UDC 004.8:681.3
A.I. Shevchenko, I.S. Salnikov, R.I. Salnikov
About Principles of Construction of the Artificial Intellect in Anthropomorphic Systems

In the article basic possibilities of construction of an artificial intellect as by one of making functions anthropomorphic systems are considered. The last are considered as artificial designs of the person, homomorphic displaying all its constructive components in their interrelation and interaction. Proceeding from interdependence of structure and function authors come to a conclusion about possibility of construction of the artificial person or the person with all functions inherent in it and possibilities, including an artificial intellect which will not differ from natural at achievement of full isomorphism of created intermediate models of the person as its prototype.

In the article the target review of the state of the problem of an artificial intellect construction both from the optimistic point of view, and from the pessimistic is resulted. The opinion on necessity already is supported today to begin direct designing of artificial beings not only similar to the person, as to their prototype, but also equal to it on all parametres and structures of its body with the assumption that all abilities and the functions inherent in the person as to the difficult biological car, will appear by itself, as consequence of the structurally functional dependences existing in its organism.

In the article the condition of modelling of figurative thinking, structure and functions of robots-anthropomorphs, a design of the future person-anthropomorph and its structurally functional models also is considered: organismic and case. It is in detail considered the model of organism and its designing by analogy to the design of the person considered at various levels of its complexity and realisation in the nature: cellular, fabric, artorganismic and at level of systems of bodies which the person as the biological car possesses. As a result is supposed design creation «artificial person» or person-anthropomorph in the form of one unit-design – person reasonable, capable to pass all stages of its evolution and development: training and formation, spiritual arrangement and the creative activity, gradually turning to the robot humanoid type, capable to live in conditions of a human society among real human persons.

About case models authors assume to publish separate article with detailed consideration of structural designs and functions of these models corresponding to them anthropomorphic systems with high level of artificial thinking and intelligence and physicomechanical actions.

UDC 004.8:519.254
V.V. Zubenko
To the Concept of Function as a Computational Procedure

The research is dedicated to the formal refinements of general notion of function as a computational procedure. The strongest level of abstraction is adopted: all objects are treated as "black box". The notion of function as a procedure makes it possible to revise generic notion of abstract algorithm, as it becomes it's derivative. The general properties of such algorithms are considered. It is proved that classes of function-procedures and abstract algorithms are closed under regular compositions. A generic solution for the tabulated algorithms analysis problem is proposed.

UDC 519.237.5
Yu. Prokopchuk
Automatisms of Cognitive Dynamic Systems

The paper deals with the features of the functioning of a new class of dynamic systems – "Cognitive Dynamic Systems" (CDS's). It is postulated that all processes that proceed continuously in CDS's have their origins in micro- and macroautomatisms, which are a subset of cognitive-behavioral patterns of the form:

$$k = \{f/\mu: k^1 \rightarrow k^2 \mid \mu \in \{\mu\}_f\} \cup P_k,$$

where f = cognitive automatisms and patterns; $\{\mu\}_f$ = behavioral automatisms and patterns (with their energetics and resources); k^1 = description of the starting situation of reality, of the original pattern; k^2 = goals and criteria of attainment of the target situation, pattern sketches; P_k = pattern composition rules, i.e. rules that describe the ways of combination of local cognitive and behavioral tasks. The patterns may interact to form stable or unstable processes.

Any patterns live off target and/or background energy. Target energy is distributed by the CDS dispatcher; however, most of the processes live off background energy and are beyond the dispatcher's immediate control. Background processes proceed in full measure through automatisms.

Classed with the basic microautomatisms are the operations that implement the method of limiting generalizations, the model of multilayer pattern/situation sketches, and the method of revealing the qualitative discontinuity of (physical) reality. The method of limiting generalizations allows one to find invariant knowledge models for problems of real-world complexity starting from empirical data and subject domain ontology. The model of multilayer sketches and the method of revealing the qualitative discontinuity of reality allows one to construct sketch graphs for any phenomenon of reality represented by a set of quality intensities. The possible values of quality intensities are specified by configurators, which are part of the ontology. Sketch graphs implement the "memory – prediction" model. These automatisms are brought to the level of software implementation.

Classed with the macroautomatisms is the decision-making process. A phenomenological model of decision-making within the CDS framework is presented: the information "loading" and "mixing" stages may result in the attainment of coherence followed by the "maturation" stage, which can be described, for example, by the "self-organized criticality" model. Any decision-making within the CDS framework is almost without exception followed by the "after-maturing" stage , which may last in the background regime indefinitely long.

UDC 519.6
M.I. Gusti
An Algorithm for Simulation of Forest Management Decisions in the Global Forest Model

An algorithm for decision making on forest management in the Global Forest Model (G4M) is developed. The algorithm provides harvesting of a specified amount of wood in countries. Adequateness of the algorithm is demonstrated on example of Ukraine, Poland, Byelorussia and Russia.

UDC 628.5.66
M.I. Gorbiychuk, M.A. Shufnarovych
The Method of Constructing Mathematical Models of Complex Processes on the Basis of Genetic Algorithms

The method of constructing mathematical models of complex processes on the basis of genetic algorithms is worked out. The current method gives the possibility to synthesize the model any difficulty without the previous choice of a number of selection rows as opposed to the multiple-row algorithm of a collective consideration of the arguments. This method will find the application for increasing the accuracy of prognosis concerning the oscillating processes, for example the level of the Dniester river.

UDC 519.1
V.I. Petreniuk
Identity of Noncylindrical Graphs with 3-minimal Planar Graphs

It was detected the fact of identity noncylindrical graphs with 3-minimal planar graphs and it's proposed new modification of algorithm for construction all 3-minimal graphs, on the basis of method of φ-transformations of graphs.

