OBJECTIVE DEVELOPMENT OF APPLIED INFORMATION TECHNOLOGY COLLECTION BUSINESS INFORMATION IN INTERNET

page 4–5

This article examines the search, collection and processing business information. The main problem is a search for sources of business information. The main groups of sources were identified: legislation, reporting, infrastructure, media and Internet. Internet today is the main source of any kind of information, but there is still the actual problem of data retrieval, that meets the criteria of quality business information. This paper analyzes the requirements for such sources. The criteria for the quality of business information have been identified, among which the most important are accuracy, timeliness, completeness, verifiability, fairness, etc. The detailed analysis of the enterprise data flows resulted in the formulation of information technologies development for the collection and business information storage problem, which would take into account all the basic information in the enterprise, as well as additional sources. The basic requirements that must be met by developed system: adaptability, portability, usability, etc. The present paper identifies the stages of collecting information, set goals and objectives for the solutions. For each task of collecting and storing business information from a variety of sources have been defined the mathematical tools for its program implementation.

Keywords: business information, information technology, internet, search, collection, automation, word processing.

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THE ORGANIZATION OF THE EXPERIMENT PSYCHOLOGICAL MECHANISMS TO ENSURE THE EFFECTIVENESS OF THE OPERATORS

page 6–7

With the advent of the scientific approach to the development of artificial intelligence systems designed to process different images, by analogy as a man, for describing their semantics problem identifying the psychophysical laws and their quantitative representation that deliver the highest efficiency and quality of the operator's personnel. Taking into account the mental and physical aspects of operator activity, and that the intellectual is essential and is to provide the human operator the necessary information to make a decision as reducing tension and fatigue caused by pushing a high level of responsibility, insufficient representation of information and lack of time.

The main purpose of this paper is to describe an experiment that results in an accurate and adequate recognition quantify time depending on the brightness and contrast of the images presented on the screen.

Keywords: psychophysical features, visual images, the complexity of pattern recognition, data analysis, system testing.

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ANALYSIS AND CHOOSINGTHE WIFI-NETWORK IN UNSTABLE ETHER SITUATION

page 8–10

This article presents analysis and choosing the connection parameter to WiFi-network devices in an unstable ether's situation. There are the questions of effective using the WiFi-network in the intranet data exchange.

The developed software scans ether, displays to user's PC the graph attenuation signal, full information about networks that are in range. The recommended WiFi-channel is determined. Then user's device is reconnectedautomatically to the most powerful/not noisy network.

Implementation of this program will be beneficial for the users of WiFi-devices that will be automatically set to the stronger network in unstable ether's situation. Also implemented function of the definition channel (free or non-overlapping) give the opportunity to manage efficiently the ether's situation and to increase the productivity WiFi-adapter in the office, corporate and private networks.

Keywords: WiFi-network, scanning of ether, choosing of WiFi-channel, automatic reconnection of user's device.

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UKRAINIAN ENGINEERING SCIENCES AND SCIENTOMETRIC TOOLS

page 10–12

This article presents the importance of ensuring the visibility of Ukrainian scientists research in the field of technical sciences through the evaluation using the scientometric tools. The main problems of the scientometric tools use have been analyzed. The most well-known scientometric databases, namely, Web of Science and SciVerse Scopus as well as the scientometric systems elibrary.ru and «Scientific Periodicals of Ukraine» are considered. It is concluded that the share of the analyzed publications in the field of technical sciences in the international scientometric databases is represented insignificantly. The recommendations on the use of scientometric tools for assessing the scientific activities of Ukrainian scientists in the field of engineering are developed.

Keywords: scientometric database, scientometric systems, engineering, recommendations for use.

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IMPROVING THE SYSTEM OF INTERNATIONAL FREIGHT TRAFFIC DISTRIBUTION IN PORT TRANSPORTATION HUB

page 12–14

The paper highlights the main issues of improving the operating efficiency of port railway stations and commercial seaports by increasing the traffic and handling capacity of stations of port transportation hubs. Based on the performed analysis of the current state of port transportation hubs, it was proposed to develop the plan of freight and car traffic distribution in the hub with determining the areas of «surplus» and «deficit» concentration of wagons and freight, including the terms of maritime and rail transport interaction. Herewith, the method of linear modeling was used, namely representation of the optimization of specified processes as a multistage transportation problem. As a result of the research, recommendations for the formation of multistage transportation problem in the form of transport network polygon, which can be used in the formation of rational modes of international consignments transportation, were proposed.

