THE COMPARATOR IDENTIFICATION METHOD FOR DYNAMIC FILLING THE THESAURUS OF OPERATIONAL SEARCH ACTIVITIES (p. 4-8)

Nina Khairova, Dmitry Uzlov, Svetlana Petrasova

The use of the thesaurus considerably improves recall and precision of relevant information output of integrated information and criminalistic systems used in operational search activities. The design difficulty of the object-oriented criminal thesaurus consists in the necessity of its constant changes and adapting to new domains. This paper proposes a method for automatic dynamic filling of this particular kind of thesaurus. On the basis of existing thesaurus development standards we propose the semantic linguistic processor for automatic selection of information terms and the method of comparator identification for descriptorization of received notions. The functions of understanding a connected text, key terms, a conceptual-semantic predicate, and a descriptorization predicate introduced in the paper enable to divide the set of terms into mutually exclusive semantic equivalence classes corresponded to semantically similar concepts. This method allows detecting automatically descriptive dictionary entries of a dynamically variable thesaurus adapted to textual information arrays that are used in the process of operational search activities.

The method is implemented as an automatic thesaurus of the information retrieval subsystem integrated by information and criminalistic systems. The conducted experimental study of subsystem results has shown quite high indicators of recall and precision of subsystem outputs.

Keywords: information and criminalistic system, object-oriented thesaurus, comparator identification method, automatic word-list descriptorization.

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DATABASE DEVELOPMENT INFORMATIVE SYSTEM DIAGNOSTICS MEASURE COGNITIVE DISORDERS AT THE PATIENTS WITH DISCIRCULATORY ENCEPHALOPATHY (p. 9-14)

Olena Visotskaya, Irina Panfyorova, Lyubov Rysovana

The information system database for determining the degree of cognitive disorders of patients with discirculatory encephalopathy is presented in the paper. It allows storing information about patients, results of clinical and biochemical blood and urine tests, methods and results of testing and surveys.

The database is required for ordering the laboratory-diagnostic, clinical-psychopathological and psychognostic information, obtained about a patient. A physical model, based on the relational model was developed. It has a simple and user-friendly data scheme in the form of tables, logically interrelated, and does not disturb the performance and integrity of the database during its modification.

This model facilitates the access for medical staff of psychoneurological departments to data for the purpose of timely and correct diagnostics of the degree of cognitive disorders.

Keywords: database, information system, encephalopathy, cognitive disorders, physical model.

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SYNTHESIS OF DATABASE "SPECIALIZED COMPUTER NETWORKS" FOR THE OBJECTS OF OIL AND GAS COMPLEX (p. 14-18)

Sergiy Babchuk

In today's world there are over a hundred different specialized computer networks. Detailed information about them in media is virtually absent. Nowadays, information about specialized computer networks is not generalized and structured. When upgrading, enterprises need to choose effective solutions for particular process sections.

However, there is no methodological framework for effective solution of this problem. The structure of the knowledge base "specialized computer networks" and its mathematical model is given. The basic characteristics and features of specialized digital networks INTERBUS, CAN, CAN Kingdom, PROFIBUS-PA, Foundation Fieldbus H1 are presented in the paper. The developed knowledge base facilitates the structured formation of information about specialized computer networks. Also, it enables enterprise automation experts to select an optimal specialized computer network for a particular control object.

Keywords: specialized computer networks, fieldbus networks, INTERBUS, CAN, PROFIBUS, Foundation Fieldbus.

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MODELLING OF ECOLOGICAL CONDITION IN THE SEVERSKY DONETS RIVER BY ArcSWAT (p. 19-22)

Victor Belogurov, Aleksej Tyurin

It is analysed the wide range of the hydroinformatics programs.

It is found, that GIS technology ArcSWAT is the only way to desing all the main processes of the water cycle for both phases of the hydrological cycle (ground and surface).

It is demonstrated, that SWAT- desing allows to determine the means of water management in the basin, as it is based on classical mathematical description of the fundamental components of the water balance. The calculation experiments have confirmed the suitability of ArcSWAT GIS technology for assessment the contaminant concentrations and solving the water protection tasks.

The presented model is recommended as a basic tool for the assessment ecological efficiency arrangements which is provided in the transfrontier "Inter-regional environmental program for the the water of the river Seversky Donets protection and using".

