

Реферати

УДК 621.396.96

Мезенцев О.В., Юзефович В.В., Буточнов О.М., Сотніков О.М. Спосіб комплексування зображень різних діапазонів хвиль з метою створення універсальних еталонів для комбінованих кореляційно-екстремальних систем навігації. *Реєстрація, зберігання і оброб. даних*. 2018. Т. 20. № 2. С. 3–11. — рос.

Проаналізовано відомі способи комплексування цифрових зображень різного діапазону хвиль для створення універсальних еталонних зображень, що використовуються в комбінованих кореляційно-екстремальних системах навігації (наведення). Запропоновано спосіб комплексування радіолокаційного і полутонного оптичного зображень. Застосування даного способу призводить до підвищення яскравості та контрастності загальних фрагментів вхідних зображень, не призводить до руйнування кореляційних зв'язків, що дозволяє використовувати одержувані комплексовані зображення для формування універсальних еталонних зображень. Іл.: 6. Бібліогр.: 6 найм.

Ключові слова: універсальне еталонне зображення, спосіб, комплексування, аналіз зображень, обробка зображень, інформативні ознаки.

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Mezentsev A.V., Yuzefovich V.V., Butochnov A.N. and Sotnikov A.M. A method for integrating images of different wave bands with the goal of creating universal references for combined correlation-extreme navigation systems. *Data Rec., Storage & Processing*. 2018. Vol. 20. N 2. P. 3–11. — Rus.

To ensure the accuracy of navigation and aiming of modern unmanned aerial vehicles and controlled means of destruction in any weather conditions and time of day, in conditions of interference, the most promising is the joint use of sensors of various physical nature for the detection and identification of targets (objects to be defeated). In this case, combined correlation-extremal systems are used to solve the problems of navigation (guidance). For the operation of such systems, it is advisable to form universal reference images.

The methods for integrating digital images of a different range of waves to create universal reference images used in combined correlation-extremal navigation systems are analyzed. To form a universal reference image it is necessary to solve the problem of obtaining a «combined» image on the basis of several initial images of the same section of the terrain in different wave ranges. In this case, the problem of integrating images for the subsequent synthesis of a universal reference image is conveniently reduced to the task of combining in one image the characteristics common to the optical and radar images — the original images. That is why there is proposed a method for integrating radar and grayscale optical images which allows to create digital grayscale image combining the main informative signs of images of both ranges.

The use of this method leads to an increase of the brightness and contrast of common fragments of the original images, does not lead to the destruction of correlation links, therefore the resulting composite images can use to form universal reference images. Fig.: 6. Refs: 6 titles.

Key words: universal reference image, method, integration, image analysis, image processing, informative signs.

УДК 004.421

Ланде Д.В., Андрущенко В.Б. Построение сети предметных областей на базе ресурса arXiv. *Регистрация, хранение и оброб. данных*. 2018. Т. 20. № 2. С. 12–22. — укр.

Предложен новый способ оценки информации системы библиотеки Корнуэльского университета — ресурса препринтов arXiv. Авторами разработан и реализован алгоритм поиска публикаций по заданному концепту с учетом научного направления, к которому относится публикация. Основное внимание сосредоточено на распределении публикаций по определенным научным направлениям и соответствующим подгруппам, которые предусмотрены ресурсом. Основные методы, которые использовались для реализации задачи, — это работа с текстовыми массивами и дальнейшая обработка полученных результатов, параметры оценки работы поиска и результатов поиска. Сформулировано определение сети предметных областей. Для каждой предметной области составлен словарь как справочный инструмент для решения поставленной задачи. Также отображены основные этапы построения сети предметных областей на базе ресурса препринтов arXiv. Результатом работы стало визуальное представление сети предметных областей для концепта — «cavitation» и обоснование полученных результатов. Данные, представленные в статье, были собраны и протестированы в феврале-марте 2018 года. Ил.: 4. Библиогр.: 8 найм.

