

Summary
«INFORMATION SYSTEMS AND NETWORKS» BULLETIN
INFORMATION SYSTEMS, NETWORKS AND TECHNOLOGY

1. Берко А.Ю., Висоцька В.А., Сороковський М.М. Застосування методу контент-аналізу для формування інформаційних ресурсів у системах електронної контент-комерції

**APPLICATION OF CONTENT ANALYSIS FOR THE INFORMATION
RESOURCES GENERATION IN THE ELECTRONIC CONTENT
COMMERCE SYSTEMS**

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Problems (terms of reference) of the information resources processing in the electronic content commerce systems are topical through the active research development in the e-business field and the lack of theoretical justification of standardized methods and the unification of software tools for the content generation, management and maintenance. There are new approaches / solutions to this problem but there is an inconsistency between the known technology of the information resources processing and the principles of the electronic content commerce systems development. There are no general approaches for these systems engineering, their generic architecture type and the unified methods of content generation / management / maintenance.

The relevance derives from the e-business globalization; demand growth for commercial content and quick access to it; irregularity in the business processes functioning in accordance with the regions; the need to promptly / regularly / periodically obtain the necessary content; saving time / resources to obtain the required content; personalization in service delivery and integrity of electronic content commerce systems. The advantages of these systems implementations involve increasing the efficiency of the content obtaining; reducing the production cycle and sales of the commercial content; reducing costs associated with the content exchange; openness for the users; automatically informing the users interactively; the creation of alternative sales channels.

The feature of the electronic content commerce use is openness (access for all companies / users), globality (access from anywhere), unrestrictedness in time (access anytime), straightforwardness (low barrier to the market entry) of the system processes, direct user interaction (reduction of distribution channels and the elimination of the intermediate links); automatic requests processing and tracing information about users, reducing the costs of the e-business functioning and the provision of additional information in the interactive mode.

Content is the basis of the online magazine in which a user carries out a search to obtain the necessary information. But texts are full of the key words and it is not always sufficient to ensure the user has received the necessary information. In addition, the keyword spotting for each article is long and time consuming process. Through the formalized method of the content analysis the process is fully automated and happens when the authors add a new article. They determine the similar articles to those seen by the user and display them. Using keywords the user receives not entirely similar article, or not similar to what he is interested in (to increase the popularity of the article the authors add keywords on various topics). The advantage of using content analysis is the content determination for a specific request, for example, the detection of the content absence on a certain topic and focusing the authors on the development of this issue.

In the online magazine there is implemented the article distribution. At the entrance there are the raw articles that are sent to the articles processing unit. According to the rules in the form of search parameters, dates and keywords of the viewed articles the article distribution by the categories (popular, similar, selected in the search result or last reviewed) is made and they are placed in the database. The process is controlled by the administrator. Developed articles are introduced into the blocks for the popular articles search (with the most reviews), last reviewed (by the publication date within the period from the set to the current date), parametric (according to the user settings) and similar (by the keywords from previously reviewed articles by the user) and the result is displayed.

Developed articles get into the search block for the matches of the keywords previously reviewed by the user. The generated list of articles is sorted by the number of matches for further screening that is most similar to the reviewed one by the author. The first articles are selected the number of which is specified in the system settings. Further work of the article author, currently under review, is moved to the top of the list and displayed for viewing by the user.

The article dwells upon the development of the unified methods of the information resources processing in the electronic content commerce systems. The formal model and generalized typical electronic content commerce system architecture is developed. The design methods and methods of the electronic content commerce system implementation on the example of the online magazine are developed. This magazine reflects the results of theoretical studies.

Keywords - content, information resource, electronic content commerce systems.

2. Бойко Н.І. Моделювання Web-орієнтованих систем та напрямки розвитку Web-ресурсів

WEB-ORIENTED SYSTEMS MODELING AND WEB-RESOURCES DEVELOPMENT DIRECTIONS

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Today there is developed a wide range of software and hardware for the web systems building. However, further development of web-technologies is impossible without a solid formal mathematical basis development, above all without creating of a web system formal model. Without such a basis it is impossible to develop methods for its design. As a consequence, there are no extensions for web technologies of the well-established methods and the analysis and design tools of information systems (in particular, of structural methodologies). The nonexistence of a web system mathematical model makes it impossible to develop the intellectual tools of their administration based on its optimization algorithms and the prediction of the time-dependent behavior.

The need for the modeling of the multiple level web-system of global nature leads to the need to develop their formal models and algorithms to optimize them as a basis for the qualitative development of the effective systems, regardless of their complexity and nature.

The diversity and multidimensionality of the research problem and the construction of these resources in the global information network has led to the emergence of a significant number of publications with have a direct or indirect relevance to the subject of this study. A number of papers [1-10] are focused on the features of the websites generation, touched on the issue of the information resources formation, including digital resources and search for the information through them and some aspects of the information technology of the web resources representation.

The subject of the research is the functioning of the websites, peculiarities of the information resources formation and maintenance, organization of access to them, the development prospects of these resources in conditions of the society IT penetration taking into account the modern historical stage of Ukraine development.

The methodological basis of the article is the general scientific approaches to the scientific knowledge (system, functional, structural, modeling). Methods of information analysis are used. It allowed explore the web sites specifics and development, delineate the complex of the topical scientific and technological issues of the site formation and its resources use.

The topicality is due to the issues of IT penetration, information and communication technologies implementation in the economic activities of the enterprises and familiarization with the basic models and information databases of web-oriented systems.

The purpose and objectives of the study. Today there is a variety of web technologies used for the websites creating and they continue to develop. The aim of the study is to develop methods and algorithms for the information systems modeling implemented on the basis of web-technologies, and the establishment of the procedures for the web systems structure optimization.

The article discusses a typical example of the web systems coordination. The main problems while building the effective web sites and approaches to solving these problems are described. In particular, the basic sites efficiency indicators are studied and the methods for their improvement are determined. There are

analyzed directions for the development of information systems built on web-technologies. We have formulated the main approaches to web technologies implementing. We have considered a structurally functional model of a software package for the web-oriented systems designing and there is a description of the structural modules included in its composition.

Keywords - Internet, World Wide Web, HTML language, web technologies, web systems, web-oriented systems, website, programming language, technology, information systems, script, module.

3. Буров Є.В. Застосування онтологічних моделей для побудови програмних систем

ONTOLOGY MODELS APPLICATION FOR THE SOFTWARE SYSTEMS DEVELOPMENT

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Increase in the integration degree of the enterprises business processes, the e-commerce development and world economy globalization lead to the increase in the rates of change in the business environment and, as a consequence, the need for constant adaptation of software systems to the changing environment of their functioning.

Traditional methods of design and architectural principles of the software systems building are focused on the software product development based on a fixed set of requirements. Hence, we get the systems that do not respond well to changing requirements and external factors which are expensive in the support and operation. There are often failures and emergencies in these systems.

The modified requirements usually lead to the necessity of a new version of software product release that requires the time-consuming and resource-intensive stages of analysis, design, coding, testing and implementation of a new product version.

Adaptation of a software system requires a consideration of the expert knowledge of the relevant subject areas. Typically, these experts are not programming experts. Hence there is a need for a clear statement of the system developer requirements by the experts. Errors and misunderstandings in the management system requirements in the conceptualization represent a significant proportion of the failure causes in software development. One way of solving this problem is to separate the logic of the software system functioning from the mechanism of its processing and implementation. Meanwhile, the functioning logic is represented in the form of a particular formal model. One way of implementing this approach is MDD / MDA (Model - driven design / model-driven architecture) established in the works by Shlaer and developed by Mellor. This approach is the formalization of the program in the form of models and their subsequent compilation into code. Long-continued cultivation of this approach, in addition to the benefits, identified its significant shortcomings, in particular, the complexity of the creation and modification of the models complex which is comparable with the complexity of creating a system in the traditional way.

Another way of MDD implementing is the use of ontologies for the software systems building. Indeed, by Gruber definition an ontology is a formal model of the subject area conceptualization. This model contains the definition of the subject area entities and dependencies between them. Building software systems based on ontologies we avoid re-conceptualization of the subject area, thereby reducing the use of resources at the analysis and system design stage. A barrier to the use of ontologies when building software systems is purely a declarative nature of ontologies, their lack of procedural knowledge representation.

The paper shows the mathematical formalization of a software system built on the basis of the ontological models. The apparatus of the algebraic type theory is used for its construction. We have developed a formal representation of models and their systems processing.

The use of ontological models can improve the efficiency of solving problems in various subject areas. Theoretical and experimental studies on the development of methods of the ontological models in the business analytics systems held within the state budget topic at the Information systems and networks department in Lviv Polytechnic National University for several years. In particular, the experimental model of an instrumental program complex for the system modeling using ontological approach and models is developing. A mathematical model of knowledge representation presented in this article provides a formal basis for building a tool set and its validation.

Keywords - knowledge base, mathematical model, ontology, model

4. Василюк А.С., Басюк Т.М. Адаптивний синтез формул абстрактних алгоритмів

ADAPTIVE SYNTHESIS OF THE ABSTRACT ALGORITHMIC FORMULAS

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There is a known algorithmic algebra which has the unconventional operations, for example, sequencing, elimination, parallelization and cyclic operations which are marked by special signs that are not known among mathematical symbols. For typing and editing the abstract algorithmic formulas there is developed a specialized MODAL computer subsystem. But it does not perform an automatic adaptation of the abstract algorithmic formulas. In graphics packages such as Microsoft Visio, Corel DRAW, Adobe Illustrator there is not implemented the adaptation system of algorithmic formulas. Editing processes and algorithmic formulas composition are considerably more complicated without the implementation of such functions.