UDC 519.9
V.N. Petrovich
Development of Software for Optimization System

One of the features of the optimization problem to the problem of identification of dynamic model parameters, a system of differential equations, the criterion of minimizing the inconsistency of transition was the fact that in this case, computing the value theme allows you to define the minimum point of a given function of many variables $f(x)$ requires significant computational cost, making it difficult to stay on *k*-th iteration $f(x_k)$ and makes it almost impossible to calculate the value of derivatives $f'(x_k)$. This imposes certain restrictions on the class of admissible optimization algorithms for solving the problem of identification of model parameters. This observation applies to the real problems of optimization of technological modes of operation of

objects, where in most cases it is difficult in an explicit analytical form to submit an optimization criterion. These considerations were the basis for selecting the set of optimization algorithms, which are represented in the developed software. Each of the existing algorithms for multivariate optimization has its advantages and disadvantages and can work more effectively or in the vicinity of the minimum point, or at the initial stages of optimization, where the approach is far from the minimum point.

Subsystem allows to determine the minimum point of a given function of many variables $f(x), x = (x_1, \ldots, x_n)$ for the problem without restrictions

$$\arg\min_{x \in E_n} f(x),$$

or a problem with constraints

$$\arg\min_{x \in D} f(x), \quad D = \left\{ x : a_i \le x_i \le b_i, \overline{i = 1, n} \right\}.$$

Restrictions on the parameters dictated by the very formulation of the problem, based on physical considerations. The complex optimization algorithms can consistently connect various algorithms on the stages of the optimization process, where each of them will be most effective. Substantial assistance in selecting an effective method in the case of a particular function $f(x)$ is the possibility of graphical representation of the level curves of the function $f(x)$.

UDC 004.021

V.A. Chepurko

Reduction of Graphs with Marked Vertices and Acyclic Components

Graphs with labeled vertices are one of the main models in consideration of problems associated with the analysis of the operating environment with agents moving on it as well as problems associated with the validation of program. In both cases, these graphs may contain a large number of vertices, so the problem of reducing their number with retain all properties of the graph is arisen. The reduction problem is to find a partition of all vertices of the graph into classes of equivalent states. A new algorithm for graphs reducing is proposed. It consist of next steps. The algorithm builds a correct partition into classes of equivalent states.

UDC 004.522

V.Yu. Budkov, M.V. Prishchepa

Dialogue Model of Information Mobile Robot Control

The paper describes a dialogue model of the mobile information robot control, which is intended for assistance of mall visitors with finding shops and services. Potential user requests were analyzed and a logical structure of dialogue model was proposed.

UDC 004.89:004.93

A.S. Zvenigorodsky

Cybernetics Foundations of Understanding Text Sense

The paper is devoted to the problem of formalization an understanding text sense in information systems. It is proposed a new definition of sense conception, such as a process, which defines contradiction between situation described in text and situation in formal language problem area of situations. It is given a definition of formal language problem area of situations, a problem of understanding text sense is raised.

UDC 004.934:007:811

Yu. Kislenko

Informative Approach to the Analysis of Structural Level of Language Organization

The new approach is offered to the analysis of structural level of language organization which is based on the structure-functional features of neuron organization of visual channel of man; it stipulates new vision of syntax which basis presents formal determination of base semantical-sintax structure as grounds of forming of arbitrary report, the contradictory breaking up of sentences on simple/complicated ones replaces by more clear dichotomy a «monopredicative/polipredicative» report, takes off the problem of combination of words and brings all our knowledges over in relation to organization of language in the orderly system.

UDC 517.958:531.33
Y.V. Krak, I.O. Stelia
Modeling Human Speech Apparatus in Problems of Computer Synthesis

The paper has further developed the methods of solving the issue of synthesizing the voice data, thereby solving the issue of artificial formation of sounds of a human voice based on the shared use of physical models of the voice source and vocal tract. On the basis of the developed algorithms there was created the program and algorithmic complex for studying of influence of parameters of the models in the language source – vocal tract system on speech production. For acoustical Klein – Gordon's equation the inverse problem of recovering the parameters of the vocal tract according to the measured output signal was solved.

UDC 004.8
R.I. Lupiychuk
Anaphora Resolution: Actual Algorithms

Algorithms of anaphora resolution are presented in this paper. The considered algorithms are examined on concrete example. The following algorithms are presented: Lappin & Leass', Hobbs', Centering and Mitkov's.

UDC 004.921, 004.928
B.A. Trotsenko
An Investigation of Information Processes for Effective Visualization of Fingerspelling

One of the approaches to visualize a hand during the fingerspelling process is proposed in the paper. Appropriate mathematical skeleton-based model of a hand is suggested. Algorithms for hand animation using the model are explored. Skinning algorithms are researched and compared. An algorithm for proper transition of hand states during the fingerspelling of a word is suggested. The parallel algorithm of computing frames for the animation is considered.

UDC 621.391.7
V.G. Abakumov, S.G. Antoshchuk, L.V. Ratomska
Protection of The Plastic Documents

The basic methods concerning plastic cards protection are described. Expediency of using these methods is analyzed. Matrix bar code is offered as an effective protective method of plastic documents.