Keywords: port transportation hub (PTH), port railway station (PRS).

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FLOW STRUCTURE VISUALIZATION WITH MEASUREMENT OF VELOCITY FIELDS IN UNSTEADY MOTION OF FLUID

page 14–16

Based on the analysis of scientific researches on the unsteady motion of fluid in pipes it was found that the most accurate study of

the flow structure can be obtained by the flow visualization with the measurement of velocity fields and turbulence characteristics.

The use of the laser Doppler velocity meter for studying the structure of unsteady fluid flow was substantiated. For measuring the fluid flow velocity, the laser Doppler velocity meter was used, allowing to measure the flow rates of fluids and gases in local resistances of circular pipelines, as well as in circular pipes with a curved longitudinal axis.

The method of studying the flows using high-speed filming and photographing was developed. The operating experimental facility was made that provides film and photographic recording of the structure of actual non-stationary flows of fluids in circular pipelines. Visualization of the flows on local resistances and pipelines was held.

Keywords: unsteady, non-stationary, fluid motion, velocity distribution, flow structure, flow visualization.

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PROPERTIES OF E-PLANE WAVEGUIDE CONVERTERS OF COMPLEX REFLECTION COEFFICIENT

page 16–18

Graphical interface for studying the basic properties of a four-probe model of an X-shaped divider-diffuser of vector analyzer was developed.

The analysis of basic properties of multiport *X*-joints showed that they can be used in measuring converters of analyzers of complex reflection coefficient merely in the case when the single-mode operation remains both in rectangular waveguides of dividers and in discontinuous area of output ports joint. Thus, for symmetrical *X*-shaped E-plane power divider with cross dimensions of rectangular waveguide 7,2 × 4,6 mm, during the implementation of multimode operation in the output ports, or in the case of *X*-jointing with the angle of rectangular waveguides intersection equal to 135° and over, the dimensional refocusing of mutual arrangements of optical discontinuities of the divider-diffuser takes place. Disintegration of the four-probe equivalent circuit of divider, which is built within the scope of the circuit theory, occurs. Constructions of dividers with such parameters cannot be used in 12-pole measuring converters.

Keywords: vector network analyzer, four-port discontinuity, reflection coefficient.

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IMPROVEMENT OF WASTE MANAGEMENT SYSTEM

page 18–20

The modern waste management system of Ukraine was studied. Some differences in the domestic management system compared with the developed countries of the world were determined. Basic negative aspects of the current waste management system were revealed, in particular, the predominance of administrative methods over economic methods. The main problem of the current mechanism of economic management of natural resources is the lack of interest of enterprises-polluters in more efficient and careful use of natural resources and environmental protection. The methods of improving the waste management system were proposed. The research results can be used by public authorities of various levels to adapt current legislation in the sphere of waste management, improve and increase the effectiveness of management decisions in the field of waste management.

Keywords: economic mechanism, management system, waste minimization, waste management, economic instruments.

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COMPLEX SOCIOTECHNICAL SYSTEMS REGIONAL DEVELOPMENT TRENDS OUTLINING WITHIN THE FRAMEWORK OF EUROPEAN INTEGRATION PROGRAMME

page 20–22

Production complexes development problem status has been reviewed as an array of complex sociotechnical system elements in view of probable European integration processes. Basing on existing sociotechnical systems activity efficiency factors, a conclusion has been drawn about insufficient methodological studies in available resources management. Four essential trends of development for complex sociotechnical systems have been offered: development of logistics and transport infrastructure; stable energetic resources formation; creation or restoration of industrial complexes; creation of educational center.

Each of the proposed trends has been objectively estimated from the point of view of demand for their development within the framework of European integration. Cornerstone principle of activity has been determined on the basis of projects implementation procedure in correlation with results probably obtained in specified trends, reading as «From Confidence to Understanding, from Active Application to Socially Beneficial Results».

Keywords: sociotechnical system, regional development, project, European integration, efficiency, resource.

