UDC 685.31

# USE OF NEURAL NETWORKS IN THE IMPLEMENTATION OF GENETIC ALGORITHM PROCEDURES FOR COMPILING DISCLOSURE SCHEMES

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Keywords: neural networks, cutting scheme, technological preparation of cutting production, linear effects, genetic algorithm, row placement, visualization.

The development of computer technologies and the computerization of production activities allow us to focus on the development of faster and better algorithms for finding optimal or suboptimal solutions. Such tasks include the tasks of optimizing the design of combined cutting schemes of rolled materials, taking into account technological aspects [1, 4-7].

The analysis of information sources showed that initially, in the studies on rational cutting, calculation methods were based on the input information about the schemes of combining parts obtained by hand, which did not give high efficiency and quality of developments [1-4]. The development of computer technologies and the computerization of production activities allow us to focus on the development of faster and better algorithms for finding optimal or suboptimal solutions. Such tasks include the tasks of optimizing the design of combined cutting schemes of rolled materials taking into account technological aspects [2]. The task is multimodal and multidimensional, that is, it contains many parameters [5, 3-6]. For such problems, there is no universal method that would allow finding an absolutely accurate solution quickly enough. To solve the given problem, it is proposed to choose a genetic algorithm modified for specific conditions. The genetic algorithm, as a combination of screening and gradient methods, allows you to get an approximate solution, the accuracy of which will increase as the calculation time increases.

The procedures for building the initial population, selection, crossover, mutation, and updating the population have the following features:

1) When creating the initial population, sequences of 0 and 1 of a given length n are generated ("shotgun principle") and the fitness of each individual is evaluated.

2) Selection takes place by the method of outbreeding, which ensures faster convergence of the algorithm. This method consists in the fact that the "parents" become the individuals that are as far apart as possible according to the characteristics, the fitness of which (criterion of quality) in one is greater than the threshold value of fitness in the population, and in the other - less. The one-point crossover operator involves the breaking of two parental chromosomes at a point randomly determined for each time and the

recombination of the newly formed chromosomal remains: each time we get two different offspring.

3) Mutation can occur in 2 directions: to increase fitness, a random 0 is inverted into 1, and to decrease it, on the contrary, 1 is replaced by 0.

4) A new population is created by adding newly obtained "descendants" to the previous population and excluding from it individuals that have an excess of quality indicators (excess details). Thus, the size of the population (the desired number of rational schemes) remains unchanged.

5) The output criterion is the "convergence" of the population, when it is impossible to exclude individuals from the population - all the obtained cutting schemes do not exceed the indicators of the complete output of products, that is, a better solution has been found, or a solution close to it. The final population is sorted according to the chosen criterion - the percentage of use of the area, the number of complete sets.

Algorithms for adjusting cutting diagrams obtained in automatic mode, which involve the addition or exclusion of individual parts, include:

- an algorithm for controlling the placement of parts on the material of given sizes and their non-intersection of the material boundaries due to the imposition of restrictions on the possibility of placing the coordinates of the poles of the parts on the material.

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