

APPLICATION OF THE GENETIC ALGORITHM FOR SOLVING  
THE PROBLEM OF OPTIMAL PLACEMENT OF RECTANGLES

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The placement problem as one of the most traditional optimization problems is expanding its scope of application. This is due to the fact that today the mathematical support has developed considerably and the possibilities of technical support of automatic programming systems have increased, which allows solving problems of higher complexity than it was possible before.

Problems of optimal placement arise during designing a variety of devices, placing equipment, cargo and other engineering tasks. The ability to optimally place objects of various shapes in productions and businesses directly affects financial and economic performance such as material use, the number of employees involved and the speed of production.

The problems of optimal placement of geometric objects belong to the class of problems of optimization geometric designing. In the submitted report, the question of optimal placement of rectangles in the field of the rectangular form is investigated. The solution of a given problem with the help of genetic algorithms is proposed. Since the task is NP-complete and thus has a large number of objects, the use of most traditional algorithms is not rational. An alternative to this is the use of evolutionary algorithms, in particular genetic.

The mathematical model of the problem was described, the main criteria for the methods of decommissioning were discovered and a software product was developed that satisfies the needs of the user in graphically mapped work of the methods of solving the problem.

Two main methods for local and global extremums were considered: the BLBF method, as one of the methods of heuristic search of a local extremum, and a genetic algorithm as one of the types of evolutionary algorithms for the search of a global extremum. A program on C # programming using the XAML technology, which simulates the problem of optimal placement of rectangles in the region, was developed.

Evolutionary algorithms, in particular genetic, can be used for problems of two-dimensional cutting. The genetic algorithm showed satisfactory results in a computational experiment. The visualization of the solutions was developed and presented.

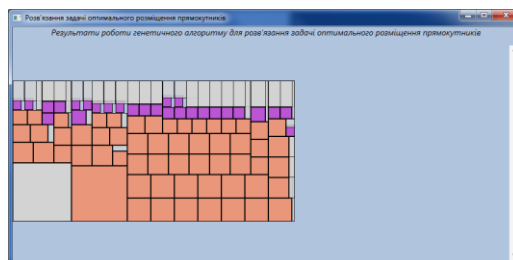


Fig. 1. Visualization the options for optimal placement of rectangles.