UDC 004.93
A.M. Akhmetshyn, K.A. Akhmetshyn
Hidden Domains Extraction of Low Contrast Images by Means of Orthogonal Decomposition Method

Information possibilities of a new method low contrast images analysis are considered. The main idea of the method is founded on separation of analyzed image on orthogonal components. For solution of this problem in the article were used two approaches: the first one is based on using the singular value decomposition (it is an algebraic method) and the second one is based on independent component method. The last provides the stochastic orthogonalization. Hidden domains of analyzed image are separated on orthogonalyzed image of high order. The results of real testing of the method possibilities are presented. It's shown that both methods are complement each other.

UDC 004.932.2
Yu.M. Batko
Method and Algorithms of Segmentation of Biomedical Images on the Basis of Previous Labeling

In the article the problem of automated objects selection on biomedical images and determination of quantitative evaluation of segmentation algorithms quality is considered. It's proposed a method of images segmentation on the basis of previous labeling. It is developed the algorithm of the automated objects selection on biomedical images on the basis of previous labeling and also evaluation criterion of operation of segmentation algorithms.

UDC 658.012:681.32
S.N. Belan
System of a Pattern Recognition with Growing Cellular Layers

Application of cellular technologies for construction of the system of artificial perception with growing cellular layers is shown. The system has ability to be taught new to the objects on the basis of the geometrical type formed by her. The methods of selection of informative elements and forming of geometrical type are considered.

UDC 004.932.2:004.921
O.M. Berezsky
Methods and Algorithms for Analysis and Synthesis of Asymmetric Images

In the article group-theoretical approach for analysis and synthesis of asymmetric images is considered. Methods and algorithms of analysis and synthesis of asymmetric images are offered. For software implementation of the offered algorithms the integrated development environment Visual C++ Express Edition and opened library of functions of computer vision Open CV is used.

UDC 004.051:004.627
V.I. Bovsunivskiy
Feasibility of Operational and Adaptive Image and Video Data Compression

This article discusses the basic methods of encoding video data and their shortcomings. It describes the problem of distortion waveforms of video when encoding in the study of test frames of the primary array of video data.

UDC 621.3
V.V. Garmash, A.Y. Kulyk
Blocking Artifacts Reduction Method in JPEG-images

The paper is devoted to the problem of construction of polynomial separate surfaces for the task of two-class images classification. It is proposed an iteration method that provides to get the coefficients of separate hyper surfaces based on taking into account of peculiarity of the location of learning examples on the boundary between classes. A new algorithm for reducing block artifact structure that occurs in images processed by JPEG algorithm with high compression ratio was proposed. This algorithm combines diadic wavelet transform and the method of optimal interpolation. Its main advantage – simplicity and easy implementation, due to the absence of any threshold techniques in the development process. The proposed method improves the visual quality and peak signal – noise ratio (PSNR).

UDC 004.931
I.V. Drozd, E.V. Volchenko
A Method of the Reduction of the Teaching Selections GridDC

A grid-density-center method of the reduction of the teaching selections in the recognition systems is proposed. It is based on coverage of character space and on finding the unique object of a cage as object of new teaching selections. Principle of forming of the grid and methods of the construction of the objects of brief teaching selection are offered. For calculation of the efficiency of the offered method a comparative experimental analysis is conducted with the known methods. The analyses have shown that the method increases accuracy the classification and decrease the length of the teaching selections.

UDC 004.891.3
V.I. Dubrovin, T.A. Shchedrina
Automated Analysis System of Electrocardiogram Based on the Wavelet Technology

In this paper of the ECG signal was analyzed using wavelet transform techniques to identify diagnostic features and local features of the signal.

UDC 004.89, 004.93
A.V. Djachenko, K.V. Murygin
Optimization of Character Image Templates by the Method of Vector Approach in the Task of Car Number Recognition

In the article the method of the vector approximation is considered to provide the improved templates of classes of recognizable characters with the least error of classification. The algorithm realized on this method produces the gradual displacement of vector-image of template of class towards the vectors-images of the characters classified by mistake so that an area appropriated, proper this class, took these images.

UDC 004.93
A.A. Egorov, L.G. Akhmetshina,
Enhancement of Color Adjustment Assurance in Multispectral Images Processing

This article deals with modified automated image contrast and intensity enhancement method of multispectral images. It is allowed to process various color and grayscale photos and to save color correspondence to input image. The experimental results of using proposed method for the processing of grayscale photo and medical RGB image are shown.

UDC 681.3.01:519.67
Yu.V. Emets
Multiplicative Noise Parameter Evaluation on Image by means of Multifractal Indexes

The method of multiplicative noise parameter evaluation at a multifractal index is developed. Characteristics of the developed method are probed on the test images.

UDC 519.711
V.A. Kozlovskii, A. Ju. Maksimova
Decision of Pattern Recognition Problem with Fuzzy Portraits of Classes

In the given work the algorithm of creating fuzzy portraits and fuzzy inference is suggested for pattern recognition problem. Formally fuzzy portraits are represented like linguistic variables. There is semantic rule for creating membership functions of terms-set. The base of membership functions creating is frequency analysis of set precedents. The ability to generalization of fuzzy portraits is depended on membership functions creating parameters.

UDC 621.317.07.089
V.P. Kutsenko, S.P. Sergienko
Analysis of Spectrum of Casual Signals Power on the Output of Mixer of Extremely High Frequencies Radiometer

The method, allowing to carry out the analysis of a spectrum of capacity of noise low intensive signals on an exit of the amalgamator of radiometre of the highest frequency, on the basis of influence of a casual signal on the semi-conductor diode included in the end of a long line is offered.

