Summaries

IMAGE PROCESSING FOR MEDICAL AND INDUSTRIAL APPLICATIONS

Zbigniew Bubliński, Zbigniew Mikrut, Piotr Pawlik: **Automatic Calculation of Vehicles' Collision Zones** • Automatyka 2005, t. 9, z. 3

This paper describes the method of automatic detection of vehicles' collision zones based on analysis of video sequences registered by digital camera at signalised traffic intersection. Moving vehicles, visible on particular frames, are detected and their trajectories are stored. Tracks of vehicles which are moving in the same direction create some kind of "corridors" and overlaps of those "corridors" (common areas) are quite precise localisation of collision zones. The detailed description of algorithm and results obtained during analysis of selected video sequences is presented.

Agnieszka Dąbrowska, Kazimierz Wiatr: **Implementation of Quantization's Process in FPGA Chips for Image Compression** • Automatyka 2005, t. 9, z. 3

The Quantization is one of the basic method of a lossy compression. Moreover the quantization is used in standard algorithms of compression of still image (JPEG) and video compression algorithms (MPEG, H.26x).

In case of compression's images algorithms the quantization is executed on coefficients received from the two-dimensional discrete cosine transform (2D-DCT) claculated on 8×8 pixels blocks.

Paper presents basis of quantization's process in MPEG-2 standard and implementations results in FPGA chips (XCV200BG352 and XCV2P125FF1704).

Marcin Krupski, Andrzej Cader: **Possiblity of Using Fractal Structures to Modeling Curves in Computer Graphics** • Automatyka 2005, t. 9, z. 3

Algorithms of curve generation operating with manual interface (e.g. computer mouse) are commonly used for creating computer graphics. Such methods use functions of different continuity classes (i.e. polynomials, Bezier's curves) to create a curve between given points. In many – esspecially artistic – applications, an urgency of generating not smooth line occurs, to get an effect of shading or tearing, the same as with use of simple artistic tools. In this paper a proposition of algorithm basing on non-smooth fractal curves that

can gain such effect is presented. Original modification of well known fractal object – Koch's curve – is presented.

Zbigniew Mikrut, Zbigniew Rudnicki: **Feature Extraction from the Sequence of Sliding Friction Digital Images** • Automatyka 2005, t. 9, z. 3

In the paper some methods of image analysis of the sliding friction traces are presented. These images, made on steel disk by friction of PTFE composites, are of oriented structure. The so called "transfer film" consists of dark, thin smudges and the irregular spot-like objects. Taking into account the oriented image structure several features have been proposed based on analysis of the image projections (Radon transform). The top-hat transform was utilized to enhance local maxima – both in projection functions and in images. One-dimensional projection functions and an image as a whole have been binarized by using statistics-based thresholds.

Adam Sędziwy: **Computer Aided Diagnostics in the Diabetic Foot Complications Treatment** • Automatyka 2005, t. 9, z. 3

The article concerns the computer method of finding a size of the skin changes present in the diabetic foot complications. Comparison of the sizes found in such a manner, in the subsequent treatment stages, lets a physician to estimate a undertaken treatment efficiency.

Łukasz Tomczak, Włodzimierz Mosorow: **Homogeneity Analysis of Loose Materials Mixture by Means of Image Processing Techniques** • Automatyka 2005, t. 9, z. 3

In this paper homogeneity measurement method of loose materials mixture is presented. It uses image processing techniques to automatically obtain texture of loose materials mixture on conveyor belt and then it complies Principle Component Analysis to estimate its uniformity degree. Presented method was applied to example frames analysis, showing two loose materials mixture on moving conveyor belt, received by CCD camera.

Jacek Chodak, Zbigniew Mikrut: **Computer Interface for the Disabled People of very Restricted Movability** • Automatyka 2005, t. 9, z. 3

In this paper several types of computer interfaces for the disabled people are described. After taking into account the end-user necessities and possibilities (the end-user is a boy which can control

the face muscles only) two interfaces have been developed. Both interfaces are using one or two joysticks driven by chin. Additio-nally the two-stage joystick (based on switches) was made to reduce noise generated by an ordinary one. Both interfaces have been tested by playing computer games and by using other popular programs.

SIGNAL PROCESSING FOR IDENTIFICATION AND CONTROL SYSTEMS

Krzysztof Chrzanowski, Tomasz Raźniewski: **Computer Simulation in Training of Thermal Cameras Operators** • Automatyka 2005, t. 9, z. 3

A PC-based simulator called Simter developed for training operators of thermal imaging systems is presented in this paper. The simulator allows its users to generate images closely resembling thermal images of many military type targets at different scenarios obtained with the simulated thermal camera. High fidelity of simulation was achieved due to use of measurable parameters of thermal camera as input data and accurate physical models of the observation system. The simulators posses a number of features that enable to speed up and make more effective training process of large groups of students.

