

**NEURAL NETWORKS AS A MODERN TREND IN THE DEVELOPMENT  
OF MANAGEMENT, MARKETING AND THE TOURISM INDUSTRY**

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*Annotation.* The article contains the ways of using neural networks in management, marketing and the tourism industry, the main methods of machine learning, the pros and cons of using neural networks in various activities, a description of the development and areas of application of neurotechnologies in the Republic of Belarus at the present stage.

*Keywords:* neural networks, neuro technologies, artificial intelligence, self-learning, learning with a teacher, learning without a teacher.

Looking through the news on various websites, social network groups and on YouTube, we constantly come across entries about neural networks. The topic of neural networks is undoubtedly a trend now. The boom causes apprehension among some and enthusiasm among others. Humanity has again created a technology that can change the world, it is even difficult to guess how much. But I can assume that humanity is ready for the appearance of real artificial intelligence, since for more than a century humanity has been discussing its appearance.

I have set myself a number of questions:

How can neural networks be used in management, marketing and tourism?

Have neural networks played any role in the above areas at the moment?

How to use neural networks for decision-making?

How to train them, how laborious and costly it is?

According to what principle neural networks work?

How neural networks differ from conventional programs that work according to given clear algorithms?

Why the neural network boom happened right now?

Can neural networks replace a person?

Why did the neural network boom happen in a relatively recent time?

To train neural networks, an unimaginably large amount of information was required, which was not available at an older stage.

There were no powerful supercomputers that could train neural networks fast enough.

Now scientists have much better understood the learning process, which made it possible to create "deep learning" neural networks, which expanded the scope of their application

The fundamental advantage of neural networks is that they can be self-learning. This means that they do not need to be programmed using the traditional method, but at the same time they will learn from past experience and make fewer and fewer mistakes in the future. This is expressed in the ability of neural networks to learn and remember, including informally, like a real brain. There are two ways to train a neural network: "learning with a teacher" is a controlled method, and "learning without a teacher" is an unmanaged method. Two types of algorithms are selected for network training: managed, "training with masters", and unmanaged, respectively, "Training without masters". Training data is taken from all existing sources. Most often, it is training with a master that is used. [1, p. 78]

Mathematical statistics are necessarily involved in the training. At the same time, the principle of operation of neural networks is fundamentally different from conventional algorithms. The activity of neural networks is so far a severely curtailed programmatic expression of the activity of the real human brain. They easily solve complex tasks that require intelligence, and the algorithm only performs the necessary sequence of actions. As a result, we get a convenient tool with which you can partially or fully automate many tasks that a company may face.

How can we use neural networks in management, marketing and tourism?

Firstly, neural networks are excellent forecasters. They easily find dependencies, so they easily cope with such tasks. For example, they can predict the volume of demand for a product, predict sales, customer behavior, can tell us whether the company is reliable, or how soon it will go bankrupt, can predict changes in the stock price, and also determine whether the customer is sufficiently solvent to apply for a loan.

Secondly, neural networks are suitable for solving problems of economic analysis. For example, they can be used to quickly classify customers into risk groups for providing them with services, issuing a loan.

Thirdly, neural networks perform well in clustering in marketing.

Fourth, neural networks can analyze, recognize marks in paper questionnaires and transfer them to electronic form, as well as classify calls to technical support.

Fifthly, with proper preparation, they plan the use of material, labor and financial resources.

Sixth, the possibility of accessing the neural network is really forced in the light of the fact that only with the help of it it is possible to take into account unstable changes in customer requests and their preferences in the tourism sector.

Seventh, neural networks have learned how to optimize advertising companies, as well as analyze their effectiveness for making further decisions.

Eighth, Neural networks are able to generate highly intrusive personalized content.

Ninth, Neural networks at the highest level make up personalized advertising. For example, a company selling eyeglass frames decided to conduct an advertising campaign, and a neural network was used to implement it. The neural network analyzed the photos of Vkontakte users, then, to users who had people in glasses in the photo, ads were sent. This made it possible to increase the effectiveness of advertising many times.

Tenth, a lot of neural networks that are in the public domain help to brainstorm for an approximate visualization of the idea of a logo, a mascot or even an advertisement.