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ASSESSMENT OF PROCESSES OF ENTERPRISES QUALITY MANAGEMENT SYSTEMS

page 22–24

International standards ISO 9000 require the development of the methods of quantitative assessment of the processes of quality management systems (QMS). It was proposed to apply the double exponential distribution for assessing the quality of processes. Using the symmetry principle, with the limiting distribution of the sample minimum, the limiting distribution of the sample maximum was obtained, as well as a number of additional intermediate functions allowing the regulation of requirements for the process depending on its significance within the QMS. As a result of the proposed classification of the processes quality indicators, the method of processes assessment was developed which provides the process assessment taking into account the heterogeneity of quality indicators and its significance. The method can be used at enterprises for quantitative assessment of the QMS processes quality.

Keywords: quality management system, assessment of processes, qualitative indicators.

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APPLICATION OF MODULARITY FOR NORMATIVE DOCUMENTATION DESIGN

page 25–27

The paper gives the principles and approaches of construction of modular elements of a standard. The principles of developing design and functional modules of the normative documentation system were proposed and mathematically described. Unification methods, principles of repeatability, optimality and interchangeability of structural and systemic approach were used in construction of models.

The basis of structural design of normative documents with modular elements has logical and element bases. The logical base includes the subject area and a set of modular operators of semantic description of normative documents system construction. The element base consists of a set of modular elements, which form the system of normative documents of the given class.

To improve the efficiency of the use of modular principle in the design of normative documents it is preferably to use a set of previously developed standard formulations. Such an approach allows achieving a high degree of identity in describing all types of standards that are used for the given type of products.

Keywords: regulatory documentation, modular principle, modular element, structural approach, unification.

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METHODOLOGICAL PRINCIPLES AND APPROACHES TO QUALITY ASSESSMENT OF TEXT PORTION OF NORMATIVE DOCUMENTS

page 27–29

The paper considers the methodological approaches to estimating the quality of the text portion of normative documents. The research allowed revealing the main model provisions of the text portion of normative documents and analyzing their canonical forms. The main models of the text portion of the normative document are requirements, rules (recommendations, annexes, exclusions), concepts, comments. Formal approaches to quality assessing of the text portion of normative documents were proposed, the essence of which lies in model provisions of normative documents and their assessing by weight coefficients for each of the provisions. The overall estimate is determined as the arithmetic mean. The research results allow improving the quality and scientific-technical level of the developed normative documents. The use of integrated assessment of model provisions of normative documents allows more efficient and reasonable selection of terms, concepts and definitions in their canonical form.

Keywords: normative document, quality assessment, methodological approaches, norms, rules, principles.

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EXPERIMENTAL RESEARCH OF A TOWED UNDERWATER VEHICLE ALTITUDE AUTOMATIC CONTROL SYSTEM

page 29–31

An overview of typical applications of towed underwater vehicles in modern seamanship is given in the paper and the task of improving the quality of automatic control of vehicle altitude is formulated. It is shown that the synthesized highly efficient systems for automatic motion control of towed underwater vehicles require experimental verification. For experimental research of modern management systems of such vehicles, the model of towed underwater vehicle has been created meant to carry out the areal survey of the seabed in the interests of underwater archeology. A program and approach of the marine full-scale testing of the model of the towed underwater vehicle was developed, the main modes of tests and their terms and conditions were described. The composition of marine equipment and the circuit of testing the model of the towed underwater system were considered, the results of the tests were given.

Keywords: towed underwater vehicle, system of automatic depth stabilization, testing program and procedure.

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EFFICIENCY ESTIMATION OF UNDERWATER TECHNICS APPLICATION IN DEEP-SEA ARCHELEGICAL PROJECTS

page 32–33

The problem of creation of a generalized approach to the comparative evaluation of efficiency of manned and unmanned underwater technics application in the projects of deep-sea archaeology was considered. Based on the analysis of current international requirements to conducting deep-sea archaeological expeditions and studying the existing methods for assessing the efficiency of underwater technics to perform oceanographic research, the generic criteria for safety and operational efficiency of underwater technics were proposed to perform the works on the deep-water archaeology. Under the common criteria for evaluating the effectiveness of new equipment, the possibility of using the criteria proposed by the authors for quantitative assessment of the operational characteristics was considered and the possibility to take reasonable organizational and technical decisions regarding the provision of deep-sea archaeological expeditions with manned and unmanned technics for deep-sea researches was shown.

