THE STUDY OF PARTICIPANTS' VALUES CONVERGENCE ON THE EXAMPLE OF INTERNATIONAL SCIENTIFIC PROJECT ON CYBER SECURITY (p. 4-11)

Mariia Dorosh, Olena Trunova, Dmytro Itchenko, Mariia Voitsekhovska, Maryna Dvoieglazova

Rapid development of new technologies of information wars, operating all over the world, puts forward the issue of constant development of new cybersecurity systems. It is possible to solve this problem only under conditions of implementation of international cooperation with the use of professional project management. The main task of it is providing effective interaction between project participants for its successful implementation, which requires the introduction of new methods and models for managing the values of the project.

The proposed method of forming the system of project values and distinguishing the core with the use of the methods of structural matrices provides for the possibility to determine a capability of this system to implement the project taking into account values of each participant.

The developed model of the determination of degree of convergence of values of participants of the project on cyber security allows the assessment of possibilities of effective cooperation between project participants.

The proposed recommendations regarding response of the project manager to the examined indices of values convergence are appropriate to use both at the stage of project planning and during its implementation, since the values of the project participants may significantly vary over time. The implementation of the performed studies will contribute to the prevention of conflicts and the restoration of effective cooperation for obtaining planned outcomes of the project.

Keywords: project on cyber security, project values, convergence of values, core of values, interaction in project, project participants.

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SYNTHESIS OF INTEGRAL QUALITY INDEX OF PARAMETRIC SYSTEM STATE IN CONDITIONS OF SITUATIONAL UNCERTAINTY (p. 11-18)

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The study considers the problem of synthesizing the integral index when the status quality of a parametric system is described under situational uncertainty. For this approach, it is natural to use an information and entropy criterion of evaluation. Unlike in the classic representation of a system, the situational uncertainty range is supplemented with interconnect uncertainty, which is inherent in any real system. Under such circumstances, the state of a parametric system is determined by a joint impact of the destabilizing factors of the environment and the compelling resource constraints of the system that are manifested at the physical level in the form of random external disturbances and interconnect perturbations.

It is suggested to assess the current state of the parametric system numerically by the average amount of information at its output, using a modified Shannon metric. This solution is developed through a synthesis of the integrated quality factor of the parametric system state, with determining the total and partial analytical forms of its presentation. Being multidimensional, the synthesized index establishes a single functional relationship between the system dimension, the information amount at its output, the parameters of the reference vector, as well as the dispersion levels of interconnect and external disturbances.

The study shows a practical application of the synthesized integral indicator of quality to evaluate numerically information losses at the output of the system, taking into account the combined effect of external and interconnect disturbances. The possibility of reducing the loss of information is considered with the introduction of an adaptive management regime.

Keywords: information and entropy approach, integral factor, external and interconnect disturbances, uncertainty, information loss.

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AN ALGORITHM FOR BUILDING A PROJECT TEAM CONSIDERING INTERPERSONAL RELATIONS OF EMPLOYEES (p. 19-25)

Zulfiya Imangulova, Liudmyla Kolesnyk

The setting of the problem of building a project team considering interpersonal relations between the employees was formulated.

While selecting an employee to a project team, it is proposed to consider his contribution to inter-group interaction, which is determined on the basis of the number of choices and rejections, given and obtained by each candidate in the process of sociometric survey.

We proposed improvement of the procedure of sociometric survey, which allows taking into consideration the degree of preference (rejection) of each other by the individuals while filling in sociometric cards and when calculating individual sociometric indices, which makes it possible to decrease the uncertainty during selection of candidates to a project team.

The algorithm of solution of the problem of building a project team by the criterion of the maximum total contribution of employees to group interaction was developed, in which ranking procedure of sociometric survey was used.

It is expedient to build a project team by the criterion of maximum total contribution of employees to group interaction in the case, when each candidate can perform only one role in the project. If employees of a company can perform different roles in the project, the proposed criterion of individual contribution of employees to group interaction can be used as a particular criterion in the overall model of multifactor evaluation of candidates to a project team.

Keywords: project team, sociometric matrix, sociometric indices, group interaction, interpersonal relations in team.