In the known works the approaches to solving the described problems are discussed, however, with all the diversity in no study the authors did not analyze and describe the main challenges that emerge while attempting to adapt the algorithmic formulas.

With all the urgency of the problem today we have a relatively little accumulated experience of its solution which is primarily determined by a relatively new research direction.

As you know, when you try to compose and edit the algorithmic formulas by means of the known information systems there are significant difficulties. The main reason is that these systems do not implement the adaptation process without which it is virtually impossible to correctly reproduce the algorithmic formula. The objective of the study is the synthesis, research and the construction of the mathematical software process of the algorithmic formulas adaptation.

The synthesized, minimized and studied mathematical model of the adaptation algorithm of the abstract algorithmic formulas describes the identification of the subalgorithms of the basic operations adaptation to the nested formulas and the nested formulas to the basic ones. Its realization provides the greater visibility of the algorithm presentation in the form of formulas of the abstract algorithmic theory. Research of mathematical model before its implementation and testing ensured the detection of errors made in the process of its synthesis and proves that it describes the necessary processes. The processes of the adaptive synthesis of the algorithmic formulas are described through the abstract adaptation algorithmic formula of the abstract algorithms.

The definition of the adaptation processes of the algorithmic formulas is described. We give an algorithm of the algorithmic formulas computer adaptation. A mathematical model is synthesized, minimized and constructed and the adapting algorithm of the basic operation sign is studied.

Keywords - adaptation, adaptive synthesis, algorithm, mathematical model.

5. Верес О.М., Кушнірецька І.І. Проектування системи підтримки прийняття рішень виборця у вигляді веб-сайта

PROJECT OF DECISION MAKING SUPPORT SYSTEM FOR VOTER IN THE FORM OF WEB-SITE

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The constant innovations, rapid development of social progress, opening of new and new technological novelties is our present time, in which there is such a concept as a system for decision support (DSS). The main objective of this system is to help a person in making any decision. Classification systems occupies a special place in these types of systems. The result of such a system is extremely important, because it is obtained fast enough and a person does not need to make colossal effort. Classification systems distribute objects according to certain classification criteria. An important task in the classification of objects is the construction of the feature space, or in terms of a theory of pattern recognition - the original description of the object. When forming the initial description of the object the task may be complicated by the fact that a posteriori selected features can be distributed across heterogeneous groups. In such cases, the

common processing of given groups in order to determine the degree of influence of each feature on the classification process. In many cases due to the significant heterogeneity and multiple scopes of features given problem is complicated and its solution depends on classification means that are used, and the processing algorithm of input parameters. It is advisable in such cases to use facet classification.

In the process of creation a DSS for the voter in the form of web-site it is needed to consider the level of control of access to the system and the maximum updating of information that relates to the political forces that are considered in the system. Every able-bodied citizen of the state upon reaching the age of discretion gets the right to vote, according to which has the opportunity to participate in elections of the country. The election of the head of state usually does not cause major difficulties. Another thing, when it is the elections to the Verkhovna Rada. In the elections to the Parliament is involved quite a large number of political parties and blocks from which is quite difficult to choose such a concrete political force that would be in the interests of the voter. The possibility to group a list of political parties in accordance with the interests of the voter may simplify the whole process of voting. The choice of the voter will be maximum correct and justified, because the voter will give the selection criteria on his/her own.

Nowadays in various fields of human activity is accumulated a huge amount of information about the various tangible and intangible entities, their properties, behavior and relations. Quite often a problem may arise concerning the speed of finding the right information, according to defined criteria and objectives, if processing of large data amounts and compiling of various reports kinds are considered. A large amount of data can contain heterogeneous information that makes the search extremely long and the time expenses for its implementation are completely unproductive, especially in systems of a political nature, where democratic structures function and democratic procedures have become the norm. The problem lies in the correct choice of the population and the individual voter in particular such a democratic structure that would meet all the demands. Constant changes and various innovations in political systems happen fast enough and not predictable, therefore constant monitoring of all the news in this area is required. The functioning of the DSS website for the voter should be based on absolute control of access level. The diversity of political structures and only their name does not give a complete picture of their descriptions, that in turn absolutely does not improve the selection made by the person who is the participant of the electoral process. When processing such data can be useful to utilize the grouping by requisites-features and performance using a particular system. Such a representation is possible in the system of decision support for the voter, which structurally uses the website and works on the principles of grouping, which occurs on the basis of systems of classification and coding.

To solve the problem of decision making by the voter the functioning of the system of decision support for the voter in the form of a website is considered. The creation of a system with a maximum possible control system of system user access rights is shown. The practical significance of the developed system lies in expanding the sphere of applications of the developed methods and automatic classification systems and the division of objects according to facet features.

Proposed facet formulas are able to work with text arrays of large dimension, the developed system allows to improve the voting process, without making user colossal effort and much time. All this makes possible the application of these developments data to a wide range of similar tasks. The effectiveness of the developed system of support of decision-making is demonstrated by the example of classification of political parties, where the classification attributes are the programmes of political parties.

Further research will be devoted to scientific search of expanding the scope of applications of developed and proposed methods in the design of systems of another type.

The general characteristic of the system of decision support for the voter in the form of a website is given. The principles of operation of the DSS for the voter through the use of a classification approach are described. The process of developing a system of control and management of access rights for users of the website is shown.

Keywords - DSS, web-site, classification, access control.

6. Веровчук В.В., Вовк О.Б. Прогнозування поведінки інформаційного продукту

FORECASTING THE BEHAVIOR OF THE INFORMATION PRODUCT

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In today world, information that is the part of information product is considered as an important factor of qualitative changes in society life and is such an influential part, as material or energy resources.

However, not all information products have a chance to be successful. In a fast changing market situations, the making of well-grounded decisions regarding the prediction of information product behavior is possible on the basis of analysis of key indicators and trends of development of information product, consumer demand for it etc.

Therefore it is necessary to forecast the possible changes that will affect information products. The need to predict is also caused by the fact that the behavior of product information may change in the process of new information occurrence that requires a new assessment of possible ways of information product behavior.

At the end of 2010, the European researchers concluded that the conceptual definition of "information product" concept is unclear. This is evident in practical work: not harmonized data formats, different number and range of indicators, different methodological approaches for data collection. Therefore, the concept of "information product" and the conception should be clarified.

The study contains the choice analysis of method and means for predicting the information product behavior as well as the forecast using a combination of two different methods for scenario of behavior "Seasonality".

1. The substantial review of the literature on this subject is made.
2. The definition of the main concepts is given
3. The set of factors is formulated
4. Their numeric values are identified
5. The mathematical dependence in the form of corresponding graphs is built.

This study gives a possibility to identify the ease of use of models and analyze the behavior of an information product. By studying the given results can be concluded that the obtained prediction of the behavior is really truthful and satisfies us. It's also worth to notice that the means of Statistica program much facilitate the fulfillment of this task in comparison with other means of such type data processing.

The article presents the classification of forecasting methods. The tentative model of prediction calculation is done. The forecast of the development of information product based on mathematical software "Statistica" is made.

Keywords - information product, forecasting, information society, information technologies.

7. Годич О.В., Мазепа Т.П. Візуалізація даних, кластеризованих динамічно-інтервальною самоорганізовною картою

DATA VISUALIZATION OF CLUSTERIZED BY DYNAMICALLY-INTERVAL SELFORGANIZED MAP

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Visualization of the cluster structure of high-dimensional data is one of the central research topics of data analysis and knowledge engineering. Self organized Kohonen maps are an efficient data clustering technology, which enable their visualization. However, the practical use of Kohonen maps points to a number of disadvantages:

1. static, pre-defined structure of the neural lattice, which leads to inadequate approximation of the data in conditions of the wrong choice of number of elements and the topology of the neighbourhood;
2. the mapping Φ , that is implemented by a trained Kohonen map, provides a "point" approximation of the data, and therefore, there is always an element of the best approximation making it difficult to identify the false classification;
3. the inability to finish Kohonen maps; in practical tasks there is a need to clarify the data model that in the case of Kohonen maps leads to a complete restructuring of the display Φ .

Dynamically-interval safe organized map (DISM) was developed to overcome these shortcomings. The ideas of the process of self-organization of Kohonen maps and the bases of interval analysis. Using interval weight vectors in the elements of the DISM allows to construct hypercube areas of the data space for

their modeling. The construction method of interval vectors uses the hypothesis of λ -compactness that distinguishes technology DISM among other studies.

Among the disadvantages of the DISM in comparison with Kohonen maps is the lack of a structured two-dimensional grid of its elements. In the case of Kohonen maps, it provides the possibility to visualize the cluster structure of the simulated data in the plane, that facilitates the analysis of high-dimensional data.

Taking into consideration the topicality of data visualization, the purpose of research described in the article is to overcome this drawback. The objectives of the study are to develop a method of visualization of the cluster structure of the data simulated DISM and analysis of the adequacy of this method for high-dimensional data.

The developed method allows us to make a qualitative step in the direction of solving the issue of data visualization of the simulated DISM. The experiments indicate to adequate visualization of the cluster structure of high-dimensional data. At the same time, it seems as for Kohonen maps, the developed method does not possess the ability automatic binding of small clusters into larger clusters, that complicates the data analysis. To demonstrate this shortcoming is used the Iris dataset for which the map of DISM heights is made.

