificial neural networks are technologies that model the activity of the human brain and are widely used in complex data processing, decision-making and forecasting. The article explains the basic principle of operation of artificial neural networks, namely the process of processing and learning incoming data through neurons. It discusses how artificial neural networks are used in various areas of society - economics, healthcare, education, transport and everyday life - and their social impact.*

Key words: *Artificial neural networks, human brain activity, model, technologies, complex data processing, decision-making, forecasting, economics, healthcare, education, transportation, social impact.*

Аннотация. *Аннотация. В статье анализируется принцип работы искусственных нейронных сетей и их роль в обществе. Искусственные нейронные сети — это технологии, моделирующие деятельность человеческого мозга и широко используемые в сложной обработке данных, принятии решений и прогнозировании. В статье объясняется основной принцип работы искусственных нейронных сетей, а именно процесс обработки и обучения входящих данных посредством нейронов. Обсуждается, как искусственные нейронные сети используются в различных областях общества — экономике, здравоохранении, образовании, транспорте и повседневной жизни — и их социальное влияние.*

Ключевые слова: *Искусственные нейронные сети, деятельность человеческого мозга, модель, технологии, сложная обработка данных, принятие*

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решений, прогнозирование, экономика, здравоохранение, образование, транспорт, социальное влияние.

Their positive impact on society and the ethical and social problems that arise with the development of technology are discussed. The article highlights the importance of artificial neural networks in the development of society and the need for their careful use.

Artificial neural networks (ANNs) are one of the key technologies in the field of machine learning and artificial intelligence, and are systems that model the functioning of the human brain. These networks work in a similar way to the working principle of human brain neurons, that is, incoming information is transmitted through neurons, processed and results are output. In recent years, ANNs have begun to play an important role in technological developments and social processes. Their role in society is very wide, and major changes have occurred in a number of areas, from economic development to medicine, education and creating conveniences in everyday life. This article examines the working principle, development and role of ANNs in society, as well as their social and ethical impact.

Working Principle of ANNs. An ANN is a system consisting of many neurons that are interconnected and learn by processing some information. The main parts of the network are:

Neurons: In an artificial neural network, each neuron receives input signals, processes them, and produces output signals. Neurons are made up of many layers.

Input layers: The network begins to receive input data. In this layer, the data necessary for the network is input.

Hidden layers: In this layer, neurons process the data. In this process, neurons identify and learn relationships between data.

Output layers: The results obtained through the hidden layers become the final output, which is presented to the user as a decision or prediction.

Training process: The neural network detects errors and adjusts weights during the training process. This process increases the efficiency of the network by analyzing

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the data. During the training process, the network adapts and learns based on the existing data.

The training process of an artificial neural network is often carried out using the "gradient descent" algorithm. With this algorithm, the neural network updates the weights to reduce errors and achieve the best model.

Role of Artificial Neural Networks in Society. Artificial neural networks are used in many areas of modern society, and their role is increasing day by day. The following is a review of the impact of artificial neural networks in some key areas.

Economy and Industry. Artificial neural networks play an important role in increasing efficiency and developing automation processes in the economy. They provide automatic decision-making in production systems and management. For example:

Automated manufacturing: Neural networks help in controlling and optimizing production processes. Robotic systems effectively control production processes using artificial neural networks.

Forecasting: Economic analysts and investors use artificial neural networks to forecast the market, determine prices, and manage risks.

Credit and financial system: Banks and financial institutions use neural networks to process credit applications, detect fraud, and develop forecasts about customers.

Healthcare. Artificial neural networks are revolutionizing healthcare. The application of networks in medicine is particularly important in improving diagnostics and treatment. For example:

Disease detection: Neural networks are used to analyze medical images (X-rays, MRIs, CT scans). They are effective in detecting diseases, including cancer, at an early stage.

Personalization: Networks analyze patient data and help develop personalized treatment plans.

Pharmaceuticals: Artificial neural networks are used to speed up the process of creating new drugs and conducting clinical trials for them.

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Education. Artificial neural networks in education help individualize the learning process. They are used in:

Personalized learning: Neural networks can provide students with educational programs tailored to their individual needs.

Analysis and Assessment: Analyzing student learning outcomes, identifying their strengths and weaknesses, and providing personalized support.

Educational Platforms: Online learning systems (Coursera, edX, Khan Academy) are trying to improve the interactive experience of users by using artificial neural networks.

Transportation and Logistics. Transportation and logistics systems also make extensive use of artificial neural networks. They include:

Autonomous Vehicles: Vehicles such as cars and drones use artificial neural networks to choose their own paths, detect obstacles, and navigate safely.

Traffic Management: Neural networks help manage the traffic network across cities and regions, which reduces traffic congestion and helps save time.

Artificial Neural Networks in Everyday Life. Artificial neural networks are also used for various purposes in everyday life.

Personal Assistants: Artificial assistants such as Siri, Google Assistant, and Alexa help users with everyday tasks, such as making calls, creating reminders, listening to music, and more.

Advertising and Marketing: Social media and online platforms use artificial neural networks to deliver personalized ads and content to users.

Artificial neural networks are a technology that is pervasive in society and is revolutionizing many areas. From economic development to healthcare, education, transportation, and everyday life, these networks are benefiting society. However, along with their development, ethical and social issues are also emerging. Artificial neural networks need to be managed and controlled to ensure their effective and safe use.

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