Keywords: underwater archeology, criterion of efficiency, underwater work safety, operational efficiency.

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AUTOMATION OF MARITIME TECHNOLOGICAL COMPLEX WITH TETHERED UNDERWATER VEHICLE OF WORKING CLASS

page 34–36

The problem of creating a generalized method for quantitative assessment of automation level of marine technological complex based on self-propelled tethered underwater system of the working class as a theoretical basis for comparative multivariate analysis of developed marine technological systems is considered. The analysis of application methods and operation modes of marine technological complex with the self-propelled underwater tethered system of the working class was made. The necessity of complex automation in order to improve its efficiency in conditions of external disturbances was shown. Based on the review of technical literature and analysis of operation modes of marine technological complex, the main areas of its automation were defined. Among these are the automation of complex equipment performance diagnosis, automation of movement modes of underwater vehicle and its external attachments, automation of control of information flows of the complex and control automation in emergency conditions. The basic ratios for quantitative assessment of the level of marine technological complex automation, which are intended for using in the design of new and comparison of existing complexes were proposed. The results can be used in scientific-research and design organizations working in the field of underwater technologies.

Keywords: marine technological complex, self-propelled tethered underwater system, operation mode, automation.

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AUTONOMOUS UNDERWATER VEHICLES GROUP CONTROL IN THE MARITIME SEARCH OPERATIONS IMPLEMENTATION

page 36–38

The applied scientific problem of automated control of group motion of autonomous unmanned underwater vehicles during maritime search operations was considered in the paper. General principles of building the systems of automation control of a group of self-propelled autonomous underwater vehicles under the uncertainty of environment characteristics and nonstationarity of underwater vehicles parameters were given. The features of organization of autonomous underwater vehicles group operation when performing maritime searching works, the main tasks of automated control of a single vehicle-agent and a group of underwater vehicles, the requirements for algorithms of their collective behavior were studied. The task of synthesis of the system of automatic control of the group of underwater vehicles was formulated as the selection of sensor, communication and actuating capabilities of autonomous vehicle-agents and the development of algorithms for their collective behavior was elaborated. The synthesis of the system of automated control of the group of underwater vehicles was proposed to conduct by defining the target function of the group and individual vehicle-agents and developing the algorithms of their collective behavior during the overall underwater mission.

Keywords: autonomous underwater vehicle, group control, automated control system, maritime search operations.

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CURRENT PROBLEMS OF TETHERED UNDERWATER SYSTEMS DESIGN

page 38–40

The summary review of standard methods of construction of tethered underwater systems and main fields of their application is given. Basic configurations of self-propelled and towed underwater systems were described. A brief description of functioning and operation features of tethered underwater systems when performing searching, inspection, technical, extracting, scientific-research, sports-tourism and special underwater works was given. The basic equipment used in tethered underwater systems, and their basic elements for the bottom and upper works of vessels of the tethered system were described. The list of project tasks needed to be solved for the design of modern tethered underwater systems was formulated. The approach to the construction of the systems of information exchange in such systems on the principles of centralization, which involves actuating mechanisms and sensors of the tethered system, devices for voice communication of operators with the deck crew, was proposed.

Keywords: tethered underwater system, self-propelled underwater vehicle, information exchange, automatic control.

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OPTIMAL CONTROL OF ELECTRIC DRIVE OF TRAWL WINCH

page 41–43

In this paper, an important technical problem of determining the optimal methods to control the electric drive of the trawl winch is solved and the result of solving the problem with the accepted assumptions is given. The main objective of the study is to develop mathematical software of development and design of automation systems of trawling. For the development and improvement of trawling automation tools it is very important to create adequate mathematical models that allow obtaining the control laws of individual elements and the entire complex as a whole. Most researches in this area are focused mainly on the studies of the trawl system only, considering the vessel just as an energy source for towing the trawl. The processes within the propulsion system and the drive of the trawl winch are neglected. Calculation and numerical simulation of the gain of the trawl winch electric drive during winding the warp over the pulley were conducted in the paper using the mathematical theory of control systems design and optimal control theory. The calculations take into account the radius of winding and the increase in the moment of inertia of the pulley. The numerical solution of differential equations allowed obtaining the dependencies of the drive gain on the time. It is shown that the change of the coefficient is the same at various values of the winding time.

