PROSPECTS FOR THE APPLICATION OF ARTIFICIAL NEURAL NETWORKS IN CONTROL SYSTEMS

Ulug'murodov Elshod Abdusalim o'g'li
Student Karshi Institute of Irrigation and Agrotechnics at the National Research University "Tashkent Institute of Irrigation and agricultural Mechanization Engineers"
ulugmurodovelshod2001@mail.ru
Sayfullayev Sirojjon Ikrom o'g'li
Student Karshi Institute of Irrigation and Agrotechnics at the National Research University "Tashkent Institute of Irrigation and agricultural Mechanization Engineers"
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Abstract. This article provides information about the research conducted in the study of artificial neural networks and also, artificial neural network training methods and training algorithms are covered.

Key words: neural network, artificial neural networks, artificial intelligence, perceptron, genetic algorithms, initialization, algorithm, deterministic method,
biological neurons, formal neurons.

Access. The rapid development of information technology, the use of all sectors of life, means that it is impossible to imagine something small that is not equipped with information technology today. At the same time, there is a growing need to develop new smart systems to support management decisions and adapt them to the most dangerous spectrum of possible conditions. The most promising direction is the use of neural networks. [1]

The concept of "neural networking" was formed in 1943 by V. McCullox and V. Pitts in an article on the logical calculation of nervous activity. The neural network is a mathematical model, as well as its integration, the establishment and operation of its biological networks. [2]

Research materials and style. A neural network is a set of neurons that interact with concepts. A neuron is a minimum computational unit, which, when it receives information, performs calculations on it and gives the result. Neurons are divided into three main types: input -- gets preliminary data, secret -- account -- performs books and reflects the output result. According to the goal, neurons are divided into layers. The synapse, as mentioned above, is the connection between two neurons with a "weight", due to which the information changes when moving from one neuron to another. [3]

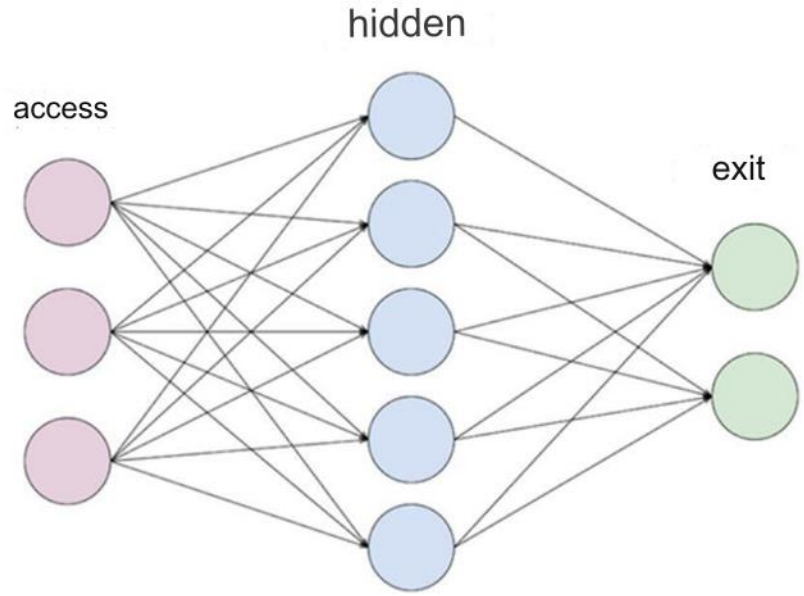

Fig 1. Schematic depiction of neural network structure

The scope of neural networks is very diverse. At the same time, each of the existing neural networks belongs to the stated goals and tasks as well as does not deviate beyond the specified limits, only developing in that direction.

For a neural network to perform its functions, it needs to be programmed. The process will have to change the internal parameters of the bond between neurons in layers known as weights.