UDC 004.932.2:004.383.5
Y. Ladyzhenskyy, A. Sereda
A Search of Image Fragments for Object Tracking in Video with Template Matching on the CUDA Parallel Architecture

A search of arbitrary shape image fragments with full-search template matching on CUDA is examined. Different approaches to search area caching in a multiprocessor's memory are proposed and analyzed. Acceleration on GPU in comparison to CPU is evaluated. The proposed algorithms can be used to accelerate object tracking in video.

UDC 615.47:16-073
G.L. Logunova
The Analysis of the Main Parameters of Medical Gamma Cameras

The article describes the main parameters, which characterize a quality level of gamma cameras, for the further accounting at product definition regarding the samples of instrumentation being developed. Peculiarities of the monitoring of gamma camera characteristics were defined, estimation of parameter levels were performed by the example of representative samples.

UDC 004.932.2
G.M. Melnyk
Method and Algorithms of Analysis of Symmetrical Images

The task of description of images of repeated elements for image classification and recognition is considered. It is proposed a method on the basis of summetry groups that provides to get rotate, translate and scale invariant structural description of image.

UDC 004.93'1;004.932
O.Nedzvedz, S. Ablameyko, A. Belotserkovsky
Detection Volume Characteristics of Dynamic Objects in Medicine

A new techniques is presented in order to reconstruct 3D-object surface from several closed, in general, non-planar curves, including contours that were outlined manually. 2D distance map was used to reconstruct object of a different shapes. Branching problem is also discussed.

UDC 004.415.24; 004.932.2
L. Nikitenko, O. Nikitina
The Side Information Hiding Into the Digital Signal Frequency Domain

Hiding method of the digital watermark into time-frequency signal notation was proposed. The selected phase term rotation on the preset angle was carrying out with insignificant changes of the some of the input signal components. The theoretical researches were made with the goal to reduce computing. The workflow was proposed to take change vector best value.

UDC 681.3
A.A. Nykonenko
The Use of Design Patterns in Computer Linguistics. Creational Patterns.
Part I. Abstract Factory and Builder

The article is dedicated to the issue of the use of the creational patterns in computer linguistics problem solving. There are definitions of patterns, history of their creation, structure, features of usage and application abilities in the article. Abstract Factory and Builder patterns are discussed in detail.

UDC 681.3.01:519.67
M.V. Polyakova
Regularization of Differentiation with the Use of Repagular Wavelet Transform

The paper is devoted to the problem of regularization of image differentiation by repagular wavelet transform for the decision of which this transform is expressed based on integration of fractional order.

UDC 004.6(075.8)
V.N. Tereshchenko, D. Yanchik, D. Pustovoytov, E. Chernishov
An Approach to Finding the Optimal Path Between Two Points on a Set of Obstacles

In this paper the algorithm is to find ways on the plane taking into account the obstacles in the form of a self-avoiding polygons and they are finally just did not overlap with the complexity *O (n ln (n))* and using a linear amount of memory.

UDC 004.932.751
A.S. Ternov
Syllable-Viseme Synthesis of External Articulation for the Problem
of Computer Reproduction of Ukrainian Sign Language

An approach to the synthesis of external articulation for the problem of computer reproduction of the Ukrainian sign language in a three-dimensional model of a human head with and without taking into account features of phonetic structure of word forms is proposed in this paper. The approach allows one to reproduce the articulation of lips synchronously with gesture animation using a database of morphs of the Ukrainian language visemes. The implementation of the software of an algorithm described proves functionality of the proposed approach.

UDC 681.51
R. Bucki
Modelling Synthetic Environment Control

The paper highlights the problem of control while events come into being in a stochastic way in a synthetic environment with no unexpected disturbances. The events result from a certain activity in the predefined area. The general model takes into account the number of events which trigger an immediate assumed action in order to eliminate the state of danger or at least to reduce it. Management of excessive unwanted events in such a logistic system is carried out by means of the heuristic approach which was proposed on the basis of preceding experiences.

UDC 004.942:519.876.5
M. Lesiv, R. Bun
Geoinformation Technologies and Spatial Analysis of Carbon Dioxide Transport through Border Line

Geoinformation technologies and methods of spatial analysis of emissions in the border regions have been developed and GIS based software has been created for estimating mass of carbon dioxide (CO_2) emissions that goes through border line. Described mathematical models of processes of CO_2 emissions in the energy sector in the border regions take into account the meteorological data. Spatial analysis of carbon dioxide transport processes has been done for Ukrainian – Polish border zone in consideration with wind rose.

UDC 681.518.9; 621.384.3
S.S. Antsyferov
Increase of the Mental Potential of Adaptive Information-distinguishing Systems

Directions of increase of a mental potential of the adaptive information-distinguishing systems realising methodology of a structurally-stochastic principle of processing of the information of realisations of existential fields are considered. Principles of adaptation of parametres of processing algorithms and overcoming of essential aprioristic uncertainty are defined. The offered evolutionary process of search of optimum model of adaptive processing places heavy demands on productivity of processing means at the supercomputer level.

UDC 519.8
I.V. Baklan, G.F. Stepankova
On Some New Pecularities of Hidden Markov's Model Usage for Analysis and Prognosis of Time Series

In this paper we consider some new approaches to analysis and prognosis of time series by means of hidden Markov's models. We propose for time series analysis to use mixtures of unhomogenous hidden Markov's models. Also we consider some properties of hybrid fuzzy hidden Markov's models for time series prognosis.

UDC 004.94
Kh.V. Hamal, O.I. Pylypchak
Development of Approach to Modeling of Spatially Referenced Greenhouse Gas Emissions Inventory in Residential Sector of Zakarpattja Region

The paper is dedicated to creation of methods of spatial greenhouse gas emissions analysis from mobile and stationary sources of emissions in residential sector. The method of spatial greenhouse gas emissions inventory on the regional level is proposed that bases on using line and area emissions sources and geoinformation technologies and gives the possibility to take into account the specificity of emission processes on the level of elementary cells of a given size.

