Package of Procedures for the Decision of Optimization Tasks by the Method of Branches and Borders

Nataliya Nestor

Abstract - **The practical aspects of realization of method of branches and borders are examined. The structure of package of procedures is pointed for implementation of basic operations at the decision of optimization tasks. A package is projected as a programmatic kernel which can be used for the various tasks of exhaustive search with returning.**

Keywords – **optimization, optimization tasks, method, algorithm, technological process**.

I. RAISING OF TASK

A method of branches and granic' is the known often common method of the numeral deciding of combinatorics tasks. This method is the variant of search with returning. In general case we assume that a decision of task is the vector $(s_1, s_2 \ . \ . \ . \ . \ )$ of complete, but indefinite length, which satisfies with certain limitation. Every si is the element of complete arc wise organized plural of S_i.

Task, the features of realization of which we will examine, we will formulate thus:
we find out the costs minimum:

$$\min cost(s_1, s_2, ..., s_{k-1}, s_k) \le cost(s_1, s_2, ..., s_{k-1}) \qquad (1)$$

at the following limitations:

$$y = f(s_1, s_2, ..., s_{k-1}, s_k) \qquad (2)$$

One of such tasks is described in-process [1] at programming of which and a sufficient enough universal kernel was developed for application in various algorhythms of decision of optimization tasks after the method of branches and borders.

II. STRUCTURES OF DATA

At the decision of tasks according with the method of branches and borders most resources of main memory and processor time outlaid on forming of decision and navigation tree on it. A decision tree can be presented in number of different ways among which are more frequently used: in form to the multi-connectional list, sequensive presentation, as a binary tree.

Simplification of internal form of binary tree comes out from that two pointing can contain every element of the CPLD list, which answers a binary tree, only for addressing of other elements of list. It means that for presentation of binary tree enough double-chained list.

Converting of a decision tree into binary is presented fig. 1.

Arcs that are directed to the right link tops which match a fork on sub-task of one level, and arcs are pointed down link contiguous even forks. For the reflection of binary tree in the memory of PC as the CPLD list every element of list can contain three fields, information which answer an element is kept in one of which, only, and in two other fields are pointing on a next element in one level and on an element in a next (lower) level.
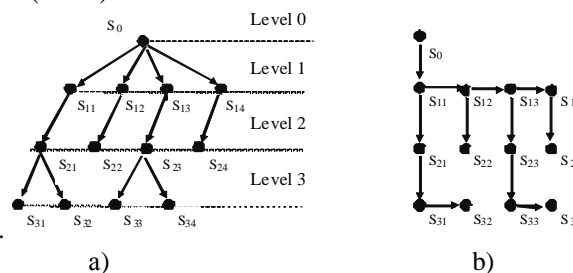

Fig.1. Converting of decision tree is into an equivalent binary tree

All lists take place in one array which is filled dynamically. The memory management is realized with the help of three lists of free space memory; the list of blocks of free space by a size one word; the list of blocks of free space by a size two words; the list of blocks of free space by a size more than two words. These lists allow to realize simple algorithms of dynamic management of memory. Every list has the table of description that consists of five fields in which the following data is consistently placed: pointing on the first element of list, amount of elements, workers information, address of the last attached element, pointing on an element with which before any actions were conducted.

In the table of description of the decision tree instead of the working data the maximal amount of levels is specified.

III. BASIC PROCEDURES

The package consists of procedures of forming of tables of description of lists, forming of tops and lists, search, tree search. In a package are also included the row of procedures of testing, adjusting and leading out of intermediate results, procedure of dynamic memory allocation are used also for backuping of place under entrance and intermediate information of all program. The developed package of procedures is programed on the algorithmic languages of FORTRAN-77, PASKAL and in an environmental system of programming Delphi-4.0.

REFERENCES

[1]. N. Nestor Optimization of sequence of the technological operations according to the criteria of output of suitable wares and cost of making. //"Computer systems of planning.Theory and practice." Bulletin Lviv Polytechnic National University №373, 1999

Nataliya Nestor - Lviv Polytechnic National University , S. Bandery Str., 12, Lviv, 79013, UKRAINE, E-mail: natalynestor@gmail.com