A METHOD FOR CONSTRUCTING RECRUITMENT RULES BASED ON THE ANALYSIS OF A SPECIALIST’S COMPETENCES (p. 4-14)

Vasyl Lytvyn, Victoria Vysotska, Petro Pukach, Igor Bobyk, Bohdan Pakholok

Under conditions of active development of innovative information technologies (IT) and eliminating the boundaries in providing educational services, human resources (staff, including IT specialists) turn into the main strategic resource of organizations, which ensures their long-term competitiveness and achievement of the set goals. Much emphasis in this problem is given to both the specific features of a recruiting company and to a high level of provision of educational services that meet international standards and requirements for the level of competences of would-be IT specialists. Therefore, the development of new conceptual approaches and promising information technologies of managing human resources acquires special relevance and practical significance. The article highlighted specific features of tasks of managing qualified human resources (MQHR), which allows identifying them as a task of multicriteria analysis and decision making in the fuzzy environment. A generalized conceptual model for decision making in the problems of MQHR was proposed. It was substantiated that in order to enhance effectiveness and transparency of decisions in MQHR, it is appropriate to use multicriteria optimizations based on the TOPSIS method, the advantages of which were shown. A modification of the algorithm for using TOPSIS for making recommendations in recruiting qualified human resources was proposed. The modification implies the integration of additional components of the content management in the decision making algorithm, which provides for the calculation based on the method of analysis of hierarchies (MAH) of coefficients of level or course of attained educational services. Using the TOPSIS and MAH methods and the scale of assessment of competence of qualified human resources, experimental calculations with ranking of alternatives were performed using the example of recruiting, which demonstrated effectiveness of the proposed approach.

Keywords: content management, human resources, recruiting, decision making, fuzzy environment, fuzzy sets.

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STUDYING THE MECHANISMS OF FORMATION AND DEVELOPMENT OF OVERWEIGHT AND OBESITY FOR DIAGNOSTIC INFORMATION SYSTEM OF OBESITY (p. 15-23)

Olena Vysotska, Hanna Dobrorodnia, Nina Gordiienko, Viktoriya Klymenko, Ganna Chovpan, Marine Georgiyants

The structure of the semantic attribute spaces is developed. The resulting space reflects an ordered presentation of variability for obesity process considering somatotype of person. This allows to consistently deep body shaping process in detail and obtain a continuous transition from one type of metabolic disorders to another. This contributes to more accurate preclinical diagnosis and its taxonomy.

It was determined in operation that a measure of deviation from the normal structure of the somatotype of biological development is measured in fractions sigma deviation. It is a characteristic of formation in obesity and helps to explain the mechanisms of its development. The range of one sigma deviation corresponds to the functional optimum of somatic development is measured in fractions sigma deviation. It is a characteristic of formation in obesity and helps to explain the mechanisms of its development. The range of one sigma deviation corresponds to the functional optimum of somatic development is measured in fractions sigma deviation.

The research results can be used to trace individual dynamical development of body changes regarding statistical norm.

The obtained results contribute to opportunities for modeling the running of this pathology. The results need to be applied in the creation of information system obesity diagnosis for further automation of this process. Automation of the obtained results using the diagnostic information system of obesity improves the quality of diagnosis of this disease. In the future, it is necessary to analyze in detail the representatives of different age and sex, the territorial and constitutional groups for proper evaluation of the process of formation for the various samples.

Keywords: semantic space, biological age, lipid metabolism, estimation criteria, obesity.

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DEFINITION OF EFFICIENCY INDICATOR AND STUDY OF ITS MAIN FUNCTION AS AN OPTIMIZATION CRITERION (p. 24-32)

Igor Lutschenko

The problem of development rates maximizing of any business structure is solved by system processes optimization, and the best choice taking from a set of available alternatives. In order to solve these problems, an indicator that can be trusted to a central place in the technology of the optimum solutions is needed. Especially it is urgent where full automation of control processes is necessary. This responsibility involves the careful selection and verification of the indicators claiming to be the optimization criterion. According to the retrospective analysis, in this issue it is possible to allocate two interconnected problems.

The first problem is an uncertainty of the “optimization” concept. In fact, the optimization process, for today, is associated with extremum search of some function. In this regard, the second problem is related to the fact that as an optimization criterion, forming the function, it is proposed to use a variety of indicators.

In this work the essence of an efficiency indicator is revealed. The structure of this indicator and the properties which such indicator has to possess are defined. A number of classes of reference operations were created. Each such class provides a possibility of testing those qualities which the efficiency indicator applying for a role of optimization criterion has to possess.

The indicator which has cybernetic structure and successfully passed test on all classes of reference operations has been developed. Results of use of the developed indicator as optimization criterion in the system of liquid portion heating have been given.

Definition for category “efficiency” and “efficiency indicator” has been given.

The received results can be useful to developers of cross-disciplinary indicators, specialists in control processes automation and business processes optimization.

Keywords: efficiency indicator, optimization criterion, comparison criterion, resources efficiency.

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DESIGNING A MONITORING MODEL FOR CLUSTER SUPER-COMPUTERS (p. 32-37)
Igor Ruban, Vitalii Martovitsky, Natalia Lukova-Chuko

Recently there has been an increase in the number of cyber attacks against computational systems. Growth in the amounts of information that passes through computational clusters and savings on staff requires an application of effective means of monitoring computational resources for the purpose of prediction and elimination of cyber attacks. An analysis of hacker attacks revealed that the break-in was not detected by technical equipment.

