DEVELOPMENT AND INVESTIGATION OF DENORMALIZED DATA MODEL IN COMPUTERIZED SYSTEM FOR IONOSPHERE PARAMETERS MONITORING (p. 4-7)

Volodymyr Sokol, Mykola Tkachuk, Andrij Shapovalov

The considered problem domain is the data processing in computerized system of ionosphere parameters monitoring (CSIPM). The existing data structures are analyzed and their specific features are investigated.

To improve the efficiency of corresponding database (DB) the denormalized data model is developed which takes into account the specific algorithms of the data processing in CSIPM. The performed test cases specify that this approach increases a performance of data processing in 1.7 - 2.1 times respectively.

In further work it is planned to extend the current data model with the existing information about the ionosphere state such as the number of ions, electrons, etc., and with some additional information on the radar at the different points in its operation, since it is important for study of the ionosphere over a period of time. It is also planned to analyze the query performance by increasing the size of the database to a value of 80 Gb, which corresponds to the actual amount of data that have been accumulated in ASMPI for the whole period of its operation

Keywords: data model, renormalizations, monitoring system, ionosphere parameters

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EQUIVALENT CIRCUIT OF X-SHAPED CONVERTER OF COMPLEX REFLECTION COEFFICIENT ANALYZER (p. 8-11)

Volodymyr Karlov

The equivalent circuit of the measuring channel of the X-shaped converter of the complex reflection coefficient analyzer in the form of a four-probe section has been developed. The location of the probes corresponds to nodal cross sections of a standing wave in each output port of the E-planar X-shaped power divider. The main operation characteristics of the X-shaped converter are phase shifts between adjacent ports-probes.

The developed graphic interface for gauging the converter allows: modeling measured phase shifts for passive loads in the operational frequency range of a rectangular waveguide; setting the X-shaped power divider for the real phase shifts; using the X-shaped divider as an installed monoparameter reference standard for gauging external loads in future.

The experiment results have shown that the measured phase shifts between adjacent probes-ports differ from the estimated ones approximately by 1 degree.

The developed graphic interface by measuring 7500 samples of the complex load reflection coefficient with the vibration frequency of 10 Hz has helped to find out that the average value of the reflection coefficient modulus is equal to 0,54, and the points fit in the circle on the G-plane with the scattering less than 2%

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

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TECHNICAL ASPECTS OF RHINOMANOMETRY (p. 11-14)

Alina Nechyporenko

Despite a significant number of devices for rhinomanometric studies, the problem of accurate and adequate data collection remains unsolved.

It is caused by the fact that the existing devices for rhinomanometry in the schemes of differential pressure measurement do not fully take into account the aerodynamic features. Using the laws of classical aerodynamics, the paper first proposes the differential pressure measurement scheme, which eliminates additional pressure loss in the area of measurement. The differential pressure is measured between the nasopharynx and the under-the-mask space, namely at the point of zero air flow

The technology of rhinomanometer and corresponding software have been developed. The rhinomanometer allows an objective analysis of nasal breathing using the active rhinomanometry method. The device has been clinically tested in the scientific and practical ENT center.

In clinical practice the developed device provides increased accuracy of differential diagnosis with upper respiratory tracts obstruction

Keywords: rhinomanometry, differential pressure, air flow rate, nasal resistance coefficient

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SEMANTIC-PROBABILISTIC NETWORK FOR VIDEO CONTEXT RECOGNITION IN VIDEO SYSTEMS (p. 15-18)

Nikita Kovalenko, Svetlana Antoshchuk

In the recent years a considerable growth of video surveillance uses can be observed.

Due to the increasing scale and complexity of such systems manual maintenance becomes impossible, which raises a problem of developing automated intelligent surveillance systems. One of the most important tasks solved by surveillance systems is human behavior analysis and recognition, which has many applications from patient state monitoring in medical establishments to suspicious behavior detection and to crime prevention. Analysis shows, that graphical probabilistic models such as Bayesian networks are widely used and are highly effective approach for human behavior recognition.

