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CHAPTER 1

THE METHOD OF SELF-ORGANIZATION OF INFORMATION NETWORKS IN THE CONDITIONS OF DESTABILIZING INFLUENCES

ABSTRACT

In this chapter of the research, a method of self-organization of information networks in conditions of destabilizing influences 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.

In the course of the research, the authors proposed:

– mathematical model of information conflict of information networks. The advantages of the specified model are due to take into account a greater number of destabilizing factors, compared to the known ones. The model takes into account in the complex deliberate interference of an additive and multiplicative nature, destabilizing factors due to the presence of cyber attacks;

– the method of self-organization of special purpose information networks. The novelty of the method consists in the use of additional and improved procedures that allow: to take into account the type of uncertainty and noisy data; to implement adaptive strategies for finding food sources; to combine individual swarm search strategies into a single strategy; to take into account the presence of a predator while choosing food sources; to take into account the available computing resources of the system while implementing self-organization of information networks; to change the search area by individual agents of the combined algorithm swarm; to change the speed of movement of agents of the combined algorithm swarm; to take into account the priority of searching for swarm agents of the combined algorithm; to carry out the initial display of individuals of the flock of the combined algorithm, to take into account the type of uncertainty; to carry out accurate training of individuals of the flock of the combined algorithm; to determine the best individuals of the flock of the combined algorithm using an advanced genetic algorithm;

– improved method of complex management of information network resources. The specified method allows: to determine the influence of destabilizing factors on the information network, to describe the information network of different architecture.

KEYWORDS

Information networks, self-organization, multi-agent systems, information conflict, reliability and adequacy.