Ключевые слова: концепт, предметная область, сеть предметных областей, архив пре-принтов, реферативная информация.

UDC 004.421

Lande D.V. and Andrushchenko V.B. Formation of the subject domains network on the basis of the ArXiv. *Data Rec., Storage & Processing*. 2018. Vol. 20. N 2. P. 12–22. — Ukr.

The new method of information processing, which is based on the Kornel University Library resource ArXiv is represented. An algorithm of publications search by the given notion taking into consideration the research field of the found publication has been developed and actualized. The mail accents were made on the allocation of the publications according to the predefined research fields and appropriate subgroups, established by the resource. Main methods being applied for the realization of the problem are text mining methods and further interpretation of the results, evaluation parameters of the search results.

The definition of the subject domains network has been also suggested. For every subject domain predefined by the resource there was formed a vocabulary — a reference tool. The main steps of the subject domains network formation are depicted in the paper.

The result of the work is a visual representation of the subjects' domain network for the concept — «cavitation» and further interpretation of obtained results. For the search results there was calculated the parameter which identify the inherency of the given concept to several subject domain and according to the traditional approaches of the text search evaluation there was calculated the metrics — recall, which characterizes the ability of system to find out the needed documents, but it doesn't consider the number of non-relevant documents shown to user. The main conclusion of the research is the suggestion of new approaches to form the view on the notion affiliation to several research fields and is based on the open access preprint resource. The developed approach gives an opportunity to analyze, visualize and represent the concept in attribution to research fields; it allows to form the research picture and to widen the ways to form the big projects. Data obtained and represented in the research was processed in February-March, 2018. Fig.: 4. Refs: 8 titles.

Key words: concept, subject domain, subjects domain network, preprints archive, abstract information.

УДК 004.942

Денисенко Т.О., Нестерюк О.Г., Денисенко А.В. Дослідження досяжності безперервної частини гібридної системи. *Реєстрація, зберігання і оброб. даних*. 2018. Т. 20. № 2. С. 23–29. — рос.

Розглянуто питання проведення дослідження безперервної частини гібридних систем, що представлені мовними засобами дискретно-безперервних мереж з використанням підходу зменшення розмірності досліджуваної мережі. Іл.: 5. Бібліогр.: 9 найм.

Ключові слова: досяжність, дискретно-безперервна мережа, редукція, система з керованою структурою, гібридна система.

UDC 004.942

Denysenko T.A., Nesteryuk A.G. and Denysenko A.V. A study of attainability of the continuous part of the hybrid system. *Data Rec., Storage & Processing*. 2018. Vol. 20. N 2. P. 23–29. — Rus.

The issues of conducting research on the availability of a continuous part of hybrid systems, which are represented by language means of discrete-continuous networks using methods for reducing the dimension of the studied graph, are dealt with. At the present time in our country and abroad research teams are working on the development and investigation of various complex automatic control systems with a multimodal character of functioning that are represented by both discrete and continuous parts interacting with each other. An example of use of systems of this kind can serve objects of surface, underwater and space applications, various industries from the chemical to the aerospace industry (the process of launching a rocket or helicopter).

Systems of this type and systems with a controlled structure (SCS), are described using the language tools of discrete-continuous (DC) networks. One of the tasks being without the solution of which often fails to carry out the development of automatic control systems, is the attainability of the hybrid system. Approaches to the solution of this problem were proposed using DC-networks, which makes it possible to reduce the verification of the SCS attainability property to the problem of checking the attainability of the corresponding graph of a DC network. This approach requires a attainability analysis of the continue part of the DC network as one of the stages of the analysis. It should be noted that the implementation of this stage should be repeated for each new structure obtained during the verification of the algorithm of the system under analysis. Thus, a fairly large amount of computation is necessary to check the

attainability of the continuous part. One of the features of DC-networks, when describing with the help of objects of SCS, is the increased dimensionality of the graph of the network, and, as a consequence, of its matrices described. To reduce computational costs, the method used to reduce the dimension of the network graph was proposed in the paper. One of these methods is the convolution of the continuous part of the system according to pre-established rules. The main requirement is to preserve the attainability of output vertices of the transformed graph of the continuous part of the DC network from the input vertices, which reduces the time of analysis in the DCNET software environment and facilitates its mathematical calculations, which also led to a decrease in the requirements for the amount of used memory. Fig.: 5. Refs: 9 titles.