One of the most common methods of training is training with the Gaus method. Neural networks are provided with interconnected input data and output values. In this case, the weight gained from the study is corrected on the basis of a mistake between the obtained and the expected results. The goal of such a exercise is to minimize this error so that the neural network produces the most accurate result. [4,5]

Non-program training is another method of action that is usually used to solve relationships within a learning pattern or picking problems that need to be found in the initial information. In this case, the neural network will spontaneously distribute weights until the algorithm stabilizes and their values stop changing. In such an exercise, a neural implies that the network has produced the correct result and needs to change input data or weight function.

Analysis and results. Neural networks are used in integrated differential (PID) regulators that are proportional to the regulator itself building and the structure of the regulator's piD coefficients adjustment block.

Unlike the noravshan linguistic regulator, when using a neural network, the regulator does not require the formation of rules —it is enough to adjust the regulator several times in the process of training the neural network.

Network training procedures are the hardest part of creating a regulator. The training involves determining the unknown parameters of neurons. For learning, gradient search techniques are usually used for minimal criterion function, which depends on the parameters of the neuron. [6,7]

A major obstacle in installing the Pid regulator using neural networks is the continuity of the learning process, which can occur in the way neural networks are widely used in Pid regulators. Neural networks cannot predict regulatory errors that are not taken into account in the learning process.

Neural networks can be used even in areas related to human health. Trained neural networks are very helpful in the use of bioproteses in humans with disabilities.

Bioprotezes are a technical device that is directly connected to the human body and can respond to brain impulses. When ensuring the movement of the limbs, it is necessary to give tension to certain muscles. Electropotential databases are used to respond to this voltage. The signal is then transmitted to the established microcontroller that processes it, and the behavior a person is trying to take is taken. The longer the databases, the more the prosthetic will be able to move, and the harder it will be to control. For this, neural networks come to the aid.

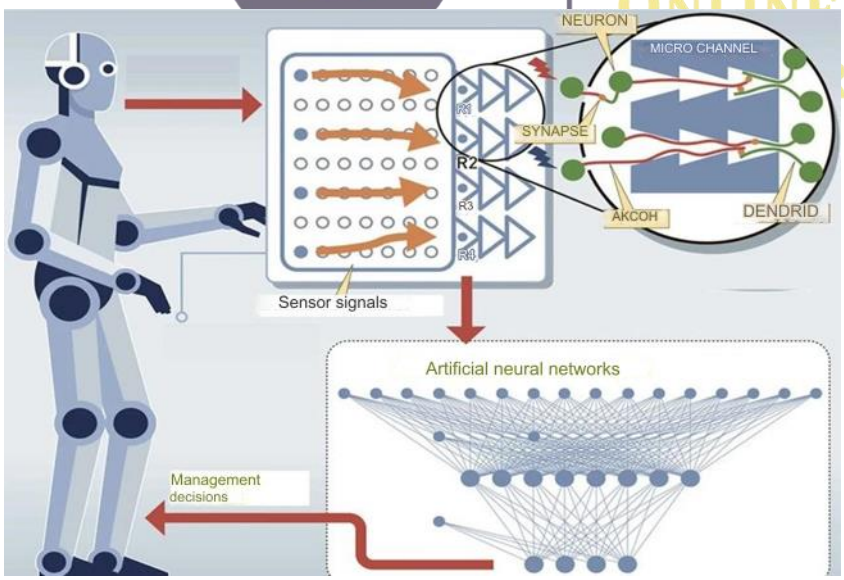

Fig 2. The application of artificial neural networks in the management of bioprotezes

The neural network is able to predict the necessary actions based on received signals, allowing it to accelerate the connection between the brain and the prosthetic's reaction, as well as identify the necessary movements depending on its state. [9] For example, a person wants to take a glass-for that you need to

squeeze the split muscles, put the bioprosthesis in the right place and bring it to the glass. If you connect a neural network and a camera to a task, it can predict a desire to move ahead, adjust the desired position and even figure out by what power to perform the compression so as not to crush a plastic glass or hold fast to a tighter product.