Keywords: trawl winch, electric drive, gain.

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METHODOLOGY OF BUILDING MULTICRITERION DIFFERENTIAL-GAME MODELS AND METHODS

page 43–45

The paper gives a methodology of analysis and synthesis of multicriterion differential-game models and methods of modeling the processes of cyber attack. Established methodology of uniform systems approaches allows the synthesis of multicriterion differential-game methods of cyber attacks modeling that involve the use of the systems of appropriate models with various degrees of accuracy, from the models of security evaluation to the models of cyber attack dynamics prediction. Application of the methodology facilitates the integration of advanced information security systems into the newly created information technologies, that along with the solution of basic assigned tasks, solve the problem of information security and are sustainable to the predicted class of cyber attacks and parameters that characterize them. The results of the metho-

dology are reflected both in quantitative and qualitative forms, which does not contradict the basic tenets of the theory of complex systems.

Keywords: cyber attack process, security level, multicriterion differential-game model, information resource.

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ANALYTICAL SUBSTANTIATION OF THE USE OF GFSR-GENERATORS IN THE TASKS OF CRYPTOGRAPHY

page 44–47

The analysis of problems associated with theoretical and practical substantiation of principles of construction of combined pseudo-random sequence generators based on the generalized feedback shift registers was conducted. It is shown that one of the promising ways to build combined generators of pseudo-random sequences is a compromise combination of the principles used as the basis for the synthesis of GFSR-generators with non-linear multiplicative filters with their own finite memory. The use of such an approach is justified by the fact that under a large period of sequences formed by the GFSR-generators, the number of generator polynomials defining the type of feedback is relatively small, which simplifies the task for cryptanalysts. Introduction of a non-linearity is an economical way to solve the problem of increasing the cryptographic protection and can be used in the design of modern information security systems and development of new ciphers.

Keywords: stream cipher, combined generator, memory filter, GFSR-generator, Mersenne twister.

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FUZZY MANAGEMENT OF INITIATION OF OCCUPATIONAL SAFETY AND HEALTH PROJECTS

page 47–49

Life safety is ensured through the occupational safety and health measures. It is shown that the latter possesses all the features and properties of the project. This allows applying the methodology of project management to improve the safety management efficiency. The occupational safety and health projects are considered in the paper as managed organizational and technical systems. The aim of the study is to develop new approaches to occupational safety and health projects management to ensure industrial safety.

The method of fuzzy detection of the initiation moment of occupational safety and health projects is presented for decision support systems.

The method was developed conceptually; it uses Mamdani's fuzzy inference method. The initiation moment of occupational safety and health project is determined as a result of fuzzy assessment of working conditions and safety in the enterprise as a whole. The problem is multi-criteria.

The research results can be used by engineers of occupational safety and health in the field industrial safety, as well as in decision support systems of industrial enterprises management.

Keywords: occupational safety and health projects, fuzzy detection of initiation moment, Mamdani's method.

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SYNERGETIC SYNTHESIS OF PROJECT MANAGEMENT SYSTEM

page 50–51

The paper gives the analysis of methods and tools used in the subject area of project management in scientific and practical researches. It is shown that they do not correspond to the synergetic paradigm of management, but based on the reductionist approach. Project management is considered as the art of project manager to achieve the desired result. Attempts to formalize the semi-structured project management system do not allow accurate forecast of success or failure of the project. To manage the projects as an open, nonlinear, emergent system it is proposed to use the elements of synergistic synthesis, formation of self-organization to asymptotically stable final state. An increase in the dimension of the synthesized system and additional attractors on the phase plane are formed by means of organizing a special set of negative and positive feedback. At the stage of project implementation it is necessary to form the control actions to reduce uncertainty. As a result, the compression of dimension takes place, the trajectory of the system on the phase plane successively moves from one attractor to another, until it reaches the target attractor.

Keywords: project management, synergistic synthesis, attractor, directed self-organization.

