

Automatic generating linear programming problems based on the interface data to determine the optimal number of techniques

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Summary: *This article considers the generation of the canonical form of linear programming to determine the optimal number of techniques. The linear programming problem was solved using the created software interface as a result of solving the problem during the generation process.*

KEYWORDS: *DECISION-MAKING, CANONICAL, GENERATION, LINEAR PROGRAMMING*

1. Introduction

The use of mathematical methods in the development of modern economies, including the solution of many economic issues, and the adoption of correct and effective decisions as a result are of great importance. The famous management researcher, Chuster Bernard, considered management as a form of management decision making [1]. Decision making is an integral part of any management function, such as information sharing. The need for management decisions occurs at all stages of the management process and relates to any aspect of management activities. The decision-making process clearly confirms the continuity of management activities, reflecting the real problems, relationships and interrelations within the organization. In addition, learning about the process of making and implementing decisions allows us to learn the content of governance. The following models are used in making management decisions:

- 1) Games theory model.
- 2) Model of the theory of sequences
- 3) Resource management model
- 4) Linear programming model.
- 5) Economic analysis model.
- 6) Physical model.
- 7) Analogical model.
- 8) Mathematical model.

The linear programming model is used to design optimal production programs. In this case, the main goal is to determine how many products are manufactured to generate the maximum profit mass with a certain amount of raw materials, details, equipment working hours and profitability of product types. Most of the optimization models used in the management system are usually combined with the requirements of the linear programming model. Since the optimization process is expensive, it is used to develop the strategic and tactical tasks of any subsystem of the management system. Operative tasks, however, usually need to be addressed using simple, heuristic methods. These methods are mainly:

a) analysis; b) forecasting; c) modeling.

In the economic application of linear programming theory, most of the issues are considered where finding of the maximum or minimum value for any linear function is required [2].

2. Problem statement

It is worth noting that you can come up with web software designed to solve the linear programming problem by simplex, which is software for mathematical data entry. As an example, the website "Simplex Method Tool" by Stefan Waner in 2016, however, has not created a friendly interface for user. On such web pages, user input data directly solves the problem using the simplex method [3]. The issue is dedicated to the elimination of this deficiency. Thus, software had been created to determine the optimal number of techniques. It has built enough comfortable interface for user. After entering user input in the

created software, the problem comes to linear programming and generates the canonical form for solving simplex [4].

The problem is the generation of the canonical form of linear programming on the basis of interface data to determine the optimal number of techniques. The number of weapons and technical ammunition to be deployed by both parties, owing to the choice of combat operations, solution of the problem should ultimately calculate the optimal number of techniques and find the estimated number of personnel losses.

If we focus on the written form of linear programming, there are different types of writing that affect the generation process. Depending on the solution method, it is necessary to apply the appropriate form of writing in the generation process. The interface to be built as a result of the problem must be as written as possible so that the generation process is properly run.

The availability of sufficient information about the enemy forces means that it has information about its weapons and technical potential [5]. One of the most important tasks is to divide technology into specified categories and know the number of different types of techniques. With the developed software interface, the information needed to automatically generate the canonical form can be stored in a file with a specific structure. It should be noted that generally reading data from a file and writing data to a file are of particular importance in this software. Interface data should be read only from certain files and transmitted to the user. The user should be able to save the data in a specific file to use the data he or she chooses for the next period of time, even if it does not fully resolve the issue for any reason or excuse after launching the software. The file structure needed to read the interface data and the file structure needed for writing are different. The process of reading and writing files should be set up that for any time it will enter to the base of its side so that it is possible to notice new weapons and used these weapons in the software. With this information, the canonical formulation of the necessary data for the complete solution of the problem and based on this data the linear programming problem are solved.

3. Problem Solution

The establishment of an algorithm for determining the number of different techniques based on the interface data is a prerequisite for solving this problem. Thanks to the interface of written software during the solution, the user can choose different category techniques, weapons, and include the coefficients needed to solve the problem [2].

The user can saved the available forces and their number for the battle from his own, the weapons that can be dispatched and their maximum number, in which types of operation (attack or defense) of battle from his own and the enemy in the file which has predefined structure after selecting from software interface (to use the file as a base). The enemy's choice of attack or defensive action during the war (as well as his own) ensures the changing of coefficients used in the generator.

Based on the entered interface data, the number of confused is found with the numbering of different weapons. Based on this number, the basic coefficients for the canonical

form of linear programming problem are defined and base variables are generated. The input data for the number of selected available forces and the number of weapons that can be ordered creates a called right side vector in the canonical writing form. The simplex method of linear programming problem was chosen as the solution. Generation of the canonical form allows a complete solution of this problem with the simplex method.

4. Conclusion

As a result, knowing the enemy forces and operating conditions, it was possible in the case of solution of this problem to determine the optimal number of techniques for defeat. The software created as a result of the solution of problem not only determines the optimal number of each technique during the battle, but also finds the estimated number of personal staff losses.

In the software files with a certain structure had been used as the base. The data displayed on the interface is read from the files defined at the start of the program, and the selected data can be stored in the newly created files using the interface.

When software is created, generation process is completely done correctly and the optimum result is achieved.

References

1. http://lib.bbu.edu.az/read.php?item_type=lecture&file_type=pdf&file=254
2. http://www.lib.bbu.edu.az/read.php?item_type=lecture&file_type=pdf&file=28
3. <https://www.zweigmedia.com/RealWorld/simplex.html>
4. S. M. Babayev, L. H. Mammadova. "Optimal" software for calculation of the tactic group composition. Advanced Information Systems. Kharkiv 2019. T.3, № 4.PP.115-117.
5. S.M.Babayev, A.A.Bayramov, E.N.Sabziev. Calculation of required static power for tactic group during battle. National Security and Military Sciences scientific-practical journal, №2, Baku 2016,PP.37-42.