

## THE METHOD OF FORMATION OF THE STATUS OF PERSONALITY UNDERSTANDING BASED ON THE CONTENT ANALYSIS (p. 4-12)

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The approach is proposed to developing an information system of determining the psychological state of personalities based on the five personality dispositions (extraversion/introversion, amiability, integrity, neuroticism, openness to experience), which is based on the content analysis of the Internet resources where users leave their mark (social networks, forums, chats, etc.).

In general, to form the status of psychological state of a personality based on the content analysis, it is necessary to solve four problems. First, it is necessary to collect content from various sources from the Internet. Then it is necessary to process it at the initial level (remove the tags, auxiliary words, signs, special symbols, hyperlinks, pictures, etc. from the text). Then the content is filtered (to identify spam, detect duplication, format the content, etc.) and sorted out (comments to the comments, likes, posts) according to the statistics over a specific period. The last stage is conducting the content analysis of collected information, which is categorized by the stop-words (markers).

To determine the psychological dispositions of a personality we implemented the developed method of the search and analysis of the marked words in the English and Ukrainian languages. We used the Potter stemming, lemmatising and the modified Potter stemming for the Ukrainian texts, designed by the authors. The tables of correlation between the marked words and psychological dispositions were developed. The information system is created for determining the psychological state of personality, based on the developed approach and the methods of the content processing. The system operates by analyzing the messages from the users in a social network based on the traits of the "Big Five". The system is designed in the form of a desktop program, which is the Internet service at the same time, and allows analyzing the psychological state of a particular user of a social network by his/her messages. All collected results are stored in the database. The results are displayed in the form of percent ratio for each trait, the number of tweets, as well as the most frequently used words related to these traits.

Potential users of such systems are consulting and marketing companies. The collected and analyzed information on users may be used in hiring or promotion of products/services. Automated compilation of the personality models of users is helpful for social networks and Web services. It improves the quality and efficiency of context advertising, referral systems, recommendations and dating services. The in-depth knowledge of the audience is crucial for business and recruiting.

The approbation of functioning of the constructed system was conducted. The results of the work of the system are satisfactory. Such an information system is recommended to use for searching employees for certain positions.

Automated analysis of messages of users in a social network to form the status of psychological state of a personality based on the content analysis significantly reduces the time of finding a potentially promising employee among those applied taking into account his/her psychological portrait for a specific position.

**Keywords:** content, information resource, content analysis, linguistic analysis, morphological analysis, social network.

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## DEVELOPMENT OF ONTOLOGICAL APPROACH IN E-LEARNING WHEN STUDYING INFORMATION TECHNOLOGIES (p. 13-20)

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The results of the studies, directed toward the development of methods and models of the ontologically controlled e-courses on the basis of ontologies of the set of subject disciplines, mechanisms of ontologic management and the architecture of the system of the automated construction of courses, were presented

The possibilities of ontological approach to electronic learning were analyzed. It was shown, that the ontological knowledge bases are one of the components of innovative technologies in e-learning and can become a basis for developing effective e-courses in different disciplines and specialities

It was shown that the ontological approach to development of e-courses, on condition of automation of this process, ensures the reduction of costs for their creation and enhances the result of learning.

The concept of developing the ontologically managed e-courses, which includes the use of methodology of e-courses synthesis on the basis of ontologies of subject disciplines and the library of reference information, was developed. There was demonstrated an example of creation of the ontologically controlled e-course on the discipline "Data bases" with the help of the program of compiling ontographs and automated construction of e-courses developed in Java language. The process of developing e-courses on the basis of its information and functional models was demonstrated. It was shown, that a high degree of formalization and structurization of ontology of subject discipline as well as the integrated ontological approach to the innovative methods of e-learning can serve as a platform for creating effective e-courses in the system of higher education.