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DEVELOPING A LOGIT MODEL FOR THE PROVISION OF THE PROCESS OF MANAGING THE CONCLUSION OF VOYAGE CHARTERING TRANSACTIONS (p. 26-31)

Svitlana Onyshchenko, Yuliia Koskina, Iryna Savelieva

A balance of interests between the parties and possible risks, linked to the set of conditions of a voyage charter, reflected in the offer, predetermines the success of concluding a freight transaction between a ship-owner and a charterer.

A mathematical basis for the formalization of the decision-making process regarding a transaction, based on the set of conditions, are the models of binary choice, the experience of using which in different areas of activity is analyzed.

A logit model was developed for evaluating the success of the conclusion of the voyage chartering transaction based on the example of a particular market segment. The logit model evaluates probability of concluding a voyage chartering transaction based on the set of values, which correspond to quanti-

tative conditions of the offer (for example, demurrage, level of the freight rate, intensity of cargo operations, interval of time of vessel delivery). We established by empirical way a boundary value of the probability, obtained by the logit model, which predermines the existence of balance of interests between the parties and the possibility of the conclusion of transaction under the given conditions.

An empirical verification of the obtained logit model demonstrated the share of erroneous conclusions, which may be considered acceptable (less than 5 %), that predetermines its theoretical and practical significance.

We developed a procedure for the application of the logit model in the activity of freight brokers for analysis of information from the offers and preparation of the substantiated recommendations to the parties involved to reach the balance of interests under existing market conditions.

Keywords: logit model, chartering, voyage charter, success, evaluation, transaction, freight rate.

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EXPLORING THE EFFICIENCY OF APPLYING FRACTAL ANALYSIS FOR THE PROCESS OF DECORATIVE STONE QUALITY CONTROL (p. 32-40)

Ruslan Sobolevskyi, Valentyn Korobiichuk, Sergii Iskov, Iryna Pavliuk, Andrii Kryvoruchko

The technique of fractal analysis of regularities in the fracturing formation for various deposits or their sections, which is based on the comparison of values of fractal dimensionality of the roses of fracturing, was developed. The groups of labradorite deposits were distinguished by index of fractal dimensionality, which allows developing standard technological solutions for each group in order to enhance the effectiveness of quality and productivity control over technological complexes. A map of spatial variability in fractal dimensionality of fracturing in the labradorite deposits of Ukraine was produced, the use of which will make it possible to increase efficiency of discovering new labradorite deposits, which will meet certain quality requirements The construction of this map will allow enhancing efficiency of the interpretation of conditions for the formation of particular deposits. The patterns of change in fractal dimensionality at the different structural levels were established and the methods for their prediction were developed, which will make it possible, by the results of exploring fractal dimensionality at one of the structural level, to predict their values for others to optimize the process of control over geological exploration and extraction operations. As a result of the performed experimental studies, the influence of fractal dimensionality of fracturing in the blast-hole drilling zone on the productivity of the process was proved. We created objective function of optimal process to control technological processes, based on geostructural and technological indices that were evaluated by generalizing index of fractal dimensionality. The objective function of optimal process of drilling the fractured array, which includes indices of fractal dimensionality of the drilling zone, was proposed.

Keywords: fractal analysis, fractal, decorative stone, cracks, splits, microfracturing, blockiness, drilling productivity, geostatistical analysis, classification of deposits.

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DEVELOPING A CONTROLLER FOR REGISTERING PASSENGER FLOW OF PUBLIC TRANSPORT FOR THE "SMART" CITY SYSTEM (p. 40-46)

Oleh Boreiko, Vasyl Teslyuk

A structure of the controller for registering passenger flow of public transport was developed, which includes the single board computer Raspberry Pi; GSM module; GPS module; controller of battery powered device; controller of the emergency restart of the device; button for registering passengers enjoying privileges; camera for registering passengers enjoying privileges and camera for registering passenger flow in a transportation vehicle. A built structure is characterized by the modular organization, which makes it possible to quickly upgrade the designed device. An algorithm of functioning of the controller of registering passenger flow of public transport and specialized software for implementing the functions of the controller were developed. A special feature of the software is the possibility of expanding functionality of the designed device in the process of upgrading the controller. Programming of the microcontroller was performed in the language C, and programming of the controller based on Raspberry Pi 2 Model B was performed in Python. We built a model of functioning of the controller based on the Petri networks, which allows exploring dynamics of the system and identifying all possible states of the designed system. Authors developed technical support of the controller for registering passenger flow of public transport on the base of the single board computer Raspberry Pi, which ensures competitive price and the required functionality of the project solution.