It is easy to verify that using only this image is quite difficult to determine how many clusters are present in the data. Knowing that the Iris dataset contains three clusters, the height map can be divided into two boundaries are more intense color. Indeed, these boundaries delineate three clusters of data. In our previous study was developed by semi-automatic method of consolidation of data clusters for the Kohonen map. In further studies it is planned approbation of this method maps the DRIVE.

Additionally, it is needed to pay attention to the execution time of the developed method of DISM visualization in comparison with the technology of Kohonen maps. Taking into consideration the characteristics of the learning algorithm of DISM map, the acceptance time of Kohonen maps for the design of the DISM elements in two-dimensional space for all used data sets, was three times faster than building of Kohonen maps on the original datasets.

It is noticed that we have not performed an asymptotic estimation of algorithmic complexity of DISM teaching methods. This is one of the important tasks of further research and development of technologies for data analysis on the basis of the DISM.

The work solves the problem of visualization of the cluster structure of high-dimensional on the basis of data model received by dynamically-interval self organized map (DISM). The developed method visualization method uses Kohonen map to design elements of the DISM on the two-dimensional lattice in combination with the algorithm of U-Matrix for visualization of data clusters.

Keywords – data visualization, data analysis, self organized map.

8. Григорович В.Г., Назарук М.В., Пасічник В.В. Інформаційні параметри загальноосвітнього навчального закладу

INFORMATION PARAMETERS OF GENERAL EDUCATIONAL INSTITUTIONS

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The introduction of new technologies of education based primarily on the use of modern intelligent educational technologies, requires solving the problem of transformation of general education schools - the transfer of each school in the state, when the application of the latest learning technologies will be technically possible.

To solve this problem it is necessary to design and implement an expert system, a software generator of projects of transferring each school from the current (actual) state to the destination state. The creation of such software generator of projects requires building of school information model, which relies on a set of parameters describing the school. To form the given set of parameters it is necessary to consider and evaluate the attributes that characterize general education schools in thenormative documents, in Government projects of the education development, and other sources and to select those that can be the basis for building the set of parameters of the information model (according to the terminology of the subject area: the term

"dimension of the hypercube data that implements one of the attributes of parameters of the information model in regulatory documents meets "the criteria of evaluation of educational institutions").

The given study is bind to the implementation of the National project "Vidkryti svit (Open World)", which purpose is the creation of information and communication (4G) of educational network at the national level". The given project, according to the Decree of the President of Ukraine dated 08.09.2010, No. 895, is a National priority "New quality of life".

The article analyzes the estimation parameters of activity of educational institutions recommended by the Ministry of education of Ukraine, state education authorities, the National project " Vidkryti svit (Open World)", "the system of stars " by V. Spivakovsky and parameters of evaluation of school according to foreign sources.

On the basis of the made analysis the classification of sources of information acceptance about the parameters of evaluation of educational institutions is introduced. Each parameter is proposed to refer depending on its possibility of use in constructing an expert system to one of the subgroups (categories): fixed attributes F, formal attributes I or important V.

The information model of general education institution based on system states space. To implement the information model is proposed to use the data hypercube which measurements are based on quantitative and qualitative characteristics of general education schools. This data model is used to implement the expert system software generator of transforming projects of each school from the current (actual) state into the target one, which make possible the application of new teaching technologies, based primarily on the use of modern intelligent educational technologies.

The article are discussed in details and analyzed the attributes of an estimation of activity of general educational institutions. A set of parameters that will be used when building information model school for the purpose of its implementation in complex intellectual information technologies of generation of projects of transformation of the school is defined. A classification of the attributes of estimation of educational schools based on the suitability for use in constructing an appropriate expert system.

Keywords – attributes of schools evaluation, attributes categories, information model of school.

9. Кісь Я.П. Інтелектуально-інформаційна система управління діяльністю фармацевтичного підприємства

THE INTELLIGENT INFORMATION SYSTEM OF THE MANAGEMENT OF PHARMACEUTICAL ENTERPRISE ACTIVITY

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In modern conditions of Ukraine transition to a market economy in each sector of the economy is made the search for new approaches and methods of production management and service rendering, the analysis of the current state is made, future prospects are described. Such approaches are typical for the institutions that render services in the distribution of medicines and medical products in pharmacies, wholesale pharmaceutical warehouses, pharmacy kiosks. In the conditions of market economy, the efficiency of pharmaceutical companies in the long term, high rates of their development, increasing of competitiveness and quality of drugs are largely determined by the level of management of material resources. The massive use of information technologies opens the possibility of creating unique services for the population and participants of the pharmaceutical market. An important principle of this work is a comprehensive automation and economic independence of pharmaceutical companies. Drugs as goods, through their high consumer value and for what they are element of the system of medical care, have a number of features. Disposing of medicines, pharmacies carry on their production and trading activities. To do this, they purchase the goods at wholesale prices on pharmaceutical warehouses and sell them at retail prices, obtaining the appropriate trade allowances, which cover all costs of the pharmacy. The recoupment and interest of pharmacy institutions in profit makes these institutions to spend economically their means, increase productivity, improve the organization of production processes at all stages from the receipt of medicines for sale to the population. Each pharmacy must cover all of its costs associated with activities of payment to suppliers, maintenance of premises, payment of salary and other expenses due to the profit from the realization of medicines and products of medical purpose. Economic activity includes not only full

coverage of revenues over all costs, but the net profit of the pharmaceutical companies. In a market economy, the efficiency of pharmaceutical companies in the long term, high rates of development, competitiveness and quality of drugs largely are determined by the level of resource management of pharmaceutical enterprises. Currently the management of material resources is not optimal, which negatively affects the efficiency of pharmaceutical companies. Important reserves of improvement of this activity is a parallel implementation of a logistics approach, international rules and standards in pharmaceutical companies that will allow to optimize costs and increase the quality of medicines.

The topicality of this subject is due to the high dependence of the final results of a pharmaceutical company from efficient management of resources, lack of readiness of software tools for managing and optimizing their flows; choice of suppliers of substances and materials; management and inventory control of substances, materials and medicines; optimization of the production program; formation of information flows taking into consideration the specificity to pharmaceutical production.

A systematic approach to solving problems is also implemented for electronic system of wholesale orders of medications, medical products, information about the availability of products in retail and wholesale enterprises. The peculiarity of the wholesale market, taking into account the best technical solutions, allows companies and companies with intelligent automated orders systems to work more effectively. Collaboration of retail and wholesale orders in conjunction with the electronic document management system to create a system of simple and affordable services to ensure clients with medical and pharmaceutical preparations. All such intellectual information systems possibilities become available to pharmacies and pharmaceutical companies that implement such approaches.

Intelligent information system analyzes the existing approaches to the management of material resources, evaluates the condition of the material management and processes of control in the pharmaceutical enterprise. During the process of software development were investigated features of the implementation of logistic approach in the management of material resources of pharmaceutical enterprises, and are developed methodological and practical foundations of an complex approach to the selection of suppliers, substances and materials. Conceptual model of management of a pharmaceutical company, formed a logistics approach to inventory management and requirements regarding the terms and conditions of storage of medicines, materials and an algorithm for optimal movement. The model of optimal regional pharmaceutical sales policy of the enterprise and the calculation of the optimal suppliers is developed. The methodology of a complex estimation of efficiency of resource management in the pharmaceutical company is created. When developing the system, a systematic analysis is made, conceptual model of a pharmaceutical company is presented, the main processes of the system are detailed, the main aim of system and the main objectives of system are defined on the basis of which pharmaceutical company acts. The expected effects of the implementation of the system is the reduction of management personnel, a significant simplification of the work of pharmacists and accountants, increasing speed of service for customers and suppliers, and therefore the increase in turnover, increase in profit, increase of customer confidence by reducing the probability of errors in connection with the automation of the processes of pharmaceutical activity.

The article describes the method of data collection, analysis and processing of information by subject area of pharmaceutical enterprise. The scheme of functioning of the algorithm and data processing methods in a given subject area are developed.

Keywords - information systems, intelligent information systems, collection and analysis of information, data processing methods, pharmaceutical enterprise.

10. Кравець П.О. Заохочувальне навчання мультиагентних систем

INCENTIVE LEARNING OF MULTIAGENT SYSTEMS

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The functioning of majority of modern information systems (IS) is based on hard-coded algorithms. In conditions of unpredictable environmental effects in such systems may disrupt the stability of the system modes that can lead to all sorts of emergency situations. To prevent the critical states software of distributed IS should be composed of interacting autonomous modules, be intelligent, flexible, able independently to track the change of states of the external environment and to take timely and appropriate decisions.

Otherwise, such systems should be based on the principles of agent-oriented methodology. The agent of IS is a autonomous software module with elements of artificial intelligence, able to make decisions independently, to interact with the environment, other agents and human being in the course of solving the task. The interaction of agents of IS is implemented within a computer network. The population of agents in a computer network that solve the joint problem is called multi-agent system (MAS).

The functioning of MAS is usually carried out under conditions of a priori uncertainty of the information about the statuses of environment of decision making and the actions of other agents. In this regard, the strategic behavior of agents should be adaptive due to the ability of agents to the self-teaching. Among the methods of learning under uncertainty practical appeal is received by methods based on stimulation, as they do not require a mathematical model of the environment and ensure the possibility of decision-making directly in the learning process. The mechanisms of reflex behavior of living organisms with a developed nervous system make the basis of stimulation learning. Effective method of encouraging learning is Markiv Q-learning, which provides a numeric identification of the characteristic function of dynamical system in the space of state-action. The function of total expected reward of the agent is typically in the form of the characteristic function.