UDC 518.3 / 681.142.2
P.N. Denisenko
The Integral Equations Solving in the Computer Algebra Systems

We presented the efficient mathematical apparatus (the tools) for the Algebraic Programming System (APS), Maple, Mathematica and other computer algebra systems. This tools construct the computer programs. These programs have:

$$\text{INPUT} = (F[\,y\,] = 0,\ [a,b],\ n),\ \text{где}\ F[\,y\,] = f(\,x,\ y(x),\ \int_a^b K(x,t,\ y(t))\ dt\,),$$

$$\text{OUTPUT} = y_n = c_0 + c_1\,x + \ldots + c_n\,x^n \approx y(\,x\,) = \text{solve}(F\,[y] = 0),\ x \in [a,b]\,,$$

$$\| y(x) - y_n(\text{x}) \|_{C[a,b]} / \inf_{c\_0,\ \ldots,\ c\_n} \| y(x) - (c_0 + \ldots + c_n\,x^n) \|_{C[a,b]} = O(1)\,.$$

Using these tools we constructed the procedure for APS. This procedure solves the linear integral equations

$$A\,y + L[\,y\,] + g = 0\,,\ \text{where}\ A = \text{solve}(B\,y + H[\,y\,] + f = 0),\ L[y] = K_1[y] + \ldots + K_p[y],$$

$$H[y] = K_{p+1}[y] + \ldots + K_s[y]\,,\ K_i[y] = \int_{c\_i(x)}^{d\_i(x)} K_i(x,t)\,y(t)\,dt\,,$$

the kerns $K_i(x,t)$ and the coefficients $c_i(x)$, $d_i(x)$, g , B , f – the polinomials. We proved the efficiency of this procedure. We proved the efficiency of this method which is the basis for this procedure. This procedure proves the efficiency of these tools.

UDC 519.237.8:510.22
K.M. Zaleskaya
The Analysis of Fuzzy Clustering Methods Stability to the Choice of their Parameters

The analysis of optimization of fuzzy clustering methods FCM, NC, PCM, FRC is being made. The question of definition of parameters values of fuzzy clustering method such as initial values of centroids and the parameters of the primal cluster confidence limits is being considered. The question of the stability of fuzzy clustering problem solution with reference to the definition of the parameters specified values is being researched.

UDC 519.816:378
E.E. Zamanova
Decision-making System for Preparing an Educational Schedule

The paper is devoted to the problem of a decision support system for scheduling at university. It is proposed to model the initial decision-making system for scheduling, which uses the methods of construction schedule based on the principle of freedom of calculating the location of the individual studies in the resulting schedule. The initial model already takes into account the multi-criteria scheduling problems and time-consuming technical process of its creation, therefore, initially focused on saving time of the calendar and its quality.

UDC 004.93:519.71
V.A. Kozlovsky, V.S. Molchanova
Construction of Automaton Models of the Simplest Graphics Primitives

The problem of vectorzation of the raster image is considered in the article. The algorithm of the description of raster images of straight line pieces and ellipses, as well as their elementary combinations in the form of systems of the automaton equations is offered.

UDC 004.415.24
N.V. Koshkina
Audio Watermarking Based on the Discrete Wavelet Packet Transform and Frequency Masking

In this work the spectral method for building of systems with the digital audio watermarks is considered. The effectiveness of the proposed blind watermarking scheme is based on features of human auditory system and also on the analysis of typical processing operations influences to the spectral components of audio signal.

UDC 004.832
V.V. Krasnoproshin, A.V. Karkanitsa
Algorithms Modification of Trees to Create a Dynamic Subject Domain

The paper describes a problem of constructing model of dynamic multi-level subject domain for tasks with complicated structure. The subject domain of these tasks has been formed from a variety of information sources, distributed in the global environment. A data structure and algorithms modification of trees to create a dynamic subject domain are presented.

UDC 681.518.54
T.V. Kudritskaya
Usage of Standard Models of Fail Safety in Planned Maintenance TSR

The problem of forming of resolvent prognosis using boundary values, regulated by normative documents is considered. It is shown the possibility to solve the above-mentioned problem by the models of fail safety. It is shown the application of the approach on the example of the mine ventilator plants of the main ventilation.

UDC 004.89
V.V. Lytvyn, R.R. Darevych, D.G. Dosyn, N.V. Shkutiak
Planning of Intellectual Decision-making Agents in an Attributes Space with the Use of Ontological Approach

In the paper the problem of metrics construction for searching of relevant precedents by an intellectual agent which operate in the attributes space is considered. The attributes is proposed to weigh by the coefficients of their importance, which is storage in domain ontology. The approaches of determination of these coefficients are considered.

UDC 004.02
O.S. Litvinskaya, I.I. Salnikov
The Generalized Structure of Decision-making for the Method of Selecting Means of Realizing an Information Technical System Being Designed

The authors present the statements of decision theory (DT) which is the basis of decision-making support systems included in artificial intelligence systems. The block diagram of decision-making succession, with the objective function as its core, is made up. The role of an individual making a decision as a person bearing responsibility is emphasized. The authors give an example of using DT for implementing the method of selecting means for realizing the algorithm of the performance of the information technical system being designed.

UDC 007:681.516.4
A.O. Lozynsky, L.I. Demkiv
Conditionally Stable Systems with Fuzzy-controller

Nonlinear dynamic system of n-th order is considered. Takagi-Sugeno fuzzy control is constructed for it. Stability criterion is presented which does not depend on the type of switching function for the $2 – 5$ order systems for which the transfer function is known.