However, a lack of strict data formalization and structuring makes the task of building a Bayesian network for complex human behavior recognition a highly difficult task. To surpass that limitation, we suggest introducing a domain ontology — a hierarchical decomposition of video contents in the terms of scenarios, situations, object roles and states, which are derived from the low-level features, computed from the annotated ground-truth video data using a set of computer vision methods, and then using this otology as a basis for Bayesian network structure learning.

The performance of the proposed framework was evaluated using a HMDB and a CAVIAR datasets, and we noticed an increased efficiency of human behavior recognition compared to other approaches

Keywords: human behavior, probabilistic models, Bayesian network, ontology, semantic models

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LATENT SEMANTIC METHOD OF EXTRACTION INFORMATION FROM THE INTERNET RESOURCES (p. 19-22)

Aleksandr Stenin, Yurij Timoshyn, Kateryna Melkumyan, Valery Kurbanov

Unlike traditional information retrieval systems (IRS) Internet has the following features: as the information warehouse it lacked the search function,thus it was decentralized; the network is social, heterogeneous, combines both modern and previous systems versions; access time to various parts is unequal; the information volume exceeds the largest IRS volume. The main task of IRS in the internet is providing methods and ways of semantic analysis of the text in natural language, which entails the ability of information extraction from the specified HTML documents in the form of certain pieces of information.

The paper suggests the latent semantic method of weighed descriptors, allowingto extract the most meaningful documents the that are close to the subject area of the search, as well as the search algorithm. The method assumes that the conceptual descriptors, based on the Zipf's law, in sentences have the downstream «latent» meaning obscured by the use of different words. Interpretation of the Zipf's law is based on the correlation properties of additive Markov chains with a memory step function.

Also, the latent semantic analysis (LSA) is disclosed, which is the method of processing of information in natural language and analyzes the relationship between the documents collection and terms. The LSA can be compared to the simple version of a neural network consisting of three layers

Keywords: internet resources, information retrieval, intelligent agents, descriptors, Zipf's law

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MODELING OF TEXTUAL INFORMATION RECOGNITION AND ANALYSIS SYSTEM (p. 23-29)

Igor Pilkevych, Nadya Lobanchykova, Igor Shulga, Roman Laziuta

Modern innovative technologies led to the active development of electronic information resources. Large storages of electronic data created in information and communication systems require their protection from unauthorized access. One of the ways of information protection is recognizing and identifying confidential information in text documents. Classification of documents according to their significance is necessary for identifying the type of information, and, depending on the degree of significance, determining the level of its availability for corresponding categories of users. The text information recognition system occupied a prominent place among the systems of information and communication structures protection.

The purpose of the research is developing an automated system for detecting the confidential information in text documents for automation of the experts' work at recognition and analysis of the text data.

The paper gives the automated system for detecting the confidential information in text documents, and the software that allows uploading of the text or text document for its further analysis and determining the degree of its significance. Microsoft Visual C # 2010 was used as the software programming environment. In the proposed program the total account of all and hazardous (key) words has been made, the database has been applied and the text itself with further evaluation of its confidentiality has been analyzed

Keywords: information and communication system, database, confidential information, classification of documents, data protection

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SOFTWARE COMPONENT FOR PROCESSING DIGITAL SIGNALS IFFT-NOISE GATE (p. 29-34)