**Keywords:** e-learning, ontological approach, electronic course, automated development of course.

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### OPTIMIZING THE PARAMETERS OF FUNCTIONING OF THE SYSTEM OF MANAGEMENT OF DATA CENTER IT INFRASTRUCTURE (p. 21-29)

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The information-extreme algorithm was developed of machine learning of the management system of a data center for predicting violations of the SLA terms. The scheme of binary encoding of features is considered, where the code of features is determined by the results of control of belonging of its value to the appropriate field of tolerances of each class of recognition. According to the data of tracing the work of virtual machines of a data center, we formed learning samples and synthesized decisive rules, optimal in information sense. The increase in reliability of decisive rules by 8 % is demonstrated, as compared to results of learning by the well-known scheme, where the control tolerances on the attributes' values are defined only for one single base class.

We proposed to use extreme serial statistics in the form of normalized statistics of the numbers of the attributes' values entering their fields of control tolerances for determining the moments of retraining a management system that allows adapting to the change in patterns of consumption of resources of a data center.

The efficiency of additive-multiplicative and entropy convolutions of the partial criteria of quality of functioning of a data center was examined to form the fitness function of swarm algorithm of optimization of the plan to deploy virtual machines of a data center. It is proved by the results of physical modeling that the additive-multiplicative convolution is more efficient on the stage of growth in the load of a data center, while the entropic convolution has higher efficiency during reduction in the load of a data center. In both cases, the decrease in operating expenses of a data center is observed in comparison to the known MBFD algorithm (Modified Best Fit Decreasing).

**Keywords:** cloud-based services, data center, information criterion, machine learning, swarm algorithm.

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### EXPERIMENTAL STUDY OF TRANSIENT PROCESSES IN OIL PIPELINE CAUSED BY STARTUPS OF PUMPING UNITS (p. 30-37)

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The patterns of pressure changes during transients caused by running the pumping unit were determined with the help of processed industrial data after experiments carried out on the main oil pipeline “Druzhba”.

It was found out, that the actual value of abruptly changing pressure both on the inlet and outlet of the oil pumping station is 15–23 % less than the theoretically expected value, in particular, half the pressure which is created by the pump started.

The actual pressure overload of the linear part of the oil pipeline, caused by running the pumping unit, was analyzed. The exponential dependencies of an abrupt oil pressure change on the distance to the origin of the disturbance were developed. The intensity of damping of high and low pressure waves of the transported oil in the pipeline was assessed.

For the oil pipeline, on which the experiments were carried out, the analytical relation was proposed to calculate a coefficient of pressure wave damping as a function of oil flow rate and the Reynolds number in the oil pipeline before the beginning of the transient caused by running the pumping unit. It was determined that the damping coefficients of increased and decreased pressure waves are almost the same for a specific transitional mode of operation of the pipeline.

**Keywords:** unstable hydrodynamic process, an abrupt pressure change, pressure wave damping factor.

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## PRINCIPLES OF CYBERNETIC SYSTEMS INTERACTION, THEIR DEFINITION AND CLASSIFICATION (p. 37-44)

Ihor Lutsenko

The class of cybernetic (dynamic) systems is defined. It is established that in the course of functioning each cybernetic system

provides performance of one basic technological function. It is also established that the processes of optimizing adaptation, for systems of a converting type, can be realized only if each such system interacts with the buffering systems presented in an explicit form.

The functions combination of converting mechanism and buffering mechanism for the purpose to minimize the system equipment production costs, leads to the connected condition of converting type systems. In this case, control change of one system leads to the coordinated controls change need for all system links of a technological graph.

It is established that the channel of information exchange of simple buffering systems, within the dual dividing system, is the buffering mechanism. Information exchange between simple systems is provided by control of each stock rate simple buffering system.

Approach to design of dual buffering systems with separate control complexes will allow to provide the increased systems survivability and will simplify diagnostics of their malfunctions.

It is also established that in an interacting systems graph it is possible to allocate the object formations presented by simple systems of two types which are defined in the work as autonomous systems. The feature of such autonomous processes systems is their independence from processes that happen in other autonomous systems. Such feature provides a possibility of parallel processes implementation of optimizing adaptation.

