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APPLICATION OF NEURAL NETWORKS FOR THE OPTIMIZATION IN USING OF ALTERNATIVE ENERGY SOURCES PROCESSES

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Power supply systems in Ukraine, having taken a course towards energy efficiency, are today being repurposed into combined structures with centralized and autonomous parts of the power supply. In connection with the spread of the use of alternative energy sources, including autonomous types in a complex of centralized power systems, the problem of forecasting electricity parameters against the background of multifactorial operating conditions becomes urgent, because the forecasting results are the basis for the formation of effective management decisions. Today, the field of energy supply requires human control, but the large number of factors that affect the indicators does not allow efficient and accurate processing of the received data. The development of forecasting tools involves the

accumulation of information, analysis, and the identification of patterns and trends. The results of energy efficiency forecasting can be used to predict new situations and problems that need to be solved.

Since in connection with scientific and technical progress, the latest technologies are being introduced in the industry, which, in turn, requires an increase in the reliability and quality of power supply, the development and improvement of systems for forecasting electricity parameters based on neural networks is an urgent direction.

Neural networks are mathematical models that mimic the way the human brain works, allowing machines to learn from data. They can recognize patterns, process speech, make predictions and much more. A neural network is a non-linear system, which makes it possible to classify data much better than any linear methods. A system based on such a powerful mechanism will be able to obtain results based on hidden patterns. The most important advantage of such a system is the absence of the need for its programming - the neural network "learns" on the basis of a huge training sample, which distinguishes it from an expert system.

The use of such an approach is motivated by the similarity to successfully functioning biological systems that work on a large scale in parallel and, which is their absolute advantage, have the ability to learn. One of the results of the training procedure is the ability of neural networks to generalize and associate data. After successfully training a neural network, you can find adequate solutions for similar tasks of the same class that were not clearly defined during the training process. This leads to a high degree of fault tolerance for changes in input data. Prediction using neural networks can be used to find outliers or values, that stand out significantly from the stream of statistics.

There are a large number of developed neural networks and the choice of the most appropriate one depends on the specific task, type of data or its volume. In general, neural networks can be conventionally divided into feedforward networks and feedback networks.

Direct distribution networks include:

- Perceptron;
- MLP (multilayer perceptron);
- Radial basis function network;
- Cascade-correlation networks;
- ADALINE.

Feedback networks are divided into:

- Counterpropagation Neural Network
- SOM, Kohonen networks;
- Associate memory network, Hopfield networks;

- Elman networks;
- ART networks;
- Stochastic networks (Boltzmann machine);
- Time Delay networks.

Multilayer perceptron (the task of forecasting energy consumption) and the Kohonen network (the task of building a customer profile of energy consumption) are best suited for solving typical problems of the electricity market.

The use of neural networks can help improve the efficiency of resource use, which in turn will help reduce costs and reduce the negative impact on the environment, contributing to a more efficient solution to many challenges in the energy sector, such as:

Management of energy systems. For example, to analyze data related to energy consumption and production, optimize management processes to increase efficiency and minimize costs. In particular, neural networks can automatically control the production of energy, manage the load and distribution of energy in the network. With the development of renewable energy, the question of its effective management by analyzing weather conditions, forecasting the production of energy by wind turbines or solar panels becomes relevant.

Optimization of electricity production. For example, by forecasting the dynamics of energy consumption through the analysis of relevant data at different levels (quarter, district, city). Based on this prediction, neural networks can detect equipment inefficiencies, predict its failure or, for example, offer recommendations for optimizing energy consumption, such as using alternative sources of energy generation.

Forecasting the demand for electricity. One of the key directions of using neural networks is forecasting the demand for electricity. By analyzing large volumes of data, neural networks can predict peak loads, changes in demand depending on the season, day of the week or even time of day.

An example of the use of neural networks in energy is a project created by Google DeepMind in collaboration with National Grid, a British company that manages energy systems. This project uses neural networks to predict the next day's energy consumption. Based on this forecast, National Grid can better allocate energy consumption, which helps minimize costs and reduces the load on the power grid.

In conclusion, it can be noted that neural networks open up new horizons for the energy industry. They make electricity production more efficient, reliable and environmentally friendly. Thanks to them, we can

count on a stable energy supply in the future and protect our planet from negative human influence.

The involvement of such a variety of information technologies is a possible basic option for building the structures of intelligent control systems and management of combined types of power consumption systems. Their application will improve the quality of power supply management of various industrial facilities, will provide multifactorial forecasting of the state of electrical energy parameters of the components of power supply systems - autonomous power sources, which, in turn, will improve the predictability of the generated power of energy sources over time.

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ОПТИМІЗАЦІЯ ТРИВАЛОСТІ НАВЧАЛЬНОГО ВІДЕО ДЛЯ МАКСИМАЛЬНОГО ЗАСВОЄННЯ ТА ЗАЦІКАВЛЕНОСТІ

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В умовах стрімкого розвитку дистанційної освіти та широкого впровадження відеоматеріалів у навчальний процес особливої актуальності набуває проблема оптимізації тривалості навчальних