Evgeniy Semenov, Victoria Shvedova

The paper deals with the issue of digital signal processing, aimed at their filtration from noise terms. The analysis of modern solutions, namely conventional filtration using FIR (finite-impulse response) and IIR (infinite-impulse response) filters, has shown their incapability for signal processing, as they exert great influence on a signal, thus distorting its AFR (amplitude-frequency response) and PFR (phase- frequency response), that leads to some problems and audio and video signal quality loss. Therefore, the paper gives the algorithm for digital filtration of various wanted signals from noise terms based on direct and indirect FFT-conversion. The specific feature of the algorithm lies in using a filtration adaptive threshold, its multiplying by frequency characteristics of initial signal allows receiving purified output signal. The choice of filtration threshold is based on priori properties of input signal. Software component for processing digital signals "iFFT-Noise Gate" has been developed based on the proposed method; the results of noise filtration modeling and comparative analysis of noise suppression properties of the new algorithm and the known analogues with respect to the most significant parameters THD, SINAD, SNR have been given. Thus, the algorithm allows obtaining a suppression ratio not worse than known analogues within the frequency range of 10-22050 Hz; does not change the initial signal phase, and virtually does not bring any sinusoidal distortions into a signal

Keywords: noise suppression, filtration, digital signal processing, range, algorithm, software

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THE SERVICE REQUIRED QUALITY ENSURE MODEL OF LTE TECHNOLOGY DOWNLINK
(p. 35-38)

Sergey Garkusha, Aymen Mohammed Khodayer Al-Dulaim, Haider Dheyaa Kamil Al-Janabi

Article presents a mathematical model of resource blocks distribution in LTE technology downlink.

Offered model aims at providing guaranteed quality of service wireless users by user stations allocating of required transmission rates. Comparative analysis of obtained solutions by using different objective functions. Using various kinds of objective functions in offered model is directed to resource blocks allocation of minimum downlink or a minimum data transmission rate of each user station. It was found the greatest savings of time frequency resource allows objective function aimed at minimizing number of used resource blocks. The model offered in classes of service CoS corresponds to Class B each providing each user station a guaranteed transmission rate, with access to additional (non-guaranteed) bandwidth

Keywords: LTE; mathematical model, required rate, objective function, resource block

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SIMULATION OF ALGORITHM FOR GENERATING THE ENCRYPTION KEY INFORMATION BASED ON DYNAMICAL SYSTEMS (p. 39-43)

Gregorii Kosovan, Mykola Kushnir, Leonid Politanskii

The modern state of telecommunications requires the development of new digital communication systems. The paper presents and investigates the scheme of digital transmission of information with the usage of chaotic masking. Recovery signal is based on diagnostication of the chaotic regime of synchronous response of the slave system to the synchrosignal of the driving system in their unidirection coupled communication. Chua's circuit has been selected as chaos generator. The essence of the proposed changes to the classical scheme of transmission with the usage of chaotic masking is the introduction of additional generator of harmonic, chaotic or noise oscillations which initially modulates digital information signal, and then additionally is added in adder to the carrying signal. The research has shown that the hiding increases with decrease of the amplitude of harmonic signal, and increase of its frequency to a value that does not exceed the practical width of the spectrum of carrying signal. The power of the signal of desynchronization at low frequency of informational signal increases almost linearly with increasing amplitude at frequencies close to the limited frequency spectrum of a chaotic signal, the power of the desynchronization signal practically does not depend on the amplitude. The results can be used for the construction of communication systems which use a chaotic signal as a carrying one.

The suitability of the proposed scheme for digital data exchange has been demonstrated and the conditions of reestablishment of the information in the receiver have been determined

Keywords: chaotic masking, digital signal, harmonic signal, Chua's circuit

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THE MODEL OF POSITIONING HOMOGENEOUS WIRELESS SENSOR NETWORK ELEMENTS
(p. 44-48)

Viktoriya Vlasova

Simulation modeling is one of the basic methods of validating research. The paper presents a model of positioning elements during initialization of a homogeneous wireless sensor network (WSN) with a combined experimental and analytical cycle. Since simulation models suppose abstraction and accounting for key parameters that influence the phenomenon being investigated, a set of constraints was adopted. They allowed identifying WSN elements and their parameters, which are directly involved in determining the location of sensor network nodes. Thus, the combination of these subsystems and their interaction algorithm made it

possible to implement the required simulation model. Its accuracy is confirmed by computer modeling results. The model was developed from the point of view of the characteristics and features of homogeneous field WSN and available equipment, allowing to define a wide range of applications. The simulation results confirm the hypothesis of significant improvement in the accuracy of determining the coordinates and increasing energy efficiency when using the method with a combined experimental and analytical cycle during network initialization.

