INTERNAL AUDIT OF THE QUALITY MANAGEMENT SYSTEM. QUANTITATIVE PROCESS EVALUATION

page 3–6

We continue to investigate the methods of internal audit with the purpose of objective evaluation of the quality management system processes at engineering enterprise. For the first time, the approach to the quantitative evaluation of the products life cycle processes is proposed, where the key indexes of the process function as a measurement object are crucial to meet the quality requirements. The process evaluation criteria are related to the characteristics of products quality and are based on the meeting the consumer requirements at every stage of the production cycle. Thus, this evaluation index means not only the actual results of the process, but also the potential opportunities that this process provides using the adjacent process. The method of the index forming and evaluation process is based on the concept «Six Sigma» and taking into account the features of the engineering enterprise, is illustrated on a practical example. The proposed method of the process quantitative evaluation is more accurate than the expert opinion and allows to make reliable conclusions on the results of the IA (internal audit). This evaluation model can be used by industrial enterprises in order to improve the process efficiency, as well as to reduce the risks and improve the products quality guarantees.

Keywords: internal audit, quality management system, index of the process, quantitative process evaluation.

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STATISTICAL METHOD FOR SCIENTIFIC PROJECTS RISK ASSESSMENT

page 6–8

This article discusses the use of statistical methods for risk evaluation of the scientific institutions activity in the public sector of the Ukrainian economy in the process of planning and execution of scientific projects, some of the results of our research in this area are presented. The main objective of the study is to determine the possibility of using the statistical method in the process of evaluation of the research projects risks. The use of risk evaluation methods allows the manager and the team of research projects to collect and analyze statistical information concerning the identification of the probability of risky situations obtained in the process of planning and execution of previous research projects, and which deals with the execution of projects with the necessary material and technical resources and performers. This article presents the results of the author's research in previous works using the statistical method of the research projects risk evaluation to figure out the possibility of risks affecting these projects. The presented method enables to process the information on scientific projects using conventional statistical techniques to analyze the results of the projects planning and execution. The method was designed for the appropriate and qualitative development of management proposals for the further decision-making in the process of planning and execution of research projects. The

research results can be applied by the managers of research projects, scientists and experts in the field of research projects execution.

Keywords: mathematical and statistical methods, statistical method, risk evaluation, risks, research project.

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WAYS TO IMPROVE OBJECTS RECOGNITION AND CLASSIFICATION IN SATELLITE IMAGES

page 9–11

The article analyzes modern technologies and methods to improve the efficiency of object recognition in satellite images, in particular the method of multispectral satellite high-resolution scans and their interpretation in a geographical information system (GIS).

Using multispectral images can improve the efficiency of objects recognition and classification. However, at a sufficiently high spectral resolution there is a problem related to the necessity of characteristics (spectral signatures) processing in high-dimensional spaces. The solution to this problem lies in the fact that first it is reasonable to reduce the space dimension and to perform recognition (classification) in the new space. Increasing of the separation ability resolves two interrelated objectives: improving of the visual quality and images reconstruction. Solution of the first problem is the method of fragmentation and zoning images. The solution of the second one is the deconvolution method.

The combination of area images processing and their reconstruction allow approaching solution of fire prediction problem and selection of distinguishing methods.

Keywords: satellite remote sensing, operator activity, multispectral satellite images operative monitoring.

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THE ABILITY TO AUTOMATE THE PROCESSING OF DIGITAL PORTRAITS

page 11–15

Nowadays, it is difficult to imagine a book, a magazine, an advertisement or a product cover without an illustration. Very often it is a photo, namely, a portrait. In order to reduce the processing time of such photos, this article defines the main defects, such as:

— color defects;
— lack of sharpness, blurred motion;
— lack of contrast;
— lack of brightness.

Thereafter, the sequences of action were developed for each defect, i. e. the algorithms which eliminate these disadvantages the most accurately. In conclusion, we put forward a method for automating each algorithm in order to accelerate retouching and selection of photographs.

The researches have shown that the automated portrait processing, in comparison with the manual one, requires 15 times less time consumption.