The system of neural networks is particularly interesting in the management of organizations and in the creation of strategies. Economic, social, financial systems are very complex systems, I think it is unrealistic to create a mathematical model taking into account all the actions of various people who make up all these systems. And it is also impossible to create a model with all the details with the parameters of maximizing utility or minimizing losses. [2, p 15]

In such complex systems, it is best to use models that can model the behavior of society much more easily and faster than others. And these models together will be a neural network. The total mass of management tasks are identical to other spheres of human life.

Directors of firms incorrectly estimate losses from suboptimal production planning. Supply and demand depend on many factors, as well as the agenda, so production is difficult to optimize. Even in such situations, neuro technologies can be applied along with conventional types of research.

Next, I would like to provide information about large companies that use the advantages of neural networks in their activities:

Amazon and Alibaba use neural networks to classify customer preferences so that the recommendations section works much better than ever before. They also created a virtual assistant for Alex. A network of offline stores has made a lot of noise completely without any cash registers: regular ones with a cashier and self-service. Purchases in such stores are automatically tracked and paid directly from the card linked to the account.

Apple uses neural networks in its voice assistant Siri, as well as the Face ID facial recognition system.

It is important to mention that YouTube's profit, like Amazon's, has grown significantly after the introduction of a new recommendation selection system. Bank clerks of JPMorgan Chase & Co. we used neural networks in our activities – now the AI processes applications in a couple of seconds.

In the CIS, Alice, the voice assistant immediately comes to mind. She is able to build a meaningful dialogue, perform a voice search, plot a route, turn on music, call a taxi, order food. But Yandex's functionality is not limited to this: for example, it can translate videos from any language into Russian in real time, while the translated subtitles will be read out by a virtual announcer.

In the Republic of Belarus, probably every second person has heard the news about the introduction of neuro technologies into medicine: neuro technology is able to diagnose asymptomatic pneumonia from digital images with an accuracy of 92%. To detect the disease, the neural network was trained on more than 260 thousand images.

As for the tourism industry in the Republic of Belarus, neuro technologies are widely used to create local routes, the use of the latest technologies has made it possible to simplify work with large volumes of materials, to build more routes. In particular, neuro technologies improve materials for online tours.

Due to the complexity of data collection and classification, the lack of specialists with the necessary level of knowledge and outdated business models, large neural network models are not widely used in Belarus yet, the growing demand and supply for the introduction of simple neuro technologies already exists. I used "so far" not only because all directions in our world are constantly developing, but also because a large number of news, comments on them, the general noise around the topic of neural networks shows a high level of interest and confidence of entrepreneurs in this topic, moreover, they are ready to introduce artificial intelligence into work processes. The introduction of artificial intelligence, despite the high cost and complexity of implementation, pays off extremely quickly, provided that you need competent intelligent processing of huge amounts of data and their analysis. [3, p. 82]

Thus, I came to the main conclusion: neuro technologies should be modernized and applied in marketing, management, and the tourism industry in the Republic of Belarus;

All the examples show the following:

Neuro technologies can be applied in a wide range of areas.

The use of neuro technologies in areas in which they are not yet used is a matter of time, this has happened with all popular technologies without which we cannot imagine life - the Internet, computer, telephone, and so on.

The introduction of nanotechnology into firms is a very labor-intensive business, and also extremely expensive, in addition, it is necessary to reach this psychologically. But it is logical to assume that a company that has applied nanotechnology in its activities, with proper handling of them, will definitely pay off all investments; as a result, it will reach a perfect high level of development.

To summarize, it should be noted that the study of neuro technologies is really an urgent topic today. Humanity is obliged to move in this direction, we need to develop them and learn how to use them correctly. Fortunately, for now neural networks cannot completely replace a person who solves various problems much more correctly.

## References

1. Bakanov, M.I. Theory of economic analysis / M.I. Bakanov, A.D. Sheremet. - M.: Finance and statistics, 1997.
2. Galushkin, A. I. Neurocomputers. Textbook / A.I. Galushkin. - M.: Alliance, 2014.
3. Latypova, Ramilya Neural networks / Ramilya Latypova. - M.: LAP Lambert Academic Publishing, 2012.