Keywords: model, initialization, mote, homogeneous, positioning, energy efficiency

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OVERLAY TELECOMMUNICATION NETWORKS SYNTHESIS TAKING INTO ACCOUNT DATA UNITS AND USING MULTILAYER GRAPH (p. 49-51)

Dmytro Ageyev

An important step of telecommunication systems design is selection of parameters of its elements. This issue is known as the issue of parametric synthesis. Existing solution methods are based on simple stream models, which became outdated for the modern multiservice traffic. According to the research, the models of self-similar processes describe the traffic properties more precisely. Another effect that must be taken into account is overlay principle of modern telecommunication network construction, when data units, transmitted in networks, are different. The paper gives a method for determining the parameters of self-similar stream for various network levels, taking into account the changes of transmitted data units, and the recommended method for parametric synthesis using multi-layer graph model.

The proposed method can be used when designing overlay multiservice telecommunication networks with various types of data units

Keywords: overlay network, model, multi-layer graph, stream, ON/OFF source, effect of self-similarity, network, service

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ADEQUACY OF WIRELESS SENSOR NETWORK MODELS IN SIMULATION ENVIRONMENTS (p. 52-55)

Anna Borisenko, Pavel Galkin

The paper gives the analysis of existing tools for wireless sensor networks (WSN) simulation and verification of the obtained models.

The objective of the research is verification of the WSN model obtained in simulation environment OMNET ++.

Each of the analyzed simulation systems of wireless sensor networks allows:

- increasing the WSN development efficiency;
- conducting an experiment without real deployment of sensor network;
- carrying out researches of WSN;
- significant costs reduction for network development and deployment.

The model adequacy depends on the purpose of modeling and accepted criteria. WSN simulation models development based on the simulation system OMNET++ provides adequate models. This is confirmed by the obtained results

Keywords: wireless sensor networks, simulation, adequacy of model

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PARAMETRIC SYNTHESIS OF OVERLAY INFO-COMMUNICATION NETWORKS OF ENTERPRISE (p. 56-58)

Fouad Wehbe, Samer Mahmoud

The paper explores the problem of parametric synthesis of info-communication network at the enterprise. Multilayer structure, formed by overlay networks, and self-similarity effect of the data flow are the main network properties, on which the article pays our attention.

For accounting the above features of modern telecommunication systems it was proposed to use a multi-layer graph for describing the structure of designed system, and the models of self-similar processes for network flows modeling. The problem of parametric synthesis was referred to nonlinear programming problem which is solved using a gradient descent method. The paper provides a comparative analysis of the proposed method with the previous one, which showed that the proposed mathematical models and the method based on them, allow improving the parametric synthesis efficiency

Keywords: overlay network, multi-layer graph, flow, self-similarity effect, network, service

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ANALYSIS AND OPTIMIZATION OF PARAMETERS OF CIRCUIT EMULATION SERVICE IN MOBILE NETWORKS (p. 59-62)

Yuriy Babich, Lesia Nikityuk

The article shows how the quantity of encapsulated TDM frames affects performance of a frame aligner in the case of CESoETH implementation in Mobile Backhaul network. Influence on the frame aligner performance is considered in terms of alignment loss probability and frame alignment recovery time. The article recommends the optimum value of encapsulated TDM frames considering minimization of alignment loss probability and frame alignment recovery time. The article proposes a model that considers to kinds of risks to the frame aligner performance. The proposed model considers risk caused by bit errors in frame alignment sequence and risk caused by frame losses. Both risks are considered in order to estimate how the quantity of encapsulated TDM frames affects performance of a frame aligner in the case of structure-agnostic CESoETH

Keywords: circuit emulation service, encapsulation of TDM frames, CESoETH, Mobile Backhaul

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