UDC 004.89
N.A. Maslova, V.V. Shamayev
Principles of Adaptation in Corporate Security Systems

The basic principles of adaptation, which are used in the security systems of information are systematized, methodology of construction of the security systems on the basis of adaptive approach is described, the method of estimation of efficiency of adaptive security systems is offered in the article. The examples of the intellectual adaptive security systems which are included in a corporate management are described.

UDC 004.942
B.V. Mysnyk
The Peculiarities of Enterprise Functioning Proccess Modelling Based on the "Artificial Life" Conception

In this paper the modelling problem of functioning processes for complex industrial systems is considered. Display of "artificial life" conception basic elements on processes of industrial enterprises life cycle is carried out. Basic components formalisation for modelling algorithm is executed and elements of functionality modelling objects are defined.

UDC 004.272
T.V. Mikhaylova
Programm System for Modeling Hierarchical Memory

The simulation model is suggested for modeling protocol of data storage. Raw data for modeling hierarchical computer memory is determined. The best protocol is chosen on the result of modeling certain type of the processed problems.

UDC 004.8
N.A. Novoselova, I.E. Tom
Method of Evaluation of Clustering Structure and Data Clustering

The paper is devoted to the problem of development of the clustering methods, which are robust to initialization (number of clusters and initial cluster parameters), to the different cluster volumes, to the outliers. It is proposed a method for estimation of cluster structure and clustering of data, based on the evaluation of similarity measure between data objects in multidimensional space. The proposed method is robust to initialization of clustering parameters, to outliers and allows definition of cluster structure and number of clusters in the data self-organizing process.

UDC 519.6
E.A. Pryanichnikova
Relationships Between Algebras of Languages that can be Represented by Labeled Graphs

In this paper we study an algebra of languages that can be represented by vertex-labeled graphs. We establish some new relationships between this algebra and the algebra of regular languages. It is proved that these studied algebras have isomorphic sub algebras. We show that it is always possible to transform regular expression of Kleene algebra into a regular expression of algebra of languages that can be represented by vertex-labeled graphs without changing its language. It is shown that algebra of languages that can be represented by vertex-labeled graphs is not the Kleene algebra.

UDC 621.37
V.A. Sanzharevskij
Model of Interaction between the Array of Microwave Sensors to the Object

The article proposes the model of interaction between the array of microwave, which allows the calculation of the parameters changes the radiated microwave antennas, transmitters of radio waves passing through an inhomogeneous medium and is reflected from dielectric dry surface of the object.

UDC 519.876:55.435.62(477.75)
V.M. Taran, A.O. Pashko
Estimation of Prognoses of Landslide Processes of the Southern Coast of Crimea by Means of Analysis of Temporal Rows (ARIMA)

General conformities with a law of construction of autoregressive models of landslide processes are investigated, on the example of the Southern Coast of Crimea. Authentication of ARIMA-models is conducted, the calculations of estimations of parameters of these models are executed. The criteria of estimation of models and estimation of prognoses on which a model is distinguished among the others are chosen, and also a prognosis is built for 10 years.

UDC 004.942
O.R. Chertov, D.G. Pavlov, V.V. Malchykov, M.V. Alexandrova
Detection of the Abnormal Contextual Advertising System User Behavior

In current paper Internet-advertizing market, contextual advertising in particular, is considered; interaction between subjects and objects of the Internet-advertizing process is formalized. Relationship analysis results in possible fraudsters' behavior models construction. Nondiadic wavelet-transform use for the users' abnormal behavior detection is demonstrated.

UDC 51-75
A.A. Sheptura
Presentation of Profits of Insurance Company in Functional Spaces

The question of compact presentation of insurance performance indicators for diminishing of time of making decision at operative receivership insurance company is introduced in the article. Profitable part of basic activity of insurance company is formalized as great numbers, the structure of these great numbers is certain, a birth-certificate, operations of addition and increase, is entered between elements, norm.

UDC 621.382
G.Yu. Shcherbakova
DN-distribution Parameters Evaluation with Noise Stability Clustering for the Automated Systems of Technical Diagnostics

The DN-distribution parameters evaluation method and own implementation procedure for the reliability estimation in time of electronic components accelerated life test was carrying out. In that procedure multi starting sub gradient iterative clustering methods for electronic components division in two groups by reliability level is used. That division procedure noise immunity increasing and error decreasing by applying of this clustering method was achieved.

UDC 004.8
T. Akinfiev, M. Armada
Dual Drive for Vertical Movement of Resonance Hopping Robot

In the present study vertical movements of resonance hopping robot of special construction with one leg and dual drive are considered. The construction of hopping robot with compensation of losses during flight of the robot allows employing a simple control system and having a stable regime of its operation so that the robot has self-property to maintain a specified height of jumping. The data on dynamical calculation, simulations and experimental testing are discussed. The solution of the problem of actuator's optimum parameters choice (including variable transmission ratio) for the considered robot is presented.

UDC 519.87
I.V. Dorokhov
Development of the Mathematical Model of the System of People Searching under the Rubble on the Basis of Doppler's Effect

The problem of mathematical modeling of basic processes which arise when searching biological objects under rubble using radiowave techniques are considered. A model which allows to calculate basic numerical parameters of Doppler processes for the heart of man is proposed.

UDC 681.5.01
D. Ivanov
Information Exchange in a Large Group Robots

The paper is devoted to the problem of ensuring information exchange between robots at their group use and the features of information exchange, depending on the chosen-term management strategy.