Keywords: computer modeling, hydrological cycle, water pollutants, environmental problem.

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METHOD OF ANALYSIS OF HIERARCHIES AS METHOD OF CONFIGURATION OF DIFFICULT SYSTEMS (p. 23-29)

Vyacheslav Zadorov, Oleksandr Vasyliev

The author's analysis of existing configurators as a set of programs that allow to structure and organize complex IT for certain domains with the implementation of functional tasks with a specified purpose and adaptation to particular standard situations is conducted.

The author's conceptual schematic diagram of the configurator and approach to creating the configurator considering the option for upgrading components are proposed. The authors have offered to use a mathematical hierarchy analysis method as a tool for forming a list of configurations and their features that the best satisfy the user. The method has been adapted to the peculiarities of the domain. Searching for the composite configuration, i.e. the package (portfolio) of software components as components of the optimal library of the system that performs and supports the efficient configured model of the program complex, i.e. the configuring system is carried out. From a mathematical point of view, the set of alternatives, i.e. configurations, optimal for the user, is defined as the Pareto set.

The global weights of alternatives are found using the methods of distributive, ideal and multiplicative syntheses, supported by configurator. Using the hierarchy analysis method, which allows to select the optimal configurations for the user's needs, the configurator-based complex systems are much more efficient than the monolithic systems with constant software package. Using the configurator, the user gets the software package, the most favorable in terms of business efficiency. The obtained results are used in developing the experimental configurator of information technologies in building (CIT-B) – Configurator of IT – the Patterns-maker of Building (C-IT PMB), which is aimed at configuring IT at certain stages of the life cycle of creating the building object.

Keywords: configurator, configured system, analytical system of model configuration hierarchy analysis method.

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INTERPRETATION OF RESULTS OF INTELLIGENT ANALYSIS OF FUZZY KNOWLEDGE BASES (p. 30-35)

Oleksandr Siedushev, Ievhen Burov

One of the most important factors when considering the results, ob-tained by the intelligent analysis of fuzzy knowledge bases is the readability, comprehensibility, clarity and transparency of the results. All of them can be considered as some aspects of interpretation. It is not obvious today which constraints should be selected or imposed in order to be able to adequately and correctly interpret the output results of the analysis when developing and implementing the extraction methods for fuzzy knowledge bases. The paper describes these constraints and provides a list of its own (for fuzzy sets, membership functions, linguistic variables and fuzzy production rules), which can be used in practice to improve the interpretation of the analysis results and maintain the content of the fuzzy knowledge base at the appropriate level of quality during the extraction process. The feasibility of incorporating each of the proposed constraints is determined according to the specifics of the extraction problem. In practice, it is recommended that as many as possible compatible constraints be used and maintained, as this will greatly simplify the interpretation process by man.

Keywords: fuzzy knowledge base, intelligent data analysis, interpretation of analysis results.

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AUTHENTICITY OF AUTHORSHIP OF SCIENTIFIC PUBLICATIONS USING LATENT SEMANTIC ANALYSIS (p. 36-40)

Andrey Kolyada, Victor Gogunsky

In this research, a latent semantic analysis is used to solve the problem of identifying authorship of scientific publications. It enables the identification of keywords related to a particular subject. It is proposed to use the keywords for identifying similar publications.

This allows distinguishing publications of different authors with the same last names or even initials. Many scientometric databases contain records of publications with the same field "author", but with completely different activities, sources, etc. As a result of the studies, it was found that publica-tions of namesakes have a different set of keywords and, accordingly, different subject-matters.

Applying the latent semantic analysis can be used to classify these pub-lications, as well as highlighting the keywords, which bind to the author, in turn, enables determining his publications with some accuracy. The research results allow automating the creation of local databases of researchers with a list of their scientific papers.

Keywords: identification, publication, indexing, latent, semantic analysis, classification, information, singular, matrix.

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EFFECT OF PRESSURE FLUCTUATIONS IN PRECISION CONTROL PARAMETERS HYDROTURBINE (p. 41-44)

Gennady Kanyk, Andrey Mezerya, Dmitry Irikov, Vyacheslav Melnikov

Ensuring effective automatic control of hydraulic turbines is an important and relevant scientific and technical task, which will allow to improve technical and economic characteristics and reliability of hydraulic units, as well as the frequency stability of electricity, generated by hydraulic power plants.