Key words: attainability, discrete-continuous network, reduction, system with controlled structure, hybrid system.

УДК 004.353

Клюева Т.Ю. Анализ современного состояния технологий снижения спекловых шумов в переносных лазерных проекторах. *Регистрация, хранение и обраб. данных*. 2018. Т. 20. № 2. С. 30–41. — укр.

Рассмотрены типы лазерных проекционных систем и охарактеризованы основные технологии воспроизведения изображения. Проведен анализ методов снижения спекловых шумов в лазерных проекторах. На основе анализа способов декорреляции лазерного излучения предложена классификация методов уменьшения когерентных шумов, определены основные преимущества методов и их недостатки. Показано, что активные методы снижения спекловых шумов являются наиболее эффективными. Ил.: 7. Библиогр.: 28 наим.

Ключевые слова: лазерный проектор, DMD, GLV, MEMS, спекл, шум, спекл-подавление, дифракционный оптический элемент.

UDC 004.353

Kliuieva T.Yu. Analysis of the modern technologies of speckle reduction in portable laser projectors. *Data Rec., Storage & Processing*. 2018. Vol. 20. N 2. P. 30–41. — Rus.

High-brightness miniature light emissive devices as well as projection technology increasingly used in mobile devices call for new solutions in creating projectors. Recent advances in diode technology and MEMS scanning devices promote the development of laser-based projection systems. Laser projectors have perfect light efficiency, high brightness, color gamut and contrast. Speckle, however, significantly impairs the resulting image quality and resolution because speckle is one of the factors preventing lasers from being widely used in projection systems. Consequently, it is obvious that in order to generate a high-quality image in laser projectors, it is necessary to suppress speckle. This paper primarily focuses on analyzing the various methods for speckle reduction. Inasmuch as the efficiency and practicability of various methods might be dependent on the projection system architecture, the paper highlights the main image projection techniques. The techniques are classified based on the approach applied to generate projected images. Strengths and weaknesses of various types of optical modulators (LCD, DMD, GLV) and MEMS-based scanning mirrors that are currently used in portable devices are analyzed. The current state of speckle reduction in laser projectors has been studied. It is suggested that active and passive methods for coherent noise reduction be distinguished based on the laser beam decorrelation method analysis. Active methods of laser beam decorrelation require mechanical movement whereas passive methods do not. Speckle reduction methods using moving stochastic diffuser, moving DOE, deformable mirror, and rotating light pipe, as well as multimode optical fiber are examined. Speckle reduction methods using mechanical motion are demonstrated to be most efficient. Fig.: 7. Refs: 28 titles.

Key words: laser projector, DMD, GLV, MEMS, speckle, noise, speckle suppression, diffractive optical element.

УДК 681.518.5

Слипченко В.Г., Полягушко Л.Г., Котунов В.А. Регистрация параметров автоматизированного программно-аппаратного комплекса медицинского назначения. *Регистрация, хранение и обраб. данных*. 2018. Т. 20. № 2. С. 42–51. — укр.

Приведено описание способов сбора и обработки данных при проведении сеансов тренировок для определения газовой гипоксической смеси и состояния системы дыхания и гемодинамики (пульсоксиметр) человека. Проанализированы способы фильтрации сигналов от шумов с разных видов датчиков автоматизированного программно-аппаратного комплекса медицинского назначения и предложены основные модули блока управления комплекса для проведения лечебно-

диагностических процедур, а именно интервальных нормобарических гипоксических тренировок. Описан комплекс программного обеспечения, который прошел испытания в реальных условиях и рекомендован Минздравом для применения в лечебных и спортивных учреждениях с целью повышения резистентности организма к различным видам нагрузки. Ил.: 5. Библиогр.: 10 наим.