The cybernetic systems basic classification has been developed on the basis of conducted researches.

The main conclusions presented in the work have been received as a result of a pilot study of systems interaction processes. The received results can be used by practitioners for design and control, and also by researchers, in the course of creation of technologies of management of new generation.

**Keywords:** system, cybernetic system, dynamic system, converting system, buffering system.

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## SEARCHING FOR THE ENERGY EFFICIENT OPERATION MODES OF ABSORPTION REFRIGERATION DEVICES (p. 45-53)

Olga Titlova, Olexandr Titlov, Olga Olshevska

The work demonstrates advantages of absorption refrigeration devices (ARD), as well as their essential shortcoming – a larger, in comparison to the compression analogs, energy consumption. In this connection, the main directions are examined of increasing energy efficiency of absorption refrigeration devices and the prospect of direction of improving the systems of automatic control is substantiated. It is shown that the only controlling influence on the efficiency of the ARD performance is achieved by the thermal power supplied in the generator-thermosyphon.

Based on the analysis of the processes of heat mass exchange and the modes of flow of vapor-liquid water-ammonium mixture in the ARU generator–thermosyphon, the ambiguous influence of numerical values of the height of the lift part of the generator on energy characteristics of a standard ARU is shown. On one hand, this increase in height leads to the increase in hydraulic resistances at the motion of the VLM flow and heat losses, on the other hand, there appears a possibility of increasing the surface of heat mass exchange in the absorber.

We run analysis of the effect of ambient temperatures on the ARD and ARU energy efficiency and the conditions of optimal operation.

To examine the working modes of real objects, we carried out experimental studies of the modernized one-chamber ARD “Kiev-410” with a low-temperature compartment (LTC) of the Ash-160 type (manufactured by Vasilkovskiy Plant of Refrigerators, Ukraine)

We obtained a set of quasi-static performance characteristics of the modernized one-chamber ARD “Kiev-410” with LTC of the Ash-160 type along the channels “thermal power supplied to the ARU generator – temperatures of the surface of the ARU elements in control points” at different conditions of heat removal from the external surface of dephlegmator (nominal, intensive heat removal, thermal insulation along the entire length of dephlegmator).

As a result of conducted studies of the real object, we selected 5 types of the working modes of generator: optimal by energy efficiency (III), “waiting” (II), “accelerating” (IV) and two non-working modes (I and V). It was shown that at modes I and V the refrigeration cycle of ARU is not realized. Mode II may be used by designers when working with positional algorithms of control as the “waiting” mode, which ensures the state of “readiness” for the rapid start; mode IV – as the “accelerating” at the start of ARU from non-operating state to the rapid attaining of the working load.

**Keywords:** absorption refrigeration devices, energy efficiency in a wide range of operating temperatures, system of automatic control, thermal power of generator.

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## DEVELOPMENT OF THE ALGORITHM OF DETERMINING THE STATE OF EVAPORATION STATION USING NEURAL NETWORKS (p. 54-62)

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Olga Shkolna, Maryna Sych

For the rational use of thermal resources with the help of optimal control of evaporation station at a sugar factory, it is necessary to carry out the operation control of the states of evaporation station, which is determined based on the current assessments of technological parameters such as levels and temperature in cases of a station, juice and syrup consumption, thermophysical characteristics of vapor as well as the level of its consumption by technological plants of the factory. The algorithm of determining the state of evaporation station as a control object based on intelligent methods of clustering and classification was developed. The applied method of clustering based on the Kohonen self-organizing maps allowed defining a set of possible states of the object on the basis on information hidden in time series of technological parameters of evaporation stations. The application of the method of fuzzy classification allowed determining the state of evaporation station in the current moment based on the values of current parameters of evaporation station and the obtained set of possible states of an object. The developed algorithm of determining the state of evaporation station as a control object is expedient to use in automated control systems with the purpose of operational determining the state of control object in order to make timely decisions on optimal control of evaporation station.

**Keywords:** evaporation station, neural networks, the Kohonen self-organizing maps, clustering, classification.

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