In comparison with monoagent systems, structure, functioning and research of methods of multiagent Q-learning is much more complicated. Due to the collective interaction of agents stationary environment is transformed into a class of non-stationary. The change of environmental states and the value of the winnings of each agent depend on actions of other agents. In general in MAS the agent cannot reach the maximum winning equal to its winning in monoagent system. Optimal winnings of agents must be balanced and meet the criteria of benefit, justice, equilibrium. So, instead of the criterion of scalar maximization of the winnings of monoagent system, the criteria of vector maximization of MAS winnings, for example, equilibrium according to Nesh, Pareto optimality, etc are introduced.

When using the method of MAS Q-learning occurs iterative construction of a system of characteristic Q-functions in the space of state-action, with the growth of the elements of these functions is made in the direction of achievement of their collective balance.

To build MASS, it is needed to perform a preliminary studies on the basis of adequate mathematical models that allow to study the dynamics of the system under uncertainty, build strategic behavior of the agents that provide the best technical and economic parameters of operation of the system. Taken into consideration the characteristics of the subject area, namely, multiagent form, the uncertainty of the environment of decision making, antagonism, or competition of goals, communication, action coordination, adaptability of strategies of the behavior of agents to build models of MAS is used the mathematical apparatus of the theory of stochastic games. The solving of stochastic games lies in the search for such strategies of agents that maximize their winnings to provide certain collective balance of interests of all players. The search for optimal strategies of players in the conditions of uncertainty is workable based on the method of incentive learning.

The aim of this work is to build an iterative method of encouraging learning for solving stochastic games of MAS in the conditions of uncertainty. The goal should be reached based on the development of a model of multi-agent stochastic game, determination of the criteria of a collective equilibrium, method and algorithm for solving game problems.

The given method of incentive learning in determined variant requires knowledge of each agent in Q – functions of all other agents. These functions are used by agents to identify strategies that ensure the dynamic method in the direction of points of collective equilibrium.

Function values can be obtained as a result of the exchange of information between agents. If integrated information about the Q-functions are not available to the agent, then the agent must determine their values independently in the learning process, observing the current winnings of other agents and performing evaluation of Q-functions. If such observations are not possible, then agents can perform a reflexive evaluation of Q-functions of other agents.

Another way of constructing algorithms of incentive learning of agents under conditions of uncertainty lies in the application of the method of stochastic approximation for the corresponding conditions of the collective equilibrium.

Practical use of methods of gaming incentive learning requires a preliminary analysis to determine the conditions of convergence to the collective state of equilibrium. Such studies are carried out on the basis of

estimation of sequences of random variables that characterize the current deviation strategies of players from their optimal values.

The speed of convergence of Q -method of incentive method is determined by the parameters α_i and T . Parameter α_i must satisfy the general conditions of the stochastic approximation. The value of the parameter T depends on the absolute values of the elements of the Q -matrices. It was established experimentally that given in the work matrices of average winnings which elements take values from the interval $[0, 1]$, the convergence of the gaming Q -method is provided when $T \in (0, 0.2]$ in the range of values of the parameter $\alpha_i = t^{-\kappa}$, $\kappa \in (0, 1]$. The highest speed of convergence of game method of incentive learning is achieved when $T = 10^{-2}$.

The article the problem of incentive learning of multi-agent systems in a playful formulation is described. The Markiv model of stochastic game is made, criteria of game-based learning are formulated, Q -method and the corresponding algorithm for solving stochastic games are described, the results of a computer implementation of the Q -method is analyzed.

Keywords - multi-agent system, stochastic game, incentive learning, Q -method.

11. Литвин В.В., Бобик І.О., Угрин Д.І., Шевчук С.Ф. Аналіз методик розвитку віртуалізації для технології CLOUD COMPUTING

ANALYSIS OF METHODOLOGIES OF VIRTUALIZATION DEVELOPMENT FOR TECHNOLOGY OF CLOUD COMPUTING

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The ability of one computer to do the job of multiple computers through the distribution of its resources across multiple environments is the basis of virtualization. Using virtual servers and virtual desktops it is possible to host several operating systems and applications in a single location, including remot form. Thus, the physical and geographical restrictions cease to have any value. In addition to energy savings and cost reduction due to more efficient use of hardware resources, virtual infrastructure provides high availability of resources, more efficient management system of personal computer, enhanced security and improved recovery system in critical situations, that give a possibility it widely to use as a component of cloud computing.

Virtualization is a technology that is useful for any computer user. Millions of people and thousands of organizations in the world, including organizations from the Fortune 100 list, solutions are applied, such as software product VMware for the virtualization to reduce costs of information technology and simultaneous increase of productivity, efficiency of use and flexibility of available computing hardware. Among the benefits of software virtualization implementing for different kinds of organizations are the following:

- server consolidation and infrastructure optimization. With the help of virtualization you is possible to achieve much more efficient use of resources because it provides the incorporation of a standard infrastructure resources into a single pool and goes beyond the outdated model of "one application per server";
- reduced spending on physical infrastructure. Virtualization reduces the number of servers and associated information technology equipment in the data center. As a result, maintenance, power and cooling material resources requirements are reduced, and information technology consumes considerably less means;
- increased flexibility and speed of response of the system. Virtualization offers a new method of managing the information infrastructure and helps administrators to spend less time on tasks that are repeating, for example, initiation, configuration, monitoring and technical maintenance;
- increased application availability and providing continuity of the enterprise. Thanks to the reliable system of reserve copy and migration of virtual environments with no interruption in service it is possible to reduce the periods of planned downtime and ensure rapid system recovery in critical situations;
- improved system of management and security of personal computers. It is also possible to deploy, manage and monitor the processes of defended computer environment to which end users will be provided

with local or remote access when connected to the network, or without it practically from any standard personal computer, laptop or tablet computer.

Virtualization as a technology is capable of providing benefits to any computer user: from information specialists and ordinary users to commercial enterprises and government agencies. Millions of people around the world use virtual technology to save time, money and energy and to achieve high results without expanding hardware resources.

Virtual machines are components of the virtual infrastructure. Virtual machines are the main components of a much larger solution: virtual infrastructure. The virtual machine uses hardware resources of a single computer and virtual infrastructure uses combined hardware resources of the entire information infrastructure, including computers, network devices and combined storage. Organizations of all sizes use VMware solutions to create virtual infrastructures of servers and personal computers, thereby improving the availability, security and ease of management especially of critical applications.

From a financial point of view, virtualization is an important saving moment. It doesn't only reduce the need to purchase additional physical servers, but also minimizes the requirements for their placement. Virtual server also demonstrates the reduction in waiting time of joining to the work of specified tasks, by reducing the period of installation, configuration, and delivery of server system.

Unlike mainframe computers, hardware from personal (prototype of the modern server) was not originally designed for virtualization - until recently, the entire loading fell on software. Only the last-generation model of its processors in the x86 architecture of AMD and Intel for the first time contains technologies that support virtualization.

Unfortunately, both leading processor corporation created their technology (AMD-V and Intel VT, respectively) independently, that's why they are not compatible at the code level, although show similar results. With support for hardware virtualization all loads on the access management of virtual servers to channels of input-output and hardware resources takes over the processor. The hypervisor (which in principle allows the simultaneous, parallel execution of multiple or even many operating systems on one computer, which provides their insulation, protection and security) is free from performing the most demanding tasks. Virtualization at the processor level does not happen by itself, automatically. It is needed to have special software that would implement it. However, taken into consideration how significant are the benefits of such technologies, virtualization software is dynamically developed and improved.

The article describes the methodology of service-oriented architecture for creating information architecture, tourism sector, based on a service orientation to achieve a closer relationship between business and supported information systems for business. The use of service orientation SOA as an approach to the integration of tourism business on the basis of related services by the evolution and improvement of the system that does not require a one-time large expenditures and total destruction of normal process of the functional system.

The article describes virtualization technology, its methods of development and development and connectivity with cloud computing, and the technical feasibility and contemporary problems of virtualization are analyzed; the benefits of using a virtual infrastructure is described.

Keywords - virtualization, cloud computing, virtual machines, information technology, virtual infrastructure.

12. Малиновський О.Б. Мультимедійний контент: стан та перспективи

MULTIMEDIA CONTENT: STATUS AND PERSPECTIVES

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The development of science, society, new technologies are growing at such a fast pace, that new knowledges become quickly outdated and obsolete. In addition, the rate of information change in the modern world is extremely high, therefore, an urgent problem of data resources formation based on the integration of information technologies that provide active human impact on this data in real time scope is arisen. Multimedia is such a navigation structure that enables interactivity, possibility of direct interaction with a software resource.

According to the generally accepted definition, “multimedia” is a special interactive technology, which with the help of hardware and software tools provides the work with computer graphics, text, speech maintenance, high quality sound, static images and video (<http://comp.vslovar.org.ru>). In the work of Kapterev, A. I. is indicated that for the creation of multimedia systems from multimedia content complex systems are formed. This is done for the most comprehensive display method and, accordingly, the perception of multimedia content data by the user, according to its type. It is suggested that multimedia content is an electronic combination of information containing text, video data, static images, audio flows that are available online. Nowadays, web sites, appendices to printed books give a significant part of information in the form of exactly multimedia resources. Multimedia is used intensively in the television industry. The translation can be represented directly in live or recorded as multimedia presentation. Such multimedia content may be presented in analog or digital format. Digital multimedia presentations are prepared mainly in streaming mode.

