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Solution of Combinatorial Problems by the Method of Random Search Based on Factorial Numbers

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Permutations are widely used in solving many combinatorial problems [1]. Permutations are an ordered set of different elements, each of which is represented by a number. In the course of solving a combinatorial problem, it is usually necessary to search through all the permutations with a certain number of elements. Each of the permutations will participate in the calculation of one of the possible solutions to the problem. Then the most effective solution will be chosen according to a predetermined criterion.

There are algorithms for quickly searching through permutations, but in the case when number of elements in permutations is high, their effectiveness decreases greatly. The time required for a full search of permutations increases exponentially, depending on the number of their elements. In those cases when it is impossible to obtain a solution of the problem by the complete search, methods of approximate solution are used. Such methods include the method of random search.

The method of random search is based on the choice of a certain number of random permutations from the whole set of permutations. In this case, there is an actual problem of random generation of permutations. This problem can be solved by randomly generating the number and converting it into a permutation. However, this method requires a sufficiently large number of calculations, since the number must first be converted to a factorial number, which in turn is transformed into a permutation [2].

It is possible to simplify this method by randomly generating a factorial number. It is necessary to generate separately the value of each digit of the factorial number. Next, the factorial number will be transformed into a permutation using the known method [3].

The proposed simplification will increase the speed of generation of random permutations when solving combinatorial problems by the random search method.

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