

Technical characteristics of MLIS and MNIS EO 1.3

The names of the proposed software products are: **Multilingual local instrumental system of expenses optimization**, version 1.3 (MLIS EO 1.3), and **Multilingual network instrumental system of expenses optimization**, version 1.3/upc (MNIS EO 1.3/upc).

1. General characteristics of the products

1.1. Business benefits

Providing opportunities to any interested users, which are faced with the problem of effective spending available funds on specific purposes, to quickly solve their tasks of finding optimal strategies for the acquisition of sale objects of some physical nature.

1.2. Products positioning

Markets of software and network computing services to solve tasks of optimizing expenses.

1.3. Information about users

Potential users of MLIS EO 1.3 and MNIS EO 1.3/upc are:

- buyers in online shops;
- clients in locations on providing various paid services (in sports, entertainments, etc.);
- customers in restaurants and other catering enterprises;
- persons planning their personal or family budget.

2. Products overview

Programs **MLIS/MNIS EO 1.3** are designed to find optimal strategies of investing funds in the acquisition of sale objects (SO) from their certain set, when it reaches the maximum value of total purchasing worth of the acquired SO samples. At that, to each selected for the acquisition SO, which may also include a specified additional elements (AE), if any, the user specifies a value of the criterion of utility of its sample. Allowed to form alternative groups of SO both on their separate categories and on all categories at once. To solve these tasks is required the availability of appropriate databases of sale objects (DBSO), the creation of which is provided in MLIS/MNIS. Such DBSO can be of two types: unlimited and limited. The first of them contain an unlimited number of SO samples of each type, and the second - a limited, which value is set.

Depending on the purpose of these programs by the sale objects can be goods, services, as well as meals and drinks. There are four modes of their localization: 1 - purchasing goods (GD), 2 - purchasing services (SR), 3 - purchasing goods and services (GS), 4 - purchasing meals and drinks (MD). The required localization mode you may set permanently or to choose it every time you create a new task.

MLIS/MNIS EO 1.3 are multilingual programs. Alternative languages of their interfaces are stored in separate files, called *language shells*. These programs include two such shells: Russian and English, as well as a special program of version 1.0 called "**Генератор языковых оболочек (ГЯО 1.0)** (Generator of language shells (GLS 1.0))", that allows users themselves to create such shells for any languages in which they usually communicate.

MLIS EO 1.3 is an offline program, designed for a particular user (the lite version of this program is free).

MNIS EO 1.3/upc is designed to provide network services to many users. This system consists of two parts: one remote module of optimization (MO), which is a part of the Universal processing center (UPC) 9 MNIS 1.0 (that is why the suffix "/upc" is indicated in the name of this MNIS), and numerous automated work places (AWPs) targeted at specific MNIS users. Each such AWP is designed to prepare by a separate user the input data of the tasks to be solved and to output the calculation results, and the synthesis of optimal strategies of SO acquisition takes place in the MO. Information link between AWP and MO can be carried out via the Internet, over the local network or even on the computer bus of a single user of AWP. In the first and second cases MO is located on the network server, and in the third - on the computer of the indicated user. At that, there is ensured the operativeness and full automation of the AWP interaction with this module.

MLIS/MNIS EO 1.3 are created on the basis of a new science-intensive information technology of

automation of control of discrete technological and information processes (IT AC DTIP), having many uses, the founder of which is the author of these multilingual programs. A set of lite version of MLIS EO 1.3 can be downloaded from any of two websites of the author: "Promotion center of IT AC DTIP" (<http://promo.dtip-optim.com/en>) and "Implement. center of IT AC DTIP" (<http://dtip-optim.com/en/main>). There also the user can solve remotely up to 10 test tasks in MNIS EO 1.3/upc.

Areas of possible using MLIS/MNIS EO 1.3 are **trade, service industry (restaurants, centers of sports and entertainments), as well as planning the family budget**. Year of release these programs - 2017 (year of MNIS update to version 1.3/upc - 2018). Place of development - Kiev (Ukraine).

3. Products functions

MLIS/MNIS EO 1.3 allow to solve tasks of finding such strategies of acquiring sale objects from their given set, at which is reached the maximum total purchasing worth of purchased SO samples.

Input data of a task to be solved:

- the used DBSO;
- amount of money allocated for purchase of SO;
- parameters a and b for the cost of serving a buyer $y = a + b \cdot x$, where x - cost of acquired SO;
- one of three possible options of creating alternative groups (AG) of SO:
 - a) AG are absent;
 - б) AG are created on separate categories;
 - в) AG are created on all categories at once;
- one of the two possible criteria of utility of a SO sample:
 - utility ratio (relative criterion);
 - purchasing worth, that equals the product of utility ratio of a sample by its cost (absolute criterion);
- upper threshold for utility ratio of a sample (≥ 2 и ≤ 5);
- a list of selected for acquisition SO, for each item of which are specified the following parameters:
 - number of an alternative group, if this a SO is included in it
 - a value of used criterion of utility for a SO sample;
 - minimum and maximum numbers of acquired samples of SO of this type or of this AG;
 - possible sign of sameness of acquired samples of SO included in thisAG;
 - a list of selected AE from that their set, which is provided for this SO.

In a basis of solving tasks of network purchases optimization is the method of numerical optimization of discrete processes of service, as well as a unique scheme to optimize such processes developed by the creator of MLIS/MNIS EO 1.3. Before using this method, the task in question is pre-tested for the presence of one of the three possible trivial options of its solving:

- choice of the cheapest SO sample when the allocated amount of money allows to buy only a such sample;
- choice of the minimum possible (i.e. the cheapest) set of SO, when this amount of money will allow only buy a such set;
- choice of a potentially best set of SO, when this amount of money is large enough to acquire the best SO set.

4. Restrictions

- maximum number of sale objects, which are contained in the used DBSO, - **65000** (for lite version of MLIS - **300**);
- maximum number of created alternative groups of SO - **20**;
- maximum number of acquired any samples of SO, belonging to each AG, - **10**;
- maximum number of acquired same-type samples of SO, not included in AG, - **20**;
- allowable number of phase states of an optimizable process - **1000000** (for lite version of MLIS - **10000**).

5. Practical application

MLIS/MNIS EO 1.3 were put into operation in February 2017 (MNIS was updated to version 1.3/upc in July 2018). Now comes the stage of the search for potential dealers and users of these systems.

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