Ключевые слова: блок управления, микроконтроллер, медицинское устройство, интервальные нормобарические гипоксические тренировки.

UDC 681.518.5

Slipchenko V.G., Polyagushko L.G. and Kotunov V.O. Registration of the parameters of the automated software and hardware complex for medical application. *Data Rec., Storage & Processing*. 2018. Vol. 20. N 2. P. 42–51. — Ukr.

The main modules of the control unit of the automated software and hardware complex for carrying out medical diagnostic procedures, namely interval normobaric hypoxic training are considered. There are described methods for collecting and processing data in real time during training with measuring instruments for determining the composition of a gas hypoxic mixture (an oxygen sensor and a carbon dioxide sensor) and the state of the respiratory system (the air volume flow sensor) and hemodynamics (pulse oximeter) of the human.

The following practical and scientific results have been obtained. A method for maintaining a given concentration of the respiratory mixture and controlling the compressor using a modified PID regulator is implemented. Taking into account the special features of the subject domain, the differential component of the PID regulator is defined as a function of the minute volume of breathing.

The existing algorithms of frequency filtration are studied and comparison of different types of software filters is made. The possibility of their use in the system of hypoxic training is analyzed. For the subsystem of pulse oximetry the Butterworth 2nd order program filter has been selected. So it does not require significant computing resources and uses signal values only up to the last two iterations.

The system of hardware timers and interrupts has been used. The functional purpose and modes of operation of which can be programmed to provide real-time work and solve problems of varying complexity and with different priorities. The created complex with the examined software was tested and recommended by the Ministry of Health to use in medical and sports institutions. Fig.: 5. Refs: 10 titles.

Key words: control unit, microcontroller, medical device, interval normobaric hypoxic training.

УДК 004.942.519.87

Додонов Е.А., Додонов А.Г., Кузьмичев А.И. Моделирование и визуализация максимальных многопродуктовых потоков в сети. *Регистрация, хранение и обраб. данных*. 2018. Т. 20. № 2. С. 52–59. — укр.

Рассмотрены многопродуктовые потоки, которые являются обычными и естественными понятиями, когда непрерывные или дискретные потоки чего-либо, пассажиров, транспортных средств, воды, электричества, сырья, продуктов или информации, перемещаются в сети из одного узла к другому. Здесь узлы могут одновременно быть источниками, промежуточными пунктами или стоками потоков одного или разных продуктов, а каждая дуга является каналом одновременного пропуска потоков разных продуктов в определенном направлении с ограниченной пропускной способностью. Предложена методика решения задачи о максимальном многопродуктовом потоке с использованием стандартных инструментов линейной оптимизации. Ил.: 4. Библиогр.: 9 наим.

Ключевые слова: потоки в сетях, одно- и многопродуктовые потоки, сетевая оптимизация, maximum multicommodity flows, network optimization.

UDC 004.942.519.87

Dodonov E.O., Dodonov O.G. and Kuzmychov A.I. Modeling and visualizing maximum multi-product flows in the networks. *Data Rec., Storage & Processing*. 2018. Vol. 20. N 2. P. 52–59. — Ukr.

Multiproduct flows are the usual natural situation when continuous or discrete flows of anything, passengers, vehicles, water, electricity, raw materials, products or information, shortly, commodities, are moving in the network from one node to another. Here, the node can simultaneously be the source, intermediate point or terminal of one or different commodities (goods or services) flows of products, and each arc is a channel of simultaneous flow of different products in a definite direction with limited capacity.