Krapivina A. V. in his textbook presents the graphical data streams, that is a common action when working with a computer in multimedia systems that are extended by solid-state graphics, animation and the combination of television and computer images. The audio streams greatly improve the perception of information. All this substantially approach information with which the user is working on the computer to its view in real time. Therefore, in the terminology of computer graphics, a realistic definition of computer graphics is appeared. It is such a graphic system that covers the above-mentioned features.

Thus multimedia is an optimum combination of text, images, video and sound presented in a single form. Multimedia and the Internet require a completely new approach to writing form. The letter style, which is suitable for "off-line world" is different from online. Unfortunately, the most majority of today developers of so-called multimedia systems believe that if there are movement and sound, then it is already the multimedia system. There is no clear definition of “Multimedia system” and that is why very something that has such name, rather is an information system in electronic form with multimedia elements. Multimedia system must have, for example, audio control, transformation of the text (visual) into the text (audio), and the text (audio) into the text (visual). Nowadays are not developed evaluation criteria and numerical coefficients of the multimedia products effectiveness, that is why it is only possible to use such phrases, which encourage to use multimedia means:

- “these means allow to increase the quality and speed of information perception”
- “the means provide additional information about the process”
- “the means increase the convenience to work with the system”
- “in a static form this process cannot be shown”
- “for people who do not see it is an effective method of providing information” etc.

The article deals with methods and means of complex information product multimedia content creation and the algorithms of diverse data representation.

Keywords - multimedia systems, information content, interactivity.

13. Морозов Ю., Пастернак І. Мережні інтерфейси рівня клієнт-сервер

NETWORK INTERFACES OF CLIENT-SERVER LEVEL

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It is clear that, in general, in order the application program running on the workstation can request a service from a server, at least is required interface software level that supports such kind of interaction (it would be at least unnatural to require that the application program directly use the primitive transport level of local network). And it causes the basic principles of the system architecture “client-server”.

The system is divided into two parts that can be executed in different nodes of the network - client and server parts. An application program or a final user interact with the client part of the system, which in the simplest case provides just over networks interface. The client part of the system when it is needed makes request through the network to the server part. It is noticed, that in the developed systems a network request to the server part may not be necessary if the system can predict the user needs and the client part contains data that can meet user next request.

The interface of server part is defined and fixed. So it is possible to create new client parts of the existing system (an example of interoperability at the system level).

The main problem of systems based on the architecture “client-server”, is that in accordance with the concept of open systems is required their mobility in as wide as possible class of hardware and software solutions of open systems. Even in case of limit to UNIX-oriented local networks, in different networks are used different apparatus and communication protocols. Attempts to create systems that support all possible protocols lead to their overload and damage to functionality. Even more challenging aspect of this problem is associated with the ability to use different data representations on different nodes in a heterogeneous local network. Different computers may have different addressing, numbers presentation, character encoding, etc. It is especially significant for servers of high level: telecommunication, computing, databases.

A common solution of the mobility problem of systems based on the architecture “client-server” is the reliance on software packages that realize the protocols of remote procedure call (RPC - Remote Procedure Call). When using such means of request to the service in the remote node looks like a normal procedure call. RPC means, which, naturally, contain all the information about the specificity of the apparatus of local networks and network protocols, change the call into a succession of network interactions. Thus, the specificity of network environment and protocols is hidden from the applied programmer.

When calling the remote procedure call of RPC program is performed the conversion of client data formats in intermediate machine-independent formats and then conversion in the data formats of the server. When transmitting the appropriate parameters similar transformations are produced. If the system is implemented on the basis of standard RPC package, it can be easily transferred to any open environment.

The network interface it is two or more PCs connected with the aim quickly to exchange data and share use of resources. To implement the network interface are required two kinds of components: hardware and software. The hardware provides the physical connection of computers. It is divided into local and global networks. For the organization of a network interface it is needed to have network software, transmission physical medium and switching devices. The main results of the load testing is the calculation of the indices of network interface productivity such as the response time of the server to the client request and the overload of system resources of the server, depending on the number of users. In accordance with results can be carried out modification of the hardware and software configuration of the network interface.

The implementation of client-server interaction based on the model of request/response in the form of formulas is suggested. As well as testing of the network interface on the load of client requests. Keywords - network, software, network testing.

14. Парфененко Ю.В., Шендрик В.В., Красніков С.І. Концептуальна модель інформаційної системи аналізу теплозабезпечення

CONCEPTUAL MODEL OF INFORMATION SYSTEM OF THERMAL SUPPLY ANALYSIS

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Nowadays the cost of energy sources in the budget structure of local government makes a very significant part. It is caused by the fact that the level of consumption of primary energy sources such as natural gas is growing/remains high. Only a few heat generating enterprises completely switched to alternative kinds of fuels. Therefore, the problem of efficient use of budget funds appointed to the needs of the objects of budget sphere in thermal energy, is currently extremely acute. In the period of energy crisis in Ukraine, due to the scarcity of resources and their high cost, has ceased to be rare cases where a budget institutions unexpectedly stop working due to non-payment of energy bills or the duration of their work is reduced to a minimum due to the inability of the institution to pay completely for the consumed energy. Sometimes, on the contrary, a significant overuse of thermal energy during periods of the heating season with a sufficiently high ambient temperatures is observed. Thus the monitoring problem of thermal energy consumption for the purpose of its rational use is currently relevant. The implementation of accounting and analysis information system of heat consumption will allow to provide the regulation of the required quantity. This will allow to maintain the adequate microclimate in the heating rooms and to avoid a situation of overuse of heating energy consumption, that is the first step of energy saving.

The majority of communal institutions understand in the simple way the consumption accounting of thermal, electric and other forms of energy, reducing it to the equipment of power supply systems of buildings by special accounting devices. Actually, the installation of special devices is only the first step towards the establishment of a complete accounting of energy. As for the qualitative consumption monitoring of intake it is necessary to organize periodic collection of data from accounting devices, to ensure validation of the devices indices correctness, to solve the problem of accumulation and preservation of these data. As accounting is used for the effective financial management of the organization, the energy accounting is an integral part of monitoring and control of energy consumption of each institution. The use and distribution of diverse information arrays when conducting an energy audit encourages the creation of new automation systems for collecting, organizing, and further analysis of monitoring data of thermal energy consumption. The first task in heating monitoring data processing is the creation of a conceptual model of the database subject area which will store the monitoring data of the energy audit objects status, data of the external environment status, various regulatory indicators, which are the input data for the analysis of the heating provision of buildings.

In recent years, the energy saving was realized by changing the structure of the economy, that is, the reduction of energy-consuming industries and transport. Currently the structure factor as a component of the energy saving potential is exhausted, therefore, to maintain the current rate of decline in energy intensity of GDP (4-6% annually) urgently is needed to include the technological factor of the energy saving potential and to increase the level of scientific support for the implementation of energy saving programs through the introduction of modern information technologies. Nowadays widespread practice of energy saving by administrative methods in the conditions of monitoring absence of energy-consuming services quality generally leads to a deterioration in the terms of institutions functioning, growing of employees dissatisfaction of unsuitable working conditions and significant reduction in quality of services.

The primary task of energy saving is to conduct high quality energy accounting. Under the energy accounting is understood the survey of enterprises, organizations, individual houses and separate industries on their initiative with the objective of identifying opportunities for savings in energy consumption and assist the company in implementing the savings in practice by introducing energy efficiency mechanisms and with the aim to implement in the enterprise (in the building) the energy management system. The need to conduct an energy audit is laid down in the Law of Ukraine "On energy saving".

The analysis of approaches to heat consumption monitoring of municipal institutions objects is made. The implementation technology of thermal supply analysis information system is defined, web hosting is selected, which contains the web system of thermal supply analysis. In order to develop the information system are chosen as the basis the selected content management system "Joomla", and the PHP language. As the database is used MySQL.

The overall architecture of the information system analysis of heating supply is built, the circle of system users is defined, the algorithm of calculation of parameters of monitoring of heating supply is created. The conducted systematic analysis of the subject area allows to construct a conceptual model of a database information system for the analysis of heating supply, defining the basic entities and the relationships between them. The web-system of heating consumption monitoring, which consists of authorization modules, entering and edition of data, calculation of the parameters of monitoring and creation of graphs is developed. Further research is aimed at the development of analysis system of the quality of heating supply and creation of rules for its regulation.

The article is devoted to the development of the conceptual model of the analysis of buildings heating supply process and description of the logical structure of the database.

Keywords - conceptual model, data base, information system, heating supply

15. Процько І.О. Алгоритм обчислення основних видів ДСП на базі циклічних згорток

COMPUTING ALGORITHM OF MAIN DSP TYPES BASED ON CYCLIC CONVOLUTIONS

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With the development of computing facilities has extended simultaneously the application of the fast computation of class Fourier discrete transform (DFT). Many studies on FFT (fast Fourier transform) highlight the prospects of the further use of only valid calculations. In 1974 is proposed a discrete cosine transform (DCT), and in 1976 - discrete sine transform (DST), a valid basis of which reproduces functional in space or time dependences similar to the DFT. Cosine and discrete sine transform and Fourier transform are related by strict mathematical ratios that allows to find an effective way to compute one transform using the second. The DST has found wide application for a number of reasons. First, the basis functions of DST well approximate Karunen-Loyew conversion functions for a wide class of stationary casual processes, make it possible to describe the signal with a given accuracy with a minimum number of components. Secondly, DST contains a number of special properties and due to this fact gives good results when processing poorly correlated conversion signals, which leads to the taking into consideration of a significant signal energy. DST is used in many applications, especially in digital signal processing of audio and video. Further intensive development of information technologies puts higher requirements on the operation speed, functional and specific capabilities of algorithmic and hardware-software means of valid discrete transformations.