You also make it easier to use and design prosthetics, starting with universal variations to suit the owner, using a learning neural network. For example, foot bioproteces that return a person at a certain angle with a certain force. Given the differences in walking and body parameters, over time the muscles and skeleton can suffer from the wrong loads and the prosthetic will wear out. To prevent this from happening, you can build a neural network that will learn how to bend the foot correctly during a walk with usage time, how many degrees to turn it, how quickly to change these parameters depending on the speed of movement.

Workflows in medical institutions are inextricably linked to the collection, processing and analysis of various medical images, such as X-rays and computer tomography. Therefore, neural networks working with images are one of the promising areas for medical diagnosis of pathologies.

Using the ability of neural networks to identify images, solutions are created to diagnose cancer spots by detecting and analyzing them through images. There are neural networks trained in a large enough sample of histological images that determine the type of cancer with ~97% accuracy. [8]

As an example of a working solution, one can cite Israel's artificial neural networks that help doctors diagnose strokes and a system based on big data technology- MedyMatch Technology. To do this, the real-time system compares a patient's brain image with thousands of other pictures located on its servers. Thanks to this, the system can track minimal deviations from the norm in the results of computer tomography. Thus, the system reduces the amount of diagnostic errors.

Also in medicine, neural networks are used to find new drugs. In 2019, the Massachusetts Institute of Technology conducted in-depth studies on antibiotics using neural networks, the results of which are Su

3327 discovered the antibacterial properties of the chemical compound, which was later called Khalitsin.

Conclusions & Suggestions

At the same time, artificial neural networks and their development issues are considered one of the most studied and criticized issues. However, it is growing

at a specific speed and margin. (Matthew 24:14; 28:19, 20) Jehovah's Witnesses would be pleased to answers with you. Yet neural networks are already in control systems,

(images) are successfully used in home roller coaster work.

Predictability and diagnosis in the healthcare system, that is, in places where traditional calculations are very difficult, is very successful. Unfortunately, optimal solutions for such problems have not yet been adequately found. Comparative study of various approaches (including without the use of neural networks) does not lead to definitive conclusions. Clearly, in such a situation it is necessary to maximize their advantages to understand the capabilities, necessary conditions and scope of all available approaches and further develop intellectual systems. Such actions require the creation of completely new algorithms that combine artificial neural networks with other technologies.

Literature:

1. Neural Networks and Neurocontrollers. Textbook / M. V. Burakov. St. Petersburg, SUAI Publ., 2013. - 284 p.: ill
2. Neural Network Technologies of Data Processing: Textbook / V. A. Golovko, V. V. Krasnoproshin. - Minsk: BGU, 2017. — 263 p. — (Classic University Edition).
3. Gulyamov, S. S., Shermukhamedov, A. T., & Khayitmatov, U. T. Experience in the development of artificial intelligence in China.
4. Rakimov, Q., / son Sotvoldiev, A. D. (2022). Trends in the application of machine learning and artificial intelligence in practical fields. youth, science, education: topical issues, achievements and innovations, 1(5), 85-91.
5. Abdullayev H.H., Qalandarov P.I. Study on signs of defects in the image of the surface of flatrolled products E3S Web of Conferences 304, 02013 (2021) pp. 1-5.
6. Abdullayev H.H., Qalandarov P.I. Features of the technology of anaerobic processing of biotails using humidity control devices IOP science (IOP Publishing), 2022 IOP.
7. Abdullayev H.H. Modeling, forecasting of systems in the process of biogas production Journal "Sustainable Agriculture" №3(15).2022. Toshkent, - Pp. 36-
8. 38.
9. Ubaydullayeva, D., Ubaydullayeva, S., & Usmonov, J. (2022, June). The development of electronic educational resources is an important step towards the digitalization of the agricultural economy. In AIP Conference Proceedings (Vol. 2432, No. 1, p. 040022). AIP Publishing LLC.

10. https://cyberleninka.ru/article/n/sun-iy-neyron-tarmoqlarini-o-qitishusullari