The multi-product flow problem is an important component of the network optimization, which can be used to deal with problems arising, for example, in emergency logistics management, in computer science and technique, in communication and transportation systems performance, in product distribution planning, in network design etc. This is both an ancient and new line of research.

The amount of flow one can push through a network from a source to a sink clearly cannot exceed the capacity of a cut separating them, and max-flow min-cut theorem of Ford and Fulkerson showed that the capacity upper bound is always tight. The value of the maximum flow is equal to the capacity of the minimum cut. A technique for solving the maximum multi-product flow problem with using standard linear optimization tools built-in in Excel is proposed.

The developed technique for modeling the problem of the maximum K -commodity flow allows investigating practical network situations reduced to a linear model, having the ability, unlike the heuristic (approximate) algorithms, to automatically determine precisely the separating set as the critical zone, to the definition which often focuses as the subject. This technique does not require additional tools or programming skills, therefore it is a perfect software product for research and development in any field of information and analytical activity. Fig.: 4. Refs: 9 titles.

Key words: flows in the networks, uni- and multi-product flows, maximum multi-product flows, network optimization.

УДК 681.327.11

Сачанюк-Кавецкая Н.В. Кодирование как средство защиты информации в системах контроля доступа с использованием логико-временных функций в форме полиномов и биометрических данных субъектов. *Регистрация, хранение и обраб. данных*. 2018. Т. 20. № 2. С. 60–67. — укр.

Рассмотрена возможность циклического кодирования и правила построения ключей ассиметричного криптоалгоритма на основе идентификационных логико-временных функций, содержащих все важные характеристики переданных сообщений. Для формального описания такого кодирования и правил построения ключей использовано представление логико-временных функций в форме полиномов. Ил.: 4. Библиогр.: 8 наим.

Ключевые слова: логико-временная функция, Δ -интервал, полином, циклический код, ключ.
UDC 681.327.11

Sachaniuk-Kavets'ka N.V. Encoding as a means of protecting information in systems of access control using time-logic functions in the form of polynomials and biometric data of subjects. *Data Rec., Storage & Processing*. 2018. Vol. 20. N 2. P. 60–67. — Ukr.

One of the main elements of the integrated information security system is the subsystem of access's control to information resources. Recently, more attention is attracted by biometrics as one of the newest information technologies that use the unique characteristics of object identification and verification. Therefore, the question of the protection of information resources from unauthorized administrative actions and access by unauthorized persons or programs to computer data is important.

Relevant is the preservation of confidentiality of information processed or stored in computer systems. External influences generally oppose using a variety of software and hardware protection methods. The content of the methods of the protective transformations is that the information stored in the system and is transmitted by communication channels, is turns into a cryptogram — a closed (encrypted) text or graphic image documents. The basis for the encryption is based on two elements: a cryptographic algorithm and key. The security of generic algorithms is determined by the key length. In asymmetric algorithms, the encryption and decryption can be performed with different keys. Such algorithms require significantly more computation time, but do not create problems during key distribution. The most promising data protection systems today are considered an asymmetric system with a public key. The last decade a great attention of scientists in the field of information security pay biometric. A biometric system can operate in modes of verification and identification. All of these approaches protect the information easy enough to implement in the time-logic environment, making all the settings required for message transform on the time-logic functions.

The possibility of cyclic encoding and the rules for constructing key asymmetric crypto algorithm on the basis of the identification time-logic functions, which contain all the important characteristics of transmitted messages, is analyzed. Available for the formal description of this encoding and the rules of construction keys used in the representation of time-logic functions in the form of polynomials. Fig.: 4. Refs: 8 titles.

Key words: time-logic functions, Δ - interval, polynomial, cyclic code, key.

УДК 621.384.3

Даньлюк И.И., Карпинец В.В., Приймак А.В., Яремчук Ю.Е., Костюченко О.И. Метод идентификации пользователя по клавиатурному почерку на основе нейросети. *Регистрация, хранение и обраб. данных*. 2018. Т. 20. № 2. С. 68–76. — укр.