More than three decades of studies were dedicated to the efficient computation of one-and two-dimensional DST that were called as fast sine transform (FST). A considerable number of publications devoted to the efficient computation of DST were received. Multivariance of efficient computing are divided into algorithms with base two, cleft base, mixed base, unpaired volume, compound volume and the algorithm of simple multipliers.

For the synthesis of efficient DST the following approaches are used:

- 1) direct factorization of the DST matrix;
- 2) indirect computation using fast Fourier transform or the discrete Hartley transform;
- 3) algorithms based on complexity theory.

To obtain a fast algorithm generalized approaches based on polynomial transformations are used. It is shown that four types of DST have a group symmetry (that is, properties that relates to the theory of groups and their representations) and for each of them fast algorithm is calculated simply algebraically. New directions of efficient DST calculation, which are embodied in the form of specific algorithms are proposed. Works on the study of fast DST are generalized and systematized and final step in this direction is the theory of fast algorithms.

Calculation of DST and IDST (direct and inverse) are one of the most intensive and lengthy procedures in information technology, for example in the analysis and processing of image frames. That is, this procedure requires a maximum degree of enhancements that will accelerate the work of software and hardware. Among the directions of efficient algorithms is the possibility to calculate DST using cyclic convolutions. This direction of effective calculation uses the presence of fast convolution algorithms. Especially a lot of publications associated with computation common in DST applications via cyclic convolutions have appeared at the beginning of 90-ies.

Most studies use a transition from computing discrete conversion to cyclic convolutions, using reindexing of the simple volume according to Raider or the schedule of compound volume of transformation into simple multipliers after Agarwal and Cooley, or combining these approaches. The use of a computation method based on convolutions has its own characteristics to determine DST of different kinds analyzed in this work. Effective evaluation of each of the four types of DST can be performed based on the rearrangement of the elements of the input sequence with forming array followed by fast cyclic convolution algorithms. For DST I-III symmetric convolutions are done, and for the DST IV convolutions have the values of the arguments at two separate intervals from full period. The individual computation of cyclic convolutions, which have structured according to the given approach basis of the main types of DST, and the further integration of the obtained results allow effectively to carry out the evaluation process, reparallelizing information processing.

The approach of efficient calculation of the four basic types of discrete sine transform (DST) based on cyclic convolutions is described. The options of forming array of the basic square matrix are used for the algorithm synthesis.

Keywords - discrete sine transform, forming array, algorithm synthesis, cyclic convolution.

CONCEPTUAL MODEL OF CLASS SCHEDULE INFORMATION SYSTEM WITH ACCESS VIA THE HTTP PROTOCOL

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Nowadays, in many industries there is a need to systematize, automatically process and store data that requires the use of databases. The use of modern communication systems provides the opportunity for both local and remote data access, primarily via the http-protocol. The widespread use of this protocol for the access to remote databases due to its universality and support on various platforms and operating systems. It can be used in local and global networks. It does not require any additional software with the exception of the browser. This allows to solve the compatibility problem and to provide access to the system from any workstation. This approach is effective in the development of databases for information systems in many fields, particularly in medicine, education and others, which are characterized by the heterogeneity of working places, frequent change of users and large territorial coverage.

One of the main problems of working with data is the development of the database structure. On its rational design will depend in the future the work efficiency. A lot of serious problems in the further work occur in the result of incorrect or not fully thought-out organization of data exactly at the stage of designing the database structure. This is because in the process of using the information system, which already contains a lot of data, it is needed to exert a lot of effort and apply innovative solutions in order to correct errors. This approach helps partially to solve the problem, at the same time causing the reduce of operation speed and resources use efficiency. That is why at the stage of designing the database it is needed maximum to take into consideration possible problems and various types of using of the data.

Today there are many software products that allow to obtain the access to remote databases. The special software (client) that runs on the user workplace, that is some integral part of the automated system, which is designed to solve problems of user is often used. This set of programs can be developed in different program fields such as C++, Pascal, Delphi, Visual C++ etc. Some manufacturers of datebases offer their unique open and powerful means of connecting to remote databases. In particular, Oracle corporation offers its unique product Net8 in order to connect to remote datebases, which can be used with a large number of network protocols, such as TCP/IP, OSI, IPX/SPX, and may be running under the widespread operating systems.

However, in the case of use of these technologies, problems arise with the compatibility of working places. Each of them requires own software on the client machine, that is, each of these systems must have separate organized module. In addition, the use of such software requires special training of users.

The technology of using the http-protocol for the access to remote databases is deprived of such drawbacks. The choice of specific solutions for developing web-interfaces depends on the information peculiarities and needs of work with it.

This article describes class schedule information system model in higher education institutions and organization of access via the http-protocol. The database relational model is proposed, the optimality of relationships creation between tables and queries that can be performed is analyzed. The requirements for the integrity and consistency of data are investigated. The choice of class schedule information system is caused by the urgency and nature of problems that arise in the course of its development, which fully cover features of the creation of databases with http-access to them. During the formation of the information systems class schedules in higher education institution it is needed to consider the organization of the educational process. In particular, lessons can be conducted by courses, streams, groups, subgroups, be held during the whole or half class, weekly or every two weeks (on the denominator or the numerator). Thus it is necessary to monitor the temporal coincidence of the classes on teachers and classrooms. Therefore there is a need for structuring the schedule, bringing it to a logical and unique view and the creation of an information system that would allow effectively to form the schedule taking into account all the above features. In addition, during the development of the database structure it is necessary to consider the fact that the access will be done through the http-protocol. Therefore, the formation must occur in such a manner that when it is needed without special difficulties to distribute its content in several places in the network and to obtain the access to data

through a web-interface. It is also need to create a convenient and intuitive understandable for users without special preparation the web-interface to work with the schedule, which would give the opportunity to get a variety of information types about class schedule in the standard form.

The model of information system of class schedules in higher education institutions with access via the http-protocol based on the study is proposed. Information system is implemented at the faculty of electronics in Lviv National University named after Ivan Franko. The operation of user part of information system "Schedule" can be viewed on the Internet at the address <http://www.electronics.wups.lviv.ua/rozk/>. The database is created on the MySQL database, web interface is developed using the program language PHP.

The paper considers the model of the information system of the schedule of the educational institution and the organization of work with it using the HTTP-protocol. The queries that the user can create, rational choice and optimality of creation of tables and relationships between them are analyzed. The limitations that arise during the design of the structure of such databases, requirements for the integrity and consistency of data are studied.

Keywords - Internet, database, web-interface

17. Шаховська Н.Б. Метод трансформації операцій алгебричної системи «простір даних» в операції моделей даних джерела

TRANSFORMATION METHOD OF OPERATIONS OF ALGEBRAIC SYSTEM "DATA SPACE" IN THE OPERATION OF THE SOURCE DATA MODELS

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Globalization aspects of modern society development make the need for building complex systems for the functioning of particular subject areas and information technology for them. So, for example, in university it is the formation of teachers and departments ratings, the definition of indicators of success and quality of education, and others; for example, in the regional administration it is a calculation of critical indicators of regional development on the basis of data received from organizations of different ownership forms. However, it is difficult to do due to mismatch between the requirements to information systems, and the need of organization (search for objects, their systematization, harmonization, data integration) of different types of information objects in a complex information system that is manifested through the following:

- weak structuring of relationships between objects
- the need to incorporate new objects into the system
- failure to comply with the general standards of the organization and reference document,
- the impossibility of systematization through a large number of objects and their different nature.

Proposed by Kalinichenko method of comutative display requires processing of structured sources (databases) that for the concepts of the data space is a partial case.

Therefore, the purpose of this paper is to develop a method of receiving a response to the user request. Scientific novelty: to develop a method of transformation of elements of data space metalanguage in operation on the data source level. Practical value: the development of a class access to a data source.

Before starting an interactive session of work the majority of operating systems require to type the name and password of the user. The entered name is the user ID and the password is the authenticator. The operating system typically doesn't store the password but its hash sum, thus ensuring the practical impossibility of restoration of the password.

Algorithmically the authorization procedure is represented as a sequential transmission of one or multiple data flows between the subject and the information system and their intermediate study by both parties. As a result of these actions, both parties of the exchange must be sure that they are those who they say they are.

The visualization task is the identification and representation of structures and relationships in data sets relating to a particular subject area and are opened to the user according to profile.

In the case of data spaces, with the presence of structured, semi-structured and unstructured sources, the purpose of visualization is to define how data is displayed. For visualization of a user request for the purpose of its further implementation. For the visualization of user request with the aim of its further operation the tree is used. The tree construction is carried out by known methods of recording format of the expression (polish notation). For the visualization is chosen the selected polish inverted notation (firstly the notation of the operands, and then operations).

The procedure of semantic analysis of the query is to verify the correctness of the tasks of the operands. Under the correctness of the operands task is understood the presence of the operand in one of the sets:

- the data directory
- the data dictionary,
- formed set of keywords of a given subject area.

In the case of entry in none of sets, the query fails.

