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## **USING REFLECTION MECHANISMS TO INCREASE THE LEVEL OF COGNITIVE PERFORMANCE OF NEURAL NETWORKS**

In the last decade, cognitive methods of analysis, diagnostics, forecasting and modeling for the research of large-scale systems operating under various types of uncertainty, as well as for managing the development of situations in these systems, have become increasingly widespread. The purpose of cognitive analysis of such systems is either to find out the mechanism of functioning of the system (the mechanism of phenomena and processes occurring in the system), or to predict the development of the system, or to control the system, or to determine the possibilities of adaptation of the subject to the existing system, or to solve all these problems. At the same time, the issues of cognitive synthesis have not yet been considered separately, although the results of the cognitive analysis of complex systems actually lead the researcher to results that can be interpreted as the synthesis of systems with the desired properties. The process of cognition (cognition) of a large system with the help of the developed tools is included in the metamodel of object research. All these features of the cognitive methodology allow us to attribute it to intelligent technologies, on the basis of which it is possible to develop intelligent decision support systems. Thus, the development of cognitive methodology is seen in the direction of the development of methods of cognitive synthesis and the development of intelligent information management systems, which contain intelligent modules built on the basis of this methodology and using the principles of distributed multiprocessor computing systems. When designing such systems, it is proposed to use the advantages of distributed information and control systems.

Currently, cognitive modeling is understood as the solution of interrelated system problems of cognitive analysis and synthesis. Cognitive analysis: development of a cognitive model; analysis of the paths and cycles of the cognitive model; analysis of the stability and possibility of disasters, etc.. Cognitive synthesis: based on the data of cognitive analysis, the solution of problems of decomposition and composition of the model, the solution of inverse problems, optimization, synthesis of a system with specified properties: from simple cognitive structures, by decomposition or completion of the original structure; decision-making is performed.

The most promising basis for model-based cognitive analysis is artificial neural networks (ANNs). However, it should be noted that today it is difficult to

fully determine the level of their cognition, as well as the internal processes and features that affect it.

Until researchers have enough knowledge to reproduce at least fragments of consciousness in the ANNs, such as reflection, neural network systems will remain just an apparatus for approximating complex functions. In this case, we will consider reflection

– in a broad sense, as a reflection of the external world, available for mental manipulation;

– in a narrow sense, as an internal representation of yourself and your actions.

However, part of the reflection can be provided by the use of self-learning mechanisms (unsupervised learning or reinforcement learning) and recurrent properties. Then, such states are arranged in complex scenarios (plots), reflecting in some way the previous experience, but do not repeat it directly. The next stage may be the use of training methods with a generative component. Thus, by competing and transmitting the current state of another neuromodel, networks can achieve better results at the stage of parametric synthesis based on the use of a system of rewards and penalties.

Further, based on the results of the study, it is planned to create a multi-layer perceptron, as one of the simple models of neural networks with high computational abilities, which is capable of learning and extracting important features from the input data. Its role will be the compression of visual information and orientation in the virtual space. It is assumed that when combining a multilayer perceptron with a recurrent neural network, it will help the latter to form an internal representation of the external world within its structure as a necessary condition for the emergence of reflection.

## REFERENCES

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