We examined a concept of building existing systems of monitoring of cluster super-computers. Deficiencies are established in the monitoring systems, which lead not only to the reduction in efficiency of computational clusters but to their safety violations. We described a formal model for the detection of anomalies in the functioning of a computational cluster. The model is the sets of the states of the system depending on functional tasks, it separates processes of targeted functioning of the system from the interface processes of interaction with the network infrastructure and provides for the possibility of their use in neural network technology for detecting anomalies in the functioning of a computational cluster. This model makes it possible to locally control parameters for each process and, based on the formed vector, to detect anomalous influence on the system as a whole.

Data of the study can be used for the improvement of already existing subsystems of monitoring of super-computer technologies, as well as form a foundation for creating fundamentally new neural network multi-agent system of monitoring of the detection of anomalous incidents in the performance of computational clusters.

Keywords: super-computer, monitoring system, detection of anomalies, computational systems, multi-agent approach.

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DEVELOPING A TECHNIQUE FOR IMPROVING THE EFFICIENCY OF ITERATIVE METHODS FOR THE CALCULATION OF THE MULTICOMPONENT RECTIFICATION PROCESS (p. 38-44)

Anton Sheikus, Elena Belobrova, Yaroslav Dovgopolov, Igor Levechuk, Valeriy Korsun

Studies of the technological base of mobile control over the processes of rectification are based on determining the concentration and temperature profiles of the installation in the established regime at different coordinates of the point of application of controlling influence.

A problem of the calculation of static characteristics of the process is in the iterative determination of such concentrations of components in the bottoms so that the bidirectional calculations, based on them, and carried out to the control section of a rectifying column, make it possible to obtain identical results. The θ-method is the effective technique for the provision of convergence of such calculations. However, when calculating multi-plate rectifying columns with several feeding inputs, in which the separation of multicomponent mixtures occurs, it is necessary to use a simple procedure for the reduction in time spent searching for the solution.

The problem of reducing the necessary number of iterations is solved by the exponentiation of coefficient θ, which is determined by the introduced tuning parameter of the algorithm. The extreme dependence of the number of iterations on this exponent is proven.

Performed calculations of the column for separating the multicomponent product of the MTBE synthesis proved that the proposed modification of the θ-method of convergence of iterative calculations of the operating modes of rectifying columns makes it possible to reduce the time, necessary for the search for the solution, by 50%. In this case, it is not necessary to obtain high quality of initial approximations of compositions of the separation products. The method is characterized by high stability and workability in a wide range of change in the input magnitudes.

Keywords: mathematical modeling, multicomponent rectification, iteration methods, the θ-method of convergence, mobile control.

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DEVELOPMENT OF THE SYSTEM OF AUTOMATIC CONTROL OF STEAM BOILERS AT ELECTRIC POWER PLANTS DURING COMBUSTION OF LOW QUALITY FUEL (p. 44-51)

Gennadiy Kanyuk, Andrey Mezeraya, Irina Suk, Igor Babenko, Elena Bliznichenko

A general principle of energy saving control of a steam boiler at thermal power stations is presented, which implies the formation and subsequent minimization of function of energy losses. This provides the possibility to ensure minimum losses of energy (maximum efficiency) under all basic modes of normal work of equipment. Parameters of the combustion activator are included in functional dependences and initial models of a boiler unit as the object of control, which makes it possible to form reference models of a steam boiler, necessary for solving the problem of energy saving control during the combustion of low quality fuels.

A method for increasing the accuracy of measurement and the control of feeding solid fuel to the furnace of a boiler at thermal power stations is proposed. This makes it possible to regulate fuel consumption more accurately and to have more precise information for determining technical and economic indices of work of the power unit. A new system of automated control of feeding additives, which activate the process of combustion, was proposed. The system of automated control of additives makes it possible to accurately regulate consumption of additives depending on the quality and amount of fuel supplied to the furnace. This provides for the possibility to maximally use the potential of activators of combustion for different grades of solid fuel. The proposed system may be used at thermal power plants that operate on the low quality fuel. The implementation of the proposed solutions will make it possible to increase efficiency of the power units of coal-dust TPP at the combustion of low quality fuels by the magnitude of up to 4 %, as well as to completely eliminate the addition of natural gas.

Keywords: steam boiler, thermal power plant, energy saving, energy losses, activator of combustion.

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ANALYTICAL DETERMINATION OF THE ELECTROMECHANICAL SYSTEM STARTING PROCESS EFFICIENCY INDEX WITH REGARD TO THE DISTRIBUTED NATURE OF INPUT PRODUCTS CONSUMPTION (p. 51-59)

Valerii Tytiuk

Currently, an approach based on the lumped-parameter resource consumption model is used to determine the starting process efficiency index. This is due to the simplicity of analytical expressions for the efficiency index. In actual practice, the resource consumption of the starting process is time-phased in nature, which may lead to biased estimates of the efficiency index and inaccurate operation of the optimization system.

In the paper, the actual form of the signal of the cost is determined using mathematical modeling of the controlled start system. It is proposed to use a fractional rational function to approximate these signals. The parameters of this approximation at different values of the control action were obtained using the MatLab Curve Fitting Toolbox.

The analytical expressions for determining the resource consumption, potential effect and efficiency index of the starting process were obtained on the basis of the proposed approximation. It was found that the position of the maximum efficiency index on the x-axis, obtained when using the lumped-parameter and distributed-parameter starting operation models varies slightly (within the 5 % margin of error). This will reasonably facilitate hardware implementation of optimal control systems of starting processes through the application of the lumped-parameter starting operation model.

Keywords: controlled start, distributed resource consumption, approximation, analytical expression of starting efficiency index.

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