AN APPROACH TO DECODING CODES USING SWARM INTELLIGENCE FOR MEDICAL DIAGNOSTIC TASKS

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The evolution of science and technics has allowed to create a wireless body area sensor networks (WBAN). It has a huge potential for the revolutionary transformation of medical technologies. A sensor node for WBAN consists of data sensing, data processing and communicating components. So, the extremely low power and high reliability requirements of WBANs make communication a challenge. These requirements induce a need for a good error correction code in the channel coding scheme. We research the potential of using turbo-codes for communication in WBANs, because it is the most effective method for information transmission in channels with low energy consumption in many communication systems [1]. The *aim* of the work is the formation of a general metaheuristic scheme for decoding error-correction turbo-code.

The problem of decoding is reduced to solving the problem of global optimization of a complex objective function with a high dimension of the search space [2–4]. The swarm intelligence scheme for finding a solution to such problems:

Step 1. In the search area, a certain number of initial approximations to the sought solution of the problem are generated. Usually, agents are randomly distributed evenly over the entire extremum search domain.

Step 2. With the help of migration operators, specific to each metaheuristic, we move the agents to get closer to the global extremum of the objective function.

Step 3. We check the fulfilment of the condition for the end of the iterative process (running time, number of iterations or generations, stagnation of the algorithm) and, if they are fulfilled, stop the calculation, otherwise, we return to the previous step.

So, to solve scientific and practical optimization problems, in the case of unsatisfactory performance of classical algorithms, swarm intelligence algorithms should be used, the skilful use of which will allow obtaining important results in different scientific fields, including medical diagnostic tasks.

References

1.Liang L. Analysis of Low Power Implementational Issues of Turbo-like Codes in Body Area Networks. Ph.D. dissertation. England: University of Southampton, 2009. 87 p.

2. Розроблення інформаційних технологій розв'язування задач дискретної оптимізації на основі ройового інтелекту / В.В. Литвин, Д.І. Угрин, Р.М. Оливко, Я.В. Боровець. *ТАРП*. 2018. №2. 11 с.

3. Ivanov Yu.Yu. Swarm Intelligence Algorithms in the Tasks of Medical Diagnostics. *MicroCAD*. Kharkiv, 2023. pp. 1096.

4. Bio-Inspired Computation: Where We Stand and What's Next / E. Osaba, D. Molina, X.-S. Yang et al. *Swarm and Evolutionary Computation*. 2019. Vol. 48. pp. 220–250.