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THERMOMETRIC PROPERTIES OF GALLIUM MONOSELENIDE

page 52–54

It is shown in the paper that significant temperature dependence of the NQR frequency ^{69}Ga is observed in GaSe. It is described as linear with conversion transconductance of 1,54 kHz/deg for the temperature range of 250—390 K.

The undoped crystal for thermometric substance is grown by Bridgman method and annealed in vacuum under the scheme: 400 °C for 4 hrs., 200 °C — 6 hrs., 150 °C — 12 hours. Conducting of annealing is the cause of ordering of structural defects and stabilization of their structure. It is shown in the quality of the spectra of resonance NQR lines. To monitor the temperature, the thermometer was realized based on marginal oscillator spin-detector on the source follower. The accuracy of tracking the temperature is ±0,05 °C.

Keywords: temperature dependence, gallium monoselenide, NQR, marginal oscillator spin-detector.

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MODELLING OF THE DIGITAL DATA TRANSMISSION WITH THE USE OF CHAOTIC MASKING

page 55–57

The modern state of telecommunications requires further development of new digital communication systems. The hidden information transmission is based on the use of deterministic chaos because chaotic oscillations have a high information capacity and continuous spectrum.

The use of the deterministic chaos system in telecommunications depends on the quality of chaotic synchronous response of interacting systems.

The research of hidden communication transmission and noise immunity demonstrated the unsuitability of a chaotic masking system for practical use while transmitting digital signals.

We proposed to use of pre-modulation information signal by chaotic or noise for hidden information increase. A signal with spectral characteristics similar to the carrier chaotic oscillations is, therefore, advisable to use as a modulating oscillation. Another chaotic signal of this generator can be used as an information signal to simplify the scheme, when the value of practical width of the spectrum of carrying signal is biggest of information signal or the generator of noise signal.

The information signal can be recovered with high accuracy using the offered technique for the channel without noise. It leads to information distortion and incorrect recovery. To address these problems, a compromise between decreasing the value of secrecy and the speed of transmission is required.

Keywords: chaotic masking, digital signal, hidden transmission, drive and driven generators.

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EMPIRICAL DISTRIBUTIONS OF STATISTICS OF CORRELATION ANALYSIS FOR PROTECTED INFORMATION CDMA-SYSTEMS

page 58–60

It is noted in the paper that the multivariate normal distribution is not always a proper model to describe the actually observed signatures. For a number of statistics that are used in testing the hypotheses regarding the observed multi-dimensional variables it is shown that in the case of laws that differ from the multivariate normal distribution in a fairly wide range, significant changes in marginal distributions of statistics do not occur. Empirical distributions of statistics data are well described by the limiting laws obtained in the classical correlation analysis on the assumption of normality of the observed vector. It is shown that based on the correlation analysis results the conclusions can be made on the existence and nature of functional dependence or the preference of the particular regression model for description of the object under the study. The necessity to have the ability to model pseudo-random vectors under the laws with controlled deviation from the multivariate normal distribution is noted in order to trace the changes in distributions of the studied statistics of the correlation analysis. The results extend the scope of correct use of the methods of classical correlation analysis in applications.

Keywords: distribution, statistics, correlation analysis, system, measurement, signature, synthesis.

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SYSTEM OF TEXTURAL FEATURES BASED ON THE MEASUREMENT OF SPATIAL FREQUENCIES

page 60–62

The paper indicates that one of the forms of contextual information is the concept of texture, which is a functional of a set of fragment points. It is noted that the advantage of textural features is the potential for the aggregation of contextual information with certain properties of invariance to a specific target of patterns recognition. The informative significance of textural features as compared to the spectral features is substantiated and an overview of texture features is given. In this regard, the problem of features selection is analyzed and the distribution of textural features into groups is shown. A group of features is studied that are based on measurements of the spatial frequencies and the feasibility of applying groups of features based on the use of the continuous Fourier transform and its discrete analogue is shown. It was found that the combined application of features based on the use of the continuous Fourier transform and its discrete analog allows making the features system sensitive both to the dimensions and to the orientation of elements forming the texture. The conclusion was made on the feasibility of application of the features, based on measurements of the spatial frequencies in various fields of human activities associated with patterns recognition on the images.

Keywords: recognition, image, texture, sign, spatial frequency, autocorrelation.

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