Keywords: retouching, portrait, automation, algorithms, defects, printing, photography, scanning, digital processing.

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INVESTIGATION OF THERMAL AND HYDRODYNAMIC PROCESSES IN THE OIL TRANSFORMER RADIATOR COOLING SYSTEM

page 15–18

Despite the large number of publications in the field of transformer, heat transfer and hydrodynamic processes that take place in the radiator cooling systems, lack of attention. However, for a comprehensive analysis of the entire oil circuit in the transformer, it is necessary to take into account the work of the radiator, as it was on the efficiency of removal of heat in it will depend on the oil temperature at the inlet of the transformer. To achieve these objectives, this paper describes two methods: by experimental and mathematical modeling. The obtained results are compared both ways between themselves and the calculated error, which is reciprocal to confirming the adequacy of the results obtained by both methods. This article has been further development of the concept of heat transfer and hydrodynamic processes that take place in the radiator cooling systems of power transformers. The logical result of the reported studies, is the determination of the coefficient of heat transfer from the radiator to the cooling medium as a parameter which characterizes the intensity of the heat removal from the oil in the radiator. The results can then be used not only for calculating the cooling radiator but in general the entire transformer.

Keywords: heat transfer coefficient, power transformer, cooling radiator, the flow rate of oil, coolant.

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APPLICATION OF GENERALIZED COMB WAVELET FUNCTIONS FOR ANGIOGRAM IMAGE SEGMENTATION

page 19–22

The existing methods of angiograms processing do not provide the required speed and quality of segmentation, which determines the accuracy of diagnostic solutions. Therefore, to reduce the angiograms processing time a method has been developed for segmentation of the vessels illustrations on the 3098 pangiograms, and analyze the result of segmentation by means of conversion with the generalized comb wavelet function at the vessels localization and the replacement of several processing levels by the one. The latter is achieved by the fact that the convolution with a generalized comb wavelet function is similar to using a set of bandpass filters. At the phase of segmentation results analysis of the vessels skeleton excretion was increased using morphological processing. The implementation of the developed method has allowed to reduce angiogram images processing time at 43 % that is required to combine the diagnostic and therapeutic potential of the angiography method during a single procedure. Thus, the noise resistance characteristics may be changed as follows: the probability of the 1st type error is 1,22 times reduced, and the probability of the 2-nd type error 1,14 times increases. As a result of experiments, it was shown that the developed method provides the vessels localization quality required for accurate singling out of the diagnostic parameters of heart disorders, which improves the accuracy of heart diseases diagnosing.

Keywords: skeleton, image segmentation, angiogram, the wavelet conversion.

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MODELING OF SOIL-CEMENT PILES CONSTRUCTION AND TESTING

page 22–26

This article is devoted to laboratory studying of soil-cement piles. The main problems of the research are defined. The

technology of pile establishing and factors that affect pile's material strength are described. The method of modeling deep soil mixing technology at laboratory with keeping soil behavior such as consistency and moisture of basement is explained. The influence of plasticizing additions on pile's material strength is experimentally studied. A set of pile samples with different composition were produced. Reference piles were produced of two cement types — portlandcement and portland-slag cement. Some piles were produced by mixing in plasticizing additions to binder. Cylindrical specimen of soil-cement were selected. The correlation that has been revealed shows the influence of plasticizing additions on soil-cement strength and consistency. It has been revealed that pile's body material strength depends on the depth of sinking. The findings of the experiment proved the validity of the suggested modeling method and efficiency of use of plasticizing additions.

Keywords: soil-cement piles, soil-cement, plasticizing additions, tests for compressive strength.

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RESEARCH OF THE STAGES OF THE DISTRIBUTION OF INTERNATIONAL CARGO TRAFFIC PROCESSING IN COMBINED TRANSPORTATION

page 27–33

This article highlights the key issues concerning the improvement the efficiency of the operation of merchant seaports and stations, due to the study and improvement of the international cargo traffic organization system. On the basis of the analysis of the current state of the port transportation hubs development the article presents the gradual process of the import and transit goods processing, with the definition of tasks on its operation improvement and their possible solutions. The method of dynamic programming was developed to create the most advantageous technological scheme of on arrival-operations execution and simulation method of dynamic coordination consistent cargo traffic supply. As a result of the research a number of improvements were suggested at each stage of processing of import and transit cargoes in combined transportation, which can be used in the formation of rational modes of international goods transportation.