The algorithms of the search for data according to the user request and validation of the obtained results with the aim of unifying work with heterogeneous data sources, that helps to improve the quality of consolidated data are developed. The metalanguage of requests to the data space, that helps to unify the types of requests for all information products included in the data space is developed. The transformation formalism of metalanguage in a query in structured, semi-structured and unstructured data sources is developed.

In this article the method for transforming the data space user request in the request to the data source is developed.

Keywords - data space, the algebraic system, database, data warehouse.

COMPUTER AND MATHEMATICAL LINGUISTICS

18. Висоцька В.А., Шестакевич Т.В., ЩербинаЮ.М. Застосування породжувальних граматики для моделювання синтаксису речення

USING OF GENERATIVE GRAMMAR FOR MODELING OF SENTENCE SYNTAX

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The rapid development of the Internet has intensified the creation of various linguistic resources. The need for process automation analysis/synthesis of natural language texts led to the emergence of appropriate linguistic models and methods of processing. An essential was the development of many linguistic disciplines for the purpose of information sciences. Integration processes in most areas of life of the modern world draw attention to the development and creation of the automated processing of multilingual information.

Traditionally, the analysis of natural language texts consists of three sequential processes (morphological, syntactic and semantic), for which were established models and methods. Thus, the theory of generative grammars, which beginning was laid by American linguist N. Khomsky, is an effective tool for linguistic modeling on syntactic level of language. Scientist used formal analysis of the grammatical structure of sentences, which allows you to identify the syntactic structure, which is the main circuit of phrase, regardless of its value. N. Chomsky ideas was developed by the Soviet linguist A. Hladkyy, who has applied the concept of dependency tree components and systems for modeling syntax of the language. He proposed a method of modeling syntax using syntactic groups that produce components phrases as units Building dependency tree - this representation made it possible to combine the advantages of the method immediate constituents and dependency tree.

Developments of N. Chomsky and A. Hladkyy, research of M. Gross i A. Lanthen, A. Anisimov, Y. Apresyan, N. Bilhayeva, I. Volkova and T. Rudenko, E. Bolshakova, E. Klyshynskyy, D. Lande, A. Noskov, A. Peskov and E. Yahunova, A. Gerasimov, B. Martynenko, A. Pentus and M. Pentus, E. Popov, V. Fomichev applicable to the development of natural language processing tools as information retrieval,

machine translation, annotation texts, morphological, syntactic and semantic analysis, training and didactic, linguistic providing of specialized software systems and more.

In the article will show method of using the device of generated grammars to modeling syntax of sentences in different languages - English, German and Ukrainian. For this goal we will analyze the syntactic structure of sentences and demonstrate the features of the synthesis of sentences indicated languages. Consider the impact of regulations and rules of the language on the course of constructing grammars.

Research application of mathematical methods for the analysis and synthesis of natural language texts originate from the middle of the last century, when the development of mathematical algorithms and software processing of natural language texts focused considerable efforts of scientists. The device of generated grammars proposed by N. Chomsky, modeling processes in syntax level of language - highlighted structural elements of the sentence give an option to describe syntactic constructions regardless of their content. In the article the features of the process of sentences synthesis of different languages with using of generative grammars had been shown, the influence of norms and rules of the language on the course of constructing grammars had been considered. Using of generative grammars has great potential in development and creation of automated systems for multilingual information processing for linguistic software of computer systems and etc.

In nature languages there are situations where phenomena, that depend on the context, described as independent on context in terms of context-free grammars. Then description is complicated with taking into account new categories and rules. In this article reviewed the introduction of new restrictions on the classes of data grammars. When the number of characters in the right part of the rule is not less than the left one, uncut grammar had been received. With replacing only one character was got a context-sensitive grammar. With the presence in the left side the rules only one character was got a context-free grammar. Any following natural restrictions on left sides of rules no longer available to be imposed.

In the article had been presented using of generative grammars in linguistic modeling. Description of modeling sentence syntax used for automation of the processes of analysis and synthesis of natural language texts.

Keywords - generative grammar, sentence structure scheme, computer linguistic system.

19. Жежнич П.І., Сопрунюк О.О. Основні підходи до моніторингу та аналізу якості туристичної документації

MAIN APPROACHES TO MONITORING AND ANALYZING THE QUALITY OF TOURIST DOCUMENTATION

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In terms of intensive globalization and significant development of the information society observed rapid growth of tourism service and the rapid development of the tourism industry. Tourism become more powerful factor in strengthening the prestige and growth of the country's income, a dynamic form of international trade in services, means of communication, self-development, improving education and general culture, expand business contacts, accelerate innovation processes.

That is why today the problem of monitoring and improving the quality of tourism services is imperative for the travel trade.

At the present stage of transition to a market economy, tourism is one of the priority areas as internal and external economic activity of the country and it's regions. In recent years, tourist flows are increasing in all countries. However, Ukraine areas of tourism businesses are not still sufficiently developed. The main reason for this - inappropriate informing about the tourism product that is connected with inability of tourist activities generate and track a large information base.

As a result of increased competition in the international tourism market national product becomes less attractive and competitive. To solve this problem, we need to create high-quality tourist documentation which is not only an effective way of providing information, but also the key to the success of tourism activity.

Tourist documentation - is an information product, the quality of which depends on the quality of providing of tourist services. Therefore, the main task of producer of tourism product is to create the right conditions for the introduction into circulation of such documents that primarily satisfy customers needs, meet the requirements of society, standards and specifications. Only then can we talk about truly unconditional competitiveness of tourist agencies.

Modern tourism is characterized highly dynamic, a significant number of its participants and its rapid spread. In such circumstances, there is an urgent problem of operative informing about tourist attractions in particular through automated information systems.

For providing of quality of travel services need to carry out constant monitoring and analyzing of the quality of tourism documentation that will significantly improve tourist servis. Based on an analysis finds out deviations from the standards of quality design and providing of information and possible reason of low quality tourist services.

It is necessary to develop comprehensive programs of developing of the tourism industry to predict its development and planning tourism activity. The organization of travels and tourist services must be approached comprehensively. Tourism as a complex and multifaceted phenomenon should be explored as a social phenomenon in terms of scientific and theoretical understanding.

Tourism agencies should develop new methods and means of formation of tourism services and improve existing based on research of characteristics of the tourist documentation taking into account the socio-psychological traits of tourists.

At the present stage the problem of providing of quality services has universal character. In the tourism area quality control, and problem related to the provision of quality services play a crucial role.

The qualitative tourist documentation is a prerequisite for the competitiveness of tourist agencies in particular and tourism market in general. We must constantly adapt and improve the methods and means of management and quality control of tourism products.

Therefore, the issue of quality tourism documentation is rather vital and requires constant detailed understanding because it affects the image of the tourist company.

A prerequisite for the effectiveness of any production is manufacturing quality products, in this case writing qualitative documentation must be accurate, complete and adequate, because it is the main props of information content.

Developers of documentation must constantly carry out it's monitoring and analysing, so as to improve it's quality and, also, the quality of tourist services.

The main approaches to monitoring and analyzing the quality of documentation based on the opinions of consumers are: the use of online forums, surveys, focus groups, "secret" buyers, expert opinions.

Effective methods of analysis of the information content of tourist documentation are: traditional, legal, social and psychological, automated.

Using automated control systems and computers, you can achieve improvement of management tourism industry, it increases productivity, service quality, increasing speed of service users.

In the article the role of tourism in the development of the Information society had been considered, the definition of tourist documentation and its classification by type had been defined, the main approaches to monitoring and analyzing the quality of tourist documentation had been described, emphasized the necessity of using of tourism products, and the main components of quality documentation had been highlighted.

Keywords – information, quality, tourist documentation, gap, monitoring, online forum.

20. Романюк А.Б., Заяць А.В. Аналіз досліджень політичного дискурсу

ANALYSIS OF RESEARCHES OF POLITICAL DISCOURSE

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At the turn of the millennium as a result of the development and growth of the role of communication technologies, globalization communicative space in modern society research of problems communicative impact on public consciousness and the consciousness of the individual came to the fore. The areas where permanently implement planned or aimed communicative impact can be considered the media, advertising

products and services and, of course, politics. The mechanism of influence on mass consciousness in politics can trace studying political discourse, which in recent decades has become one of the most popular objects of research not only in linguistics, but also in other sciences. Nowadays when becoming increasingly important mechanisms of political manipulation, it has played a more important role in the political life of the community, as it is one of the key elements of direct and manipulative process.

Relevant today is the study of political discourse ability to convince and motivate an audience to action and interpretation of political speech influence as having potentially means power or desire for it. The political discourse - a phenomenon that we encounter every day. The struggle for power is the main theme and motive of the sphere of communication. As this struggle is realized through language, and language is an intermediate between the outside world and man, the existence of linguistic research within political science is imminent. Most of the works devoted to the analysis of political discourse relating to the field of linguistic and pragmatic: they are given fairly detailed analysis of numerical arsenal of linguistic resources, accompanied by a variety of connotations that form the reader the appropriate ideological orientation.

Political discourse is a phenomenon that can be seen in at least three respects: philological, like any other text, and the researcher notes "background" - political and ideological concepts that dominate the world of the interpreter; Sociopsycholinguistics - hidden achievements in assessing whether the speaker distinct goals that are clearly political; individual hermeneutic - in identifying personal meanings of the author and / or interpreter discourse in certain circumstances. In addition, from culturally appropriate, political discourse appears important social identifier and repeater of social values. Therefore, it is clear that the study of political discourse is the intersection of different disciplines and related forms of analysis, objectives and content of the discourse that is used in certain political situations.