UDC 004.3.06
M.G. Mamedova, F.R. Mamedzade
On Estimation of Need of the IT-specialistes Based on Fuzzy Initial information

Informatization of various spheres of the human activity, fostering the diversification the IT-segment of a labour market, stimulates transformation of old and occurrence of new IT-specialities on the one hand, and causes imbalance between existing IT-education system and real structure of the IT-market on the other hand. In article the approach to an estimation of need of the IT-market through a sectional view of IT-specialities, based on fuzzy multicriterial methods of making of individual and collective expert decisions is offered.

UDC 004.896
V. Pisarenko, Ju.Pisarenko, C. Melkumyan, A. Koval
The Application of Robotics for Inspection of Mine After Collapse

The real high-actual tasks for the increase of safety in domestic of coal industry from point of support of mine-rescue works facilities intellectual robotics were analyzed. Some questions of hard- and software creation of robot's design and functioning for the inspection of obstructions and emergency-dangerous areas in mines are considered.

UDC 04.896
V.A. Plotnikov
Analysis of Efficiency of the Collision Avoidance Methods the Mobile Robot

In the article the problem of planning of movement of the mobile robot taking into account detour of obstacles is considered. The analysis of efficiency of existing methods of the collision avoidance and detour of obstacles for the mobile robot is carried out.

UDC 004.896
M.E. Popov
Stochastic Model of the Movement System of the Robot

In this paper we consider the mechanical part of the movement system of the robot with stochastic non-linear and elastic connections which movement has a pulsating character is considered. It is shown the possibility to study this system as an object of stabilization with a random structure.

UDC 004.82+007.52
A.Yu. Badalov, O.O. Varlamov, R.A. Sandu, A.N. Vladimirov, K.E. Tozha
Creation of Active Mivar Online Encyclopedia and Development of Mivar Networks Based on Multidimensional Binary Matrices for Simultaneous Evolution of Processing more than 10 000 Rules in Real Time

In this paper, an approach to creation of active Mivar encyclopedia, which is a multi-subject-matter expert system (ES) with the evolutionary capacity of knowledge and active problem solving in real time based on mivar logical-computing networks is developed. Creation of a single expert system for several different domains (multi-subject EC) requires a description in a unified formalism of tens and hundreds of thousands of objects and rules. Mivar develops a network of production and the approach used to create various expert systems, and multivariate evolution applied automated information systems (MEPAIS) support decision-making. To enhance the application of these formalisms are proposed the new ways of development mivar networks based on multi-dimensional binary matrices for the implementation of evolutionary concurrent processing of more than ten thousand rules in real time.

UDC 004.82+007.52
O.O. Varlamov, R.A. Sandu, A.N. Vladimirov, A.Y. Badalov, K.E. Tozha
Mivar Method of Logical-computational Processing of Information for the ACS Simulators Real-time and Expert Systems

The article discusses a new rapid method for unified logical-computational processing of information and data, based on the synthesis and development of Production approach and mivar logical networks. After mivar or product descriptions subject area, this method can be used to create various automated or automatic control systems, expert systems, including the processing of real-time simulators, architectures based on services and other automated data processing systems.

UDC 004.825
Ya. Vyklyuk, B. Gats
Methods of Construction the Spatial Distribution Fields of Urban Probabilities Based on ANFIS

The paper is devoted to the problem of construction the spatial distribution fields of urban probabilities based on typical tourist towns of Ukrainian Carpathian Mountains. The method of extracting data from geoinformation systems (GIS) and finding of hidden dependences using fuzzy-logic are considered. Maps of probability fields are received based on fuzzy FIS-systems with different types of membership functions.

UDC 004.89
O.V. Kravchenko, Zh.M. Plakasova
Aspects of the Formation Tests of Knowledge Control in a System of Adaptive Teaching

The systems of education, which allow to held a preliminary assessment of knowledge and to take into account the approaches of are studied are studied. The models and methods of adaptive control of knowledge are researched. The basic principles of building a modern system of testing, self-testing and self-study are given. A model of adaptive teaching, which contains the program's formation tests, is based on the principle of modular control of knowledge.

UDC 004.922
M.A. Kurilov, I.P. Cherednichenko
Pedagogical Program Facilities and its Introduction in Educational Process

In the article some problems of introduction of pedagogical programm facilities in educational process are examined. The methods for the content improvement by means of teachers' experience are offered.

UDC 004.82
V. Liubchenko
Formalization of Sufficient Level Evaluation for Domain Model Decomposition

The principle of decomposition sufficiency is formulated. The quantitative measure for rationality degree of decomposition is offered, the model research of its behavior is executed.

UDC 681.335:004.891
T. Mazurok
Neuro-fuzzy Implementation of the Synergistic Control by Individualized Teaching

The problem of teaching on the basis of a synergistic approach is considered. On the basis of investigation of existing control in traditional schemes the model of teaching control is developed. A graph-analytical method for implementing control, neuro-fuzzy system to optimize the individual teaching styles is proposed. The research results can be used to automatic control of individualized learning.

UDC 004.4.24
V.I. Mezhuyev
Ontological Models of Systems and System Engineering Process

The ontologies of systems are developed in the paper. The proposed ontologies envelop various aspects of system engineering, including capturing requirements and specifications, architectural modelling, creation of a work plan, testing, validation and verification of systems. The feature of approach is development of the ontological model of system engineering process. Practical implementation of the proposed approach in the OpenCookbook tool is considered.