Проведено експериментальне дослідження можливості використання двохуровневої нейросети з вбудованою сигмоїдною активаційною функцією для покращення точності ідентифікації користувача по клавіатурному почерку і запропоновано метод на основі даного математичного апарату, а також проведено порівняння запропонованого методу ідентифікації з існуючими. Отримані результати показали, що запропонований метод має кращу точність ідентифікації на 1–15 %. Табл.: 1. Ил.: 3. Библиогр.: 11 найм.

Ключевые слова: защита информации, идентификация пользователя, нейронная сеть, клавиатурный почерк, временные функции.

UDC 621.384.3

Danyliuk I.I., Karpinets V.V., Pryimak A.V., Yaremchuk Y.E. and Kostiuhenko O.I. Neural network based method of a user identification by keyboard handwriting. *Data Rec., Storage & Processing*. 2018. Vol. 20. N 2. P. 68–76. — Ukr.

With the development of advanced technologies, the problem of information security is becoming increasingly relevant. Given the development of spyware and digital technology allow more effective attacks on computer systems, including corporate networks, confidentiality can only be achieved through the creation of comprehensive information security. And one of the main elements of a security system is the subsystem, which provides the identification of the user of the computer. Traditional identification and authentication methods based on the use of cards, electronic keys or other portable identifiers, as well as passwords and access codes, have significant disadvantages. The main disadvantage of such methods is the ambiguity of the identified person. Existing methods of user identification by keyboard handwriting are accurate from 78 % to 93,59 % and built on multilevel neural networks, which affects the speed of their learning and as a result of the cost of more resources, so it is actual to increase the accuracy of identification and reduce the time to train the neural network and design the appropriate method. An experimental study was made of the possibility of using a two-level neural network with a built-in sigmoid activation function to improve the accuracy of user identification by keyboard handwriting and proposed a method based on this mathematical apparatus. A comparison of the proposed identification method with existing ones was also performed, which showed an increase in the accuracy of user identification by 1–15 %. The method of Saket Maheshwari and Vikram Pudi has similar accuracy indicators, but there are several significant differences between the proposed and the existing method: in their work Saket Maheshwari and Wikam Pudi used a five-level neural network; it took 9 minutes to study their neural network. In the proposed method, the time of training the neural network is 6 minutes, which is faster for 3 minutes and, as a result, is much more effective when used, since the user's identification time is reduced and high identification accuracy is on the same high level. Tabl.: 1. Fig.: 3. Refs: 11 titles.

Key words: information security, user authentication, neural network, keyboard handwriting, time functions.

УДК 004.5

Прищеп С.В. Методика виявлення подієвої основи інформаційних операцій. *Ресстрація, зберігання і оброб. даних*. 2018. Т. 20. № 2. С. 77–84. — рос.

Наведено опис методології автоматичного виявлення подієвої основи інформаційних операцій, які знаходять відображення в тематичних інформаційних потоках. Наведена методологія базується на технологіях виявлення інформаційних операцій, формуванні термінологічної основи предметної області, застосуванні кластерного аналізу з центроїдами кластерів, які визначаються шляхом аналізу термінології інформаційного потоку. Сформовані таким чином кластери відображають основні події, що відбуваються під час проведення інформаційних операцій, розкривають техніку їхньої реалізації. Лл.: 6. Бібліогр.: 10 найм.

Ключові слова: інформаційні операції, інформаційні потоки, виявлення подій, кластерний аналіз, модель предметної області.

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Prishchepa S.V. A methodology of detection of the event basis for information operations. *Data Rec., Storage & Processing*. 2018. Vol. 20. N 2. P. 77–84. — Rus.

