EVOLUTIONARY MODELS of DISCRETE OPTIMIZATION PROBLEMS BASED on FRAGMENTARY STRUCTURES

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For many problems of discrete optimization the exact algorithms of polynomial complexity are not known. For these problems, it is interesting to find algorithms, which are not always accurate, but have very low complexity. Such algorithms are called "greedy algorithms". Greedy algorithms only occasionally lead to the exact optimal solution [1]. In most cases, one can only rely on the approximate solution. An interesting question is, on what classes of problems it is possible to use the greedy algorithm for finding the approximate optimal solution. For this class of problems, the solution should have a simple structure as a union of some elementary objects - fragments.

The search for classes of discrete problems, allowing the use of greedy algorithms, leads to different combinatorial structures. In particular there are matroids [2], gridoids [3], and genetic structures [4]. However, fragmentary structure is the most common configuration for similar combinatorial problems.

Definition 1. *Fragmentary structure* (X, E) *on a finite set* X *is a family of its subsets(accessible fragments)* $E = (E_1, E_2, ..., E_n)$, $E_i \subseteq X$, $i = 1, 2, .., n$, *such that* $\forall E_i \in E$, $E_i \neq \emptyset$, $\exists e \in E_i : E_i \backslash \{e\} \in E$.

Definition 2. *Fragment is called maximal, if it is not a subset of any other fragment.*

Every maximal fragment can be constructed from the empty set, successively adding elements to it, so that at each step of this procedure the resulting subset was accessible fragment. The result of applying the algorithm is specified by linear order on the set X. Thus, any maximal fragment can be described by some permutation of the elements of X.

The existence of fragmentary structure allows us to reduce a number of optimization problems to optimization problems on the set of permutations. In turn, the universal evolutionary model for optimization problems on permutations may be applied.

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