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COMPREHENSIVE METHODOLOGY FOR ASSESSING INFORMATION AND ANALYTICAL SUPPLY IN DECISION SUPPORT SYSTEMS

КОМПЛЕКСНА МЕТОДИКА ОЦІНЮВАННЯ ІНФОРМАЦІЙНО-АНАЛІТИЧНОГО ЗАБЕЗПЕЧЕННЯ В СИСТЕМАХ ПІДТРИМКИ ПРИЙНЯТТЯ РІШЕНЬ

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The basis of any management is the decision of the manager (boss), which represents a certain order and methods of performing the assigned tasks. Preparation and decision-making is one of the most important functions of a manager (supervisor) in object management [1].

The analysis of works [1–5] showed that the vast majority are based on the use of general scientific methods, such as systematic, comparative, structural and functional analysis, the method of expert evaluations, the methodology of scenario analysis of socio-economic systems and the theoretical and informational approach.

For this purpose, it is proposed to develop a methodology that would allow for the evaluation of complex information and analytical support in decision making support systems, would have a flexible setting, and would implement direct and reverse evaluation within the framework of a single model.

The purpose of the research is to develop a comprehensive method for evaluating information and analytical support in decision making support systems using fuzzy logic. This will make it possible to take into account a larger number of factors that affect the efficiency of information and analytical support, and also have different units of measurement and nature.

Presentation of the main research material

The method of comprehensive assessment of information and analytical support in decision making support systems consists of the following sequence of actions.

1. *Input of initial data.* At this stage, the initial data about the state of the object is entered. The number of sources of information, the type of initial data and their volume are determined.

2. *Determination of the degree of uncertainty of the initial data.* At this stage, the degree of uncertainty of the initial data is determined based on the authors' previous research. The degree of uncertainty of the initial data is as follows: complete uncertainty; partial uncertainty and full awareness [2−4].

3. *Calculation of criteria and definition of development options.* The method being developed is intended for solving the tasks of both direct and reverse planning of the development of the research object. The value of the input parameters $\{X_i\}$ and the structure of the system-dynamic model determine the dynamics of the A_i value over time (i is the number of the computational experiment).

4. *Determination of system reaction time.* For the further calculation of the criteria, it is necessary to take into account the initial speed of the development of the event – A0, the maximum achievable speed of the development of the event A_{max} and the time of reaching A_{max}, which is equal to t_{max}.

The parameters and results $\overline{X}_{req} = \overline{X}_j; \overline{Y}_{req} = \overline{Y}_j$ of the j-th computational experiment, for which the obtained value of the criterion is the maximum, are sought: $K_{r_j} = K_{r_{max}} = \max\left(K_{r_i}\right)\Big|_{i=1,\dots,N}$.

6. Setting the target state of the object. Using the obtained values of the required parameters, the K_{ri} criteria are calculated for each scenario, taking into account the weights of the indicators ($0<wes_*<1$) set on the basis of user preference, which characterize the effective management of the development of the analysis object:

7. Analysis of options for influencing the object of analysis

The parameters and results $\overline{X}_{req} = \overline{X}_j; \overline{Y}_{req} = \overline{Y}_j$ of the *j*-th computational experiment, for which the obtained value of the criterion is the maximum, are sought: $K_{r_j} = K_{r_{\max}} = \max\left(K_{r_i}\right)\Big|_{i=1,\dots,N}$.

8. Obtaining intermediate target states of the analysis object. The search on the time axis of the point t_{req} of the effective transition to the next phase of the development of the object of analysis is carried out by conducting another series of simulations taking into account the change at each point $[t^-, t^+]$, determined with some step Δt. As a result of the calculation of the criteria for the newly obtained options, the desired t_{req} point is determined.

If necessary, a new set of values $\overline{X}'$ can be specified at the t_{req} point. The point of transition to the next phase t_{req} is determined according to a similar scheme, but with a change in the structure and possibly the parameters of the model at the t_{req} point.

9. Determination of options for the development of the analysis object

The system of states for determining options for the development of the object of analysis is a final weighted directed graph *Gr*. The vertices of the graph mutually uniquely correspond to the states of the system, characterized by the current speed of the event (A_b), the arcs are the control determined by a set of parameters $\left(\overline{X}_b\right)$, the weights of the arcs w_b are the costs of the corresponding transitions,

10. Checking the value of the efficiency of the made decisions

At this stage, the permissible decision-making time in the task of assessment and forecasting of the state of the analysis object is determined. Criterion of efficiency of the decisions taken T_n.

The conclusions:

1. In the research, the development of an algorithm for the evaluation of information and analytical support in decision making support systems was carried out. This makes it possible to increase the effectiveness of the taken decisions due to: the consistent solution of forward and reverse planning problems using simulated modeling of the dynamics of the object of analysis; providing a set of development trajectories of the analysis object at each phase;

analysis of possible options for the development of the assessment object in each phase of development and moments in time when it is necessary to carry out structural changes that ensure the transition to the next phase; taking into account the uncertainty about the state of the analysis object.

2. An example of the application of the proposed method in the analysis of the enterprise state is presented. According to the results of the analysis of the effectiveness of the proposed method, it is clear that its computational complexity is 10-15% less, compared to the methods used to evaluate the effectiveness of the made decisions.

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