Pulsations of pressure and flow rate, as well as other disturbance parameters, which inevitably arise during its operation, should not significantly change the turbine characteristics and lead to a considerable increase in the load on the structural elements, but due to the presence of high-Q resonances in hydraulic turbines, the issues on reducing its automatic control system stability and its impact on the hydraulic unit operation as a whole remain open.

The analysis of pressure oscillations in the static mode and load change mode is performed; ways for reducing and taking into account pressure fluctuations in the automatic control system of hydraulic turbine are identified in the paper.

Keywords: automatic control system, hydraulic turbine, pressure pulsations, pressure fluctuations.

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TWO-LEVEL CONE CRUSHER CONTROL SYSTEM (p. 44-51)

Oleksii Mykhailenko

Today, improving the efficiency of managing technological processes of ore-concentration plants takes a prominent place in the task structure of the mining and metallurgical complex. This issue can be solved in two ways. On the one hand, it requires a complete replacement of production lines using modern equipment. On the other hand, increasing the production efficiency can be achieved by upgrading existing machines and units through developing more sophisticated algorithms and control systems. The paper proposes using the second approach for improving the efficiency of technological processes of ore dressing, namely, crushing of raw materials in cone crushers. For this purpose, the extremal control search system based on the economic quality criteria is proposed. It was found that the target function is unimodal within productivity variation margins by the initial feeding of the crusher. Herewith, the optimum fluctuates when the width of the crusher opening changes. This feature conditions the choice of the control method. Furthermore, basing on the experimental data, obtained at the "NKMPC" (Novokrivirozhskiy mining and processing complex) PJSC "ArcelorMittal Krivoy Rog" crushing plant №2, the dynamic model of a cone crusher by the "width of the crushing opening – electric power" scheme was obtained. The simulation experiments conducted in the MATLAB proved the economic feasibility of implementing the proposed control system into production.

Keywords: cone crusher, target function, extremum seeking control, hierarchical system, modeling.

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INFORMATION TECHNOLOGY QUALITY MANAGEMENT PROCESS OF GROWING SEMICONDUCTOR SINGLE CRYSTALS (p. 52-56)

Igor Shevchenko

A complex of information technologies for quality management of growing semiconductor single crystals is developed. The complex includes information technology for temperature field monitoring, information technology for operational decision support on the growing mode correction and information technology for optimizing geometrical parameters of the heat shield of growth setup. Growing semiconductor single crystals in most cases is carried out by the Czochralski method. Growing process is a complex combination of thermal and mechanical phenomena and is characterized by nonstationarity. Therefore, using stabilization and program management systems does not guarantee

the process stability. Control over axial and radial temperature gradients in the ingot and the crystallization front zone is necessary. However, existing growing control methods and systems do not allow to realize these functions. The proposed information technologies implement indirect measurement of parameters of temperature fields in the melt and the ingot. This allows timely identify adverse situations and give recommendations for their elimination. In addition, it became possible to optimize the heat shield size and position in the ingot cooling zone. Implementing information technologies has allowed to reduce losses from the growing process failure and the cost of experimental works on selecting the geometric parameters of heat shields.

Keywords: information technology, growing single crystals, monitoring, decision support, optimization.

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ADAPTIVE CONTROL SYSTEM OF TEMPERATURE REGIME OF POLYMER MATERIALS EXTRUSION (p. 57-61)

Oleksii Zhuchenko

An adaptive system of controlling the temperature mode of an extruder under normal operation conditions is presented. The analysis concerning the importance of maintaining the given temperature of the extruder when manufacturing polymer materials was carried out. The necessity in applying the principle of adaptation while conducting the process was substantiated. As a controlling object, a single-screw three-zone extruder was used. As a model, the autoregressive-moving average model was proposed. The results of studying the adaptive control system with different methods of identifying the model parameters, basing on the recursive methods of least squares and their modifications, were given. The synthesis and studies of various structures of the adaptive controller were carried out. On the pretext of the conducted studies, the most effective structure of the adaptive control system, which supports the device at the specified temperature level, was proposed.

Keywords: extruder, control system, adaptation, controller, identification model.

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