The purpose of the research is to create and justify a methodology for identifying the event basis of information operations. The implementation of this methodology will determine the time frame of the information operation, identify the main events that accompany the information operation, and see the techniques of information impact. At the same time, information operations are reflected in thematic information flows. To get the dynamics of the thematic flow on a certain topic, you can use content moni-

toring systems. As the content-monitoring system, the authors chose the InfoStream system. This InfoStream system provides a search, as well as viewing the list and full texts of relevant documents, outputting graphs of the dynamics of information flows. The proposed methodology for identifying the event basis of information operations covers the following stages of the study, the result of each of which can be regarded as an independent information product: formation of a thematic information flow on the topic; investigation of the dynamics of the received flow, identification of signs of an information operation; narrowing the time frame of the information flow, obtaining a more representative sample of documents; definition of the terminological basis for the description of events within the scope of the subject area under study. Identify sources of information about events (if necessary); clustering, identifying the main events that accompany the information operation. The clusters of documents determined as a result of the proposed methodology correspond to the main events that accompany the information operation. Further meaningful analysis of these clusters makes it possible to identify the main characters of the information operation, to disclose the technique of its implementation. Fig.: 6. Refs: 10 titles.

Key words: information operations, information flows, detection of events, cluster analysis, subject domain model.

УДК 519.816

Роик П.Д., Цыганок В.В. Метод улучшения согласованности оценок экспертов в процессе диалога. *Регистрация, хранение и обраб. данных*. 2018. Т. 20. № 2. С. 85–95. — укр.

Разработан метод улучшения согласованности экспертных оценок, которая определяется на основе спектрального подхода, когда множество оценок подается в виде составляющих спектра на дискретной или непрерывной положительной шкале. Определен уровень (порог) согласованности экспертных оценок, достаточный для их агрегации. Предложенный метод в диалоге с экспертами, при сведении к минимуму давления на них, позволяет повысить согласованность их оценок до достаточного уровня и значительно повышает вероятность успешного завершения экспертиз. Ил.: 2. Библиогр.: 12 наим.

Ключевые слова: поддержка принятия решений, экспертные оценки, согласованность экспертных оценок, достаточный для агрегации уровень согласованности, обратная связь с экспертами.

UDC 519.816

Roik P.D. and Tsyganok V.V. A method for improving the expert estimates consistency in the dialogue process. *Data Rec., Storage & Processing*. 2018. Vol. 20. N 2. P. 85–95. — Ukr.

Improving the quality of recommendations for decision-makers in weakly structured domains is affected largely by the reliability of results of appraisals carried out during the construction of models of weakly structured systems based on which recommendations for decision-makers are generated. The result of every group expert appraisal is a rating obtained through the aggregation of individual expert estimates. Usually, aggregation is justified when the consistency rate achieves a certain level (threshold of consistency), otherwise the result would be unreliable. It is offered a non-statistical approach to the evaluation of consistency, using which an expert estimates are compared in pairs (simplest case). A rate of consistency between the expert estimates sufficient for their aggregation has been identified. The evaluation of this threshold value is based on a statistical approach, triangular distribution and distribution function. A method has been developed for improving the consistency between expert estimates: it is based on a spectral approach where a set of estimates is presented as spectrum elements on a discrete or a continuous positive scale. The method offered for dialogue with experts minimizes tensions put on them, and thus allows raising the consistency between their estimates to a sufficient level and increases significantly the probability of successful completion of appraisal. The technique offered allows optimizing the task of raising the rate of consistency both thanks to using more reliable algorithms for evaluating such consistency and thanks to the developed step-by-step procedure of improvements through questions asked to experts, allowing at the same time to minimize the impact of the subjectivity of their estimates on the reliability of research. The method uses optimization allowing for automatic identification of the shortest path for improving consistency. This allows addressing each expert only once, without putting tensions on him/her by indicating the desired direction in changing his/her estimate. The methods and procedures offered have been implemented in a web-distributed system of support for decision-making and have been approved in practical appraisals. Fig.: 2. Refs: 12 titles.

Key words: decision-making support, expert estimations, of expert estimates, sufficient level of consistency for aggregation, feedback with experts.