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CHAPTER 5

SCIENTIFIC-METHOD APPARATUS FOR IMPROVING THE EFFICIENCY OF INFORMATION PROCESSING USING ARTIFICIAL INTELLIGENCE

ABSTRACT

In this section of the research, a scientific and method apparatus for increasing the efficiency of information processing using artificial intelligence is proposed. The basis of this research is the theory of artificial intelligence, namely evolving artificial neural networks, basic genetic algorithm procedures and bio-inspired algorithms.

During the research, the authors proposed:

– the method of parametric optimization based on the improved wolf flock algorithm;

– the method of parametric evaluation of the control object based on the improved firefly algorithm;

– the method of finding solutions using the improved locust swarm algorithm;

– the method of finding solutions using the improved emperor penguin algorithm.

As a criterion for the efficiency of the specified scientific and method apparatus, the promptness of decision making regarding the parametric control of the state of the object with the given reliability was chosen. This makes it possible to create a hierarchical description of a complex process by levels of generalization and conduct an appropriate analysis of its state. The use of the proposed scientific and method apparatus will allow:

– to reduce the probability of premature convergence of the algorithm;

– to maintain a balance between the convergence speed of the algorithm and diversification;

– to take into account the type of uncertainty and noisy data;

– to take into account the available computing resources of the state analysis system of the analysis object;

– to take into account the priority of search by flock agents;

– to carry out the initial display of individuals taking into account the type of uncertainty;

– to conduct accurate training of AS individuals;

– to conduct a local and global search taking into account the degree of noise of data on the state of the analysis object;

– to apply as a universal tool for solving the task of analyzing the state of analysis objects due to the hierarchical description of analysis objects;