Keywords: Port Transportation Hub (PTH); Commercial Sea Port (CSP); Port Railway Station (PRS).

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SIMULATION OF THE PARAMETERS OF THE METEOR RADAR SYSTEM IN ORDER TO OPTIMIZE ITS OPERATION

page 33–36

Since 1966 the Meteor Automated Radar System (MARS) has been operating at the Balakleya scientific testing ground of the Kharkov National University of Radio Electronics, which had provided with the unique scientific data on meteors and the earth's atmosphere.

For a long time of operation the equipment has undergone considerable moral and physical obsolescence. The need to continue the meteoric research on the one hand, and the inability to do so on the available equipment on the other hand, requires the

modernization of the complex with regard of the new objectives and new opportunities.

Simple switch to the new element base without taking into account the changing of the working conditions and new research objectives is not reasonable. It is necessary to revise a number of parameters of the available equipment. A large number of factors can be found by means of modeling of the improved complex. However, the simulation cannot be carried out without a major component — the model of the meteor-trail reflections. Therefore, the primary problem is to develop a model that would include the ground-based research equipment parameters and the model of the processes occurring in the meteor zone as well.

The article proposes the structure of this model, presents the analytical concepts for some modeling stages and their graphic interpretation. The above model is implemented as a computer program. The above model is implemented as a computer program. It differs by the change of the signal amplitude in the meteor trail formation process; the ability to model meteor propagation to the «ultra-short» routs — between the main and offset points; as well as to determine the trail coordinates, which is necessary for further determination of the meteor radiant.

Keywords: meteor trail, meteor-trail reflection model.

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ANALYSIS OF METHODS FOR NUMBER ARRAY SORTING

page 37–40

This article considers the methods of sorting, i. e. placing the array of numbers, which are used in computer techniques today, according to the rule. Sorting is one of the most common principles of programming systems, while their application for various applied problems requires choosing an optimal sorting algorithm from a set of existing ones. The objective of the article is to analyze temporal characteristics of the selection process aimed at choosing the algorithm, which is the most suitable for a certain goal realization.

Existing methods of sorting can be grouped into: sorting by insertion, sorting by selection, sorting by exchange.

Existing methods are analyzed in terms of quantity indexes of exchanges, integrations and comparisons that define each algorithm at most. As a result, the total operating speed of each method was estimated; the advantages and disadvantages of each method were singled out.

The results of analysis of well known sorting methods allow choosing the best method for software and hardware implementation from this point of view. The principal possibility of new solutions in the field of hardware implementation was shown in order to increase the level of parallelism and accelerate the sorting process, whereby the sorting method by exchange should be prerogative.

After checking the known sorting methods for operating speed with the use of the constant volume array, the operation time of sorting programs was defined on the basis of different sorting methods. Yet, the sorting method of Shell and quick sort method have shown best results.

Keywords: sorting, array of numbers, operating speed, integration, memory capacity, algorithm, programming.

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THE STUDY OF THE ROAD NETWORK FORMATION PATTERNS

page 40–42

Recent researches indicate that the street is no longer an architectural element of urban design, but a universal transport artery. Therefore, when designing streets more attention should be paid to its functional aspect than architectural. However, the limits of the varying of distances between main streets do not allow to optimize the determination of the length of the road network segment. This paper covers the influence of parameters of traffic flows and the number of people on the distance between the main streets while determining the structure of the road network of the rural territory as well as of other functional areas of any settlement. The proposed dependence of the transports calculation definition, which involves the traffic flow structure, allows to study the influence on the optimal length of the road

network segment as a separate functional area and as the entire city. In general, the obtained patterns allow to determine the optimal length of the road network segment while the design of new rural territories or determine the parameters of traffic flows and rural development with the existing transportation network.

Keywords: road network, residential area, traffic flow, the length of the segment.

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