UDC 51(071)
L.P. Mironenko, I.V. Petrenko, O.A. Rubtsova
Mean Value Integrated Theorems. The Approach Based on the Integrated Measure Properties

The first and the second mean value integrated theorems and their generalizations, which are known as generalized theorems, are considered in the paper. It is shown, that Lagrange's integrated theorem coincides with the first mean value integrated theorem at certain properties of the integrand. The second mean value integrated theorem is obvious from geometrical reasons. The generalized theorems for two functions are simply proved as the generalization of the mean value integrated theorems for one function. It is the main result of the paper.

UDC 004.4'42
Yu.V. Chernukhin, M.Yu. Polenov, D.V. Bulgakov
About One Approach to Intellectualization of Multilanguage Translation Tools for the EDA's Tasks Decision

The approach to intellectualization of previously developed the multilanguage translation environment (Multitranslator) by means of the expert system usage to support of automatic translation of devices' models at various levels of the System-On-A-Chip design is considered. Implementation of the given approach allows to expand functionalities of the Multitranslator and the VLSI EDA systems, using Multitranslator as a translation and synthesis tools of models' descriptions.

UDC 003.60
A.I. Shevchenko, V.A. Yashchenko
Neural-like Multicommunicative Growing Networks. Theory and Practice

This article discusses the neural-like multicommunicative growing networks – theory and practice of their application. On the basis of neuron-like multiply-growing networks were developed virtual robot "VITROM" and System Dialog. The implementation of recognition of visual images (VITROM) and intellectual dialogue and "thinking" (System Dialog) are shown.

UDC 57.007; 004.8.032.26
S.P. Aleshin
Neural Network Pattern Recognition of Classes in the Space of Biosensors Physiological Characteristics

The work is devoted to the biosensor recognition in the space of physiological (visual, auditory, olfactory, etc.) signs. The technique of the combined use of biosensing capabilities of living creatures, their situational physiological reactions and the training of artificial neural networks for recognition of classes is proposed. The approach is based on coeducation of living beings and artificial neural networks. This allows to transform the receptor complex of biodetectors signs in the space of simple behaviors. An algorithm for constructing models of object recognition in a neural environment emulators of Statistika Neural Network format is formed.

UDC 004.8
D.V. Drobot'ko, I.V. Kachur, V.F. Drobot'ko, G.A. Gorodnik
Monitoring System and Morphology of Non-stationary Signals of Intraskull Pressure

The system of intraskull pressure (ISP) measuring elaborated and implemented by authors is described in the article. For the studying of ISP temporary signals in the wave forms it is offered to use algorithms of kalman filtration and kalman smoothing that in any moment make adaptively an assessment of autoregression model parameters. ISP wave morphology under serious trauma of brain is studied by means of these algorithms.

UDC 681.3
V.I. Kodachigov
Quasicanonical Coding of Berge's Graphs

The method in order to arrive the quasicanonical code of graph is presented. This code is significantly shorter than the known canonical and universal codes. On the basis of the proposed method it is easy to construct algorithms for encoding and decoding with linear estimation of complexity.

UDC 681.2
O.V. Melekh, E.P. Maksimovich, V.K. Fisenko
Classification of Critical Information Objects by the Requirements of Physical Protection Using Methods of Cluster Analysis

The approach to critical information objects classification by physical security requirements on the basis of the cluster analysis is proposed. Informal and mathematical problem statements are formulated. The classification methodology on the basis of objects set partitioning on non-overlapping subsets is developed. The partitioning is performed using adjacency function and partitioning criteria on the basis of set of factors in such manner that physical security requirements are the same within every objects group.

UDC 621.396
Ph.G. Nesteruk, G.Ph. Nesteruk
Intellectual Protection of the Information on the Base of Adaptive Classifiers With the Incremental Training

The organization of the system of safety, which is oriented to the processes of adaptations to the dynamics of computer attacks is considered. It is marked that a lower level of hierarchical model of adaptive defense must be intellectual (by analogy with the immune mechanisms of the biological system). A top level is oriented to the use of intellect of system administrator as a component of model (by analogy with the processes of generalization of CNS). Each of levels contains neural classifier with the incremental teaching. A similar classifier enables to increase speed of classification due to minimization of amount of clusters at periodic implementation of the stages of structural and parametric optimization.

UDC 621.384.8
T.Z. Khaburzaniya
Neural Network Modeling in Solving of Reverse Tasks of the Analytical Information Processing

In the work the approach to neural networks application is discussed as the competitive computing technology in the analytical information processing. The general function chart and algorithm of transformation of the analytical information are developed within the framework of a competition principle. The basic attention is given to a choice of topology of a neural network both its structural and parametrical synthesis.

UDC 629.735.05
B.M. Shevchuk
Protection in the Transmission of Information Packets in the Effective Local-Regional Radio Networks

In the article the performance of sequences of operations for the protection of information in radio networks with regard to achieve the theoretical strength of data protection network subscribers. It is noted that the basis of virtually resistant cryptographic protection of information packets is to use a subscriber network is encrypted with a one-time key (Vernam's cipher). To protect the information on the use of session keys, a pair of users (the sender information, recipient information) should be used for data protection algorithms built on the basis of asymmetric cryptography. In order to ensure comprehensive data protection in Radio the information is protected at various levels: at the information level, the level of formation of signal-code structures, the energy level.

UDC 004.415.24
I.V. Shvidchenko
Steganoanalysis Methods for Graphic Files

The article is devoted to a problem of detection of steganographic hiding in files of BMP and JPEG formats. The analysis of various steganoanalytical methods is carried out. Their classification and brief review is presented. The consecutive application of presented methods is offered to establish the fact of the hidden information presence in container.