The resulting technical solution in the form of the controller for registering passenger flow of public transport of the system for managing transport flows of a "smart" city is characterized by low cost, required accuracy of calculating passengers and is the optimal project solution with wide functional capacities.

The designed device was implemented and tested at the auto transportation enterprises "Mens-Auto" and "Etalon" in Ternopil (Ukraine).

Keywords: "Smart" city, controller for registering passenger flow of public transport, Petri networks, Raspberry Pi.

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HOMOGENEITY INVESTIGATION OF OIL FLAX PROCESSING PRODUCTS BY QUALITY INDEXES (p. 46-53)

Nadiia Tuluchenko, Ludmila Chursina, Dmitriy Krugliy

The paper analyzes the homogeneity of the stochastic structure of the samples of oil flax fibres of the Ukrainian and Polish selections. The distribution laws of fibres as mixtures of the normal and logarithmically normal distribution laws are identified. The general probability distribution law of fibre lengths of oil flax of the Ukrainian selection is a mixture of four logarithmically normal laws of distribution, and the general probability distribution law of fibre lengths of oil flax of the Polish selection is a mixture of a normal distribution law and three logarithmically normal laws of distribution. The parameters of the relevant components of the common distribution laws are found as a result of solving the problem of nonlinear optimization using the method of generalized lowering gradient that is implemented in Excel tabular processor.

The adequacy of the built nonlinear models of the distribution laws is proved by estimating the value of the determination index.

The comparative analysis of distribution laws of general totalities, from which the oil flax fibre samples of the Ukrainian and Polish selections are obtained, is conducted by the Kolmogorov-Smirnov statistical criterion. This criterion allows us to test and reject the hypothesis about belonging of two independent samples to the same general totality.

The analysis of the general distribution laws shows that the oil flax fibres of the Ukrainian selection have a more pronounced tendency to stratification by a fibre length. Such a fibre is easily divided into factions. The oil flax fibres of the Polish selection have a larger part of short and extra-long fibres. Thus, it is clear that raw materials of the Ukrainian selection are more suitable for the production of non-woven materials of different target purposes, and the Polish selection - for the production of ropes, cords, etc.

The obtained results can be used by specialists at processing enterprises for a reasonable choice of raw materials, optimization of processing modes and improving ready-made product quality.

Keywords: oil flax, quality indexes, mixture of distribution laws, adequacy of nonlinear models, Kolmogorov-Smirnov criterion.

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IMPROVEMENT OF THE METHODS FOR DETERMINING OPTIMAL CHARACTERISTICS OF TRANSPORTATION NETWORKS (p. 54-61)

Georgiy Prokudin, Olexiy Chupaylenko, Olexiy Dudnik, Alena Dudnik, Dzhanay Omarov

An improved method of approaching the calculation of maximum flow is developed, which implies applying the method of trees and capacities of tabular processors. The solution can be extended for a problem with several sources and runoffs. This will solve the problem on the optimization of transportation networks with and without limitations in throughput capacity.

We designed an improved method for calculating the shortest path, which is resolved by using the Minty Dijkstra's algorithm. By solving the shortest path problem, we receive the shortest route and a list of vertices that it passes. By having indicators of freight traffic from each vertex to all others, we build a tree of the shortest paths. Going from one vertex to another vertex, we obtain density of traffic in the network without limitation in the throughput capacity.

When the network has a throughput capacity limitation, imposing flows on the network is a bit complicated. In this case, it is necessary to subtract each elementary flow from the existing throughput capacity of the arc, on which it is imposed. For finding the shortest path, it is possible to correct the flows manually.

The process of transforming network models for the process of cargo transportation to the matrix models is presented, through the use of the modified Dijkstra's algorithm. Elements of transportation networks in this case are set in the form of directed graphs. Graphic representation of the results of solving a network traffic problem is given.

Keywords: maximum transport flow, shortest paths, network model, matrix model.

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