The relevance of the study of political discourse dictated by the specifics of the object of study, because there is a need for objective scientific substantiation of this phenomenon. But still there is no consistency in understanding political discourse by the various sciences. Interest in the study of this issue find representatives of different professions and different scientific disciplines. Basic theory of political discourse were laid by the Oxford and Cambridge Philosophical schools in 50s of XX century, which analyzed the linguistic context of public opinion. Among the classic work on this subject can be called work T.A. van Deik, R. Barthes, M. Foukko, J. Habermas and research local authors: M.V. Ilyin, E.I. Sheyhal, O.M. Baranova, G.G. Pocheptsov. Unfortunately, management science still has not resolved the issue systematization of experiences, identifying positive and negative influences on the state-government processes in Ukraine.

In this article, the authors set out to file a general overview of the concept of political discourse and its specific forms, and analyze the main achievements of leading scientists in the study of this phenomenon. Special attention is given to the subject of political discourse and analysis of political speeches, because this issue is an area for further research authors. The relevance of such research is predetermined orientation of modern linguistics to study the functional aspects of language units in general and ontological category of the subject properties, particularly in political speeches Ukrainian politicians.

Interest of analysis of political texts caused by factors such as internal problems linguistic theory. This analysis is required for purely practical purposes: to study political thought and society monitoring of various trends in the field of public awareness, communication attempts to free political manipulation of public consciousness. By political discourse include public speaking politicians statements of politicians, political observers and commentators in the media publications, materials specialized publications that deal with various aspects of policy. The political discourse – is a discourse of politicians. It is formed in the context of functioning political institutions (government meeting, session of Parliament, Congress, etc.) and is a political, if accompanied by a political act in the relevant institutional atmosphere. Taken into account, first of all, that the main function of political discourse is a function effects with speech and linguists interested in what language and speech means used to impose political ideas.

At first sight it is the only means of communication and its relation to politics is the ability to agree interests of a group of people or otherwise express dissatisfaction with the actions of the other group. But from that and begin deploying events that can sometimes decide the fate of entire nations.

The pragmatic aspect available in all styles and in all genres and texts in political discourse it is different quantitative and qualitative nature. Number characterized by the intensity of the impact, qualitative aspect of the content features and pragmatic means of implementation in the communication process. The political discourse - a product of mental processes both individual and collective. Each mental model is

unique. But gender, age, the role of groups and discourse are relevant only when communicant pay attention to them.

Significant prospects for further research is problematic category subject to political discourse. They can be focused on the features of self-speaker discourse in opposition or ideological systems of values. Of particular note is the study of linguistic discourse authoritarian personalities, as well as identifying the role of media in the interpretation of strategies and tactics addressee political speech. Thus, the political discourse as speech to properly social institution requires thorough research because its ingredients appear effective means of political influence.

In this article evolution of the concept of political discourse as an object of linguistic and political studies has been considered. A comparative analysis of the concepts of "political discourse" and "political speech" was given. Term "political linguistics" was introduced. Also an overview of research on the analysis of political discourse was provided. Special attention was given to the subject of political discourse and analysis of political discourse.

Keywords - political discourse, political linguistics, political speech, the subject of political speech, content analysis.

21. Шаховська Н.Б., Стахів З.В. Автоматизована система укладання реферату

AUTOMATED SYSTEM OF CONCLUDING ESSAY

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Every year the amount of power and information flow increases. Arrange the flow and keep it in a controlled channel is through automated processing systems and information processing. At the heart of these systems are analyzing processes of primary documents - indexing and subject headings and synthesis - generating secondary documents cataloging. The essence of the scientific processing of documents is in the process of creating and converting documents. This process is designed to facilitate user searching and identifying information. The main types of scientific processing of documents are: classification, sorting, conversion, placement in the database and search. The result of summarization of documents is a secondary document - essays. Introduction to papers enables the camera to get a short information about the contents of source documents and thus most properly resolve the issue of the need to use them. Sometimes even a familiarization study replaces the original source, which is especially important when it is unavailable for any reason. Essays also used in the formation of bibliographic and factual search array of traditional and automated information retrieval systems. Therefore, the development of new, effective automated stacking comment is relevant.

Developed automated system concluding essay can significantly reduce the time required for assembly of the abstract than other systems abstracting. It's algorithm is simple enough, but it has several advantages:

- Using of weighting coefficients greatly improves the quality of the essay;
- User can determine the weight of some terms, depending on what topic focused essay he wants to;
- The system is designed to work primarily with texts Ukrainian and Russian, giving a significant advantage, since most modern systems still oriented to English texts.

The result of automated essay conclusion is secondary document, which accelerates the selection of documents; provides a higher degree of accuracy, completeness; provides an opportunity to inform consumers; facilitates indexing and classification of documents; is a means of raising awareness of this new science and technology; makes it possible to perform a retrospective search. Automatic kvazi summarization can be considered as one of the first steps towards automatic evaluation of scientific and technical information to automatically generate highly factual systems.

In this article an automated system of concluding essay had been described. The information model of such system has been designed. Goal, objectives and scope of the using this system was defined.

Keywords - annotations, abstraction, summarization.

22. Ярмолюк Р.С. Підсистема перевірки орфографії електронного каталогу бібліотеки на основі технології HUNSPELL

SUBSYSTEM SPELL CHECKING ELECTRONIC LIBRARY CATALOGBASED ON TECHNOLOGY HUNSPELL

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System of an electronic catalog plays an important role in ensuring the basic functions of a modern library. The quality of the data contained in the electronic catalog directly affects the quality of information retrieval and integration capabilities of the library. When working with these electronic library catalog can be exceptional situations that lead to the emergence of various kinds of errors. Key attributes of an e-catalog (author, title, publisher, abstract source) are text type. Accordingly, the main errors in text attributes are symbolic distortion or spelling mistakes caused by both objective and subjective factors. On how efficiently searching and correction of spelling errors in text attributes of an e-catalog, depends on the quality of baseline information for search queries.

Special attention to theoretical and practical foundations of the problem of finding and correcting spelling errors in the records of the electronic catalog of his works had paid Vershynyn M.I., Karaush A.S., Nielsen R., Ballard T. and others. In his writings, and development data the authors pay attention to the development of theoretical methods and means of finding and correcting spelling errors in bibliographic records. However, practical implementation based on the finished software solutions remained unnoticed authors. The book Vershynyn M.I. pays great attention to the problems of electronic classification of various technical ways. In the matter of finding misspellings offered only general ideas based on theory of indistinct sets, however, the direction of practical implementation of these ideas have been proposed.

The main algorithmic problems arising in the development of software tools spellchecking and analysis of text strings include:

The main algorithms for matching text strings are:

- Knuth–Morris–Pratt algorithm
- Rabin–Karp algorithm
- Boyer–Moore algorithm and its variations.

The main algorithms for calculating the distance between text lines are:

- Wagner–Fischer algorithm
- Hirschberg's algorithm
- Khunt-Shymanskiy algorithm
- Ukkonen-Maers algorithm.

The main algorithm unclear comparison of text strings are:

- k – mismatch Landau-Vishkin algorithm
- k – differences Landau-Vishkin algorithm.

Classical approaches to the analysis of text strings highlighted in the papers: R. Hemming, and Lowenstein V. Analysis of the possibilities of modern automated library information system (AILS) showed that the developers of these systems, insufficient attention is paid search tools and correcting spelling errors in the records databases of the electronic catalog. The absence of the module to check the spelling of a common Automated Library Information System (AILS), as UFD/Library, MARC-SQL, UNILIB, LIBER, ALEPH, Koha, ISIS, CDS Invenio, OpenBiblio, Evergreen, causing many difficulties for electronic editor directory. Editor electronic catalog - a library employee responsible for the introduction of new data in the bibliographic database of the electronic catalog and their validation. In particular, when dealing with electronic catalog, there is a need for manual review records. Therefore, the development of approaches to the design of the subsystem spell checking e-catalog is an important and timely technical problem in the development of software systems verification of the electronic library catalog (SVELC). As a result of the study were asked to author approaches for designing subsystems spell check, formulated in the structure of articles and departments of the principal.

Analyzing functional requirements were selected Hunspell open technology to build on its core subsystems spell checking electronic library catalog. The proposed scheme of structural subsystems based on platform .NET. It has been proved in practice that on the basis of the scheme might build an effective spell checking subsystem catalog of the library. The proposed scheme is new and illustrates the workflow spell check on key technologies Hunspell.

Description and analysis of object-oriented model modified platform NHunspell showed that the proposed modified Nhunspell platform incorporates the necessary tools for spell checking, custom dictionaries based on words and affixes, morphological analysis, offers a mechanism for misspelled words, work on the thesaurus.

Experiments of assess the effectiveness of the upper time limit core system Hunspell showed a linear dependence on the characteristics and parameters of computer platforms dictionaries proving to effectively apply this technology in the development SVELC.

The main purpose of this research is to develop approaches to the design of the subsystem spell checking technology based on spell checking dictionary Hunspell. A number of requirements that apply to the subsystem spell checker had been considered. The choice of system Hunspell had been described. The structure of vocabulary words and affixes had been considered. The structural and object-oriented schema subsystem spell checker had been proposed and described. The analysis of the effectiveness of the proposed approaches based on experiment has been conducted.

Keywords - electronic catalog, system of spell checking Hunspell, dictionary, affix, AILS, object-oriented model, platform .NET.