Ewa Dudek-Dyduch, Jarosław Wąs: **Formalisation of Cellular Automata in Issues of Pedestrians Dynamic Simulation** • Automatyka 2005, t. 9, z. 3

The article contains proposition of modified Cellular Automata (CA) formalization. The formula proposed allows using of a new class of Cellular Automata. The class is defined as an extension of traditional CA. In known CA definitions of particular cell depend only on local rules. The definition proposed make it possible, to take into account global relations as well. Described class of CA could be used in creating of pedestrian dynamic models.

Maciej Garbacz: **Laboratory Mobile Robot Khepera II** • Automatyka 2005, t. 9, z. 3

This paper describes laboratory stand in Department of Automatics at AGH-University of Science and Technology. It consists of mobile robot Khepera II connected with PC computer via cabel. This cabel is used for communication with PC and for supply. The user can verify path planning algorithms for mobile robots.

Przemysław Korohoda: **Discussion of Possible Adjustment of the Adaptive Filtering Algorithms Description to Selected Discrete Transformation** • Automatyka 2005, t. 9, z. 3

In the paper the author presents possibility of the commonly known adaptive filters algorithms description adjusted to selected orthogonal discrete transformation. Thus the transformation may be selected to represent given signal in a simpler way. The proposed solution is based on the generalized circular convolution concept, while typically the algorithms make use of the filter impulse response resulting from the Fourier frequency theory. The theory is illustrated with the examples of successful simulations for the Haar, Hadamard, Hartley transformations and DCT-III.

Przemysław Korohoda: **Higher Order Filter Bank Design for Transmultiplexation** • Automatyka 2005, t. 9, z. 3

The author presents a filter design method for transmultiplexation. The synthesis and analysis filters are assumed to be of higher length than the number of transmultiplexed signals. The reasoning based on the matrix description of the up-sampled signals led to formulation of the conditions of perfect reconstruction in such case. The general discussion has been illustrated with a numerical example for 3 signals and filters of assumed length of 5.

Wojciech Kreft: **Model of Thermal Energy Consumption by Building for Different Control Strategies** • Automatyka 2005, t. 9, z. 3

The article presents problems about choosing the strategy of local control for the system of central heating one of the buildings of AGH in Cracow. One analyzes the realisation of constant in time flow of heating water and realisation of flow by periodic switching on and switching off the greatest possible flow. Each strategy has anvantages and disadvantages. The focus of this paper is to present them.

Jacek Nowakowski, Daniel Kaczorowski: **Modeling of the 3D Environment from Measure Data** • Automatyka 2005, t. 9, z. 3

This article describes the programs which were built to simulate the work of laser scanner SICK. This program simulator consists of two programs. One generates the data about the distance of obstacles. Next program receives these data. Additionally this article describes program which builds the three-dimensional space using

3D computer graphics. This program shows the flow of mixture of water and oil in the pipe. The third program which use the computer graphics shows the pour water of the terrace of river Pilica.

Krzysztof Przybyszewski, Krzysztof Łukasiak: **Symulation of the Ultrafine Grinding Processes of the Non One-Size Distribution Materials** • Automatyka 2005, t. 9, z. 3

We can use the algorithms base on the probabilistic methods for the simulations of the ultra fine wet grinding process of the solid state particles, which are built out of the crystals, agglomerates or aggregates, which is a stochastic process that we can call collective process, as it been proved in earlier publications [10, 9]. The simulations of the grinding process of one-size distribution materials were pointed out in those publications. In this paper, we point out how to use algorithm that has been fixed earlier for the simulations of materials with non one-size distribution. We suggest to addict a probability of the grain disintegration at its cross section, that makes the results much close to the results of the experiments.

Paweł Russek, Kazimierz Wiatr: **Prospect of Computation Accelleration in Huge Computation Power Processing Systems Using Reconfigurable Logic Technology** • Automatyka 2005, t. 9, z. 3

The authors presents already known but not frequently used technique of computation acceleration by circuits of reconfigurable logic with special focus on possibility of its mass usage in multiprocessor and multi-threads systems which offer huge computation power. Basic principles and techniques accommodated by reconfigurable computing paradigm are presented and discussion over prospect of this promising technique common usage is preformed taking into account current state of commercially available FPGA reconfigurable logic.

Dominik Sankowski, Krzysztof Strzecha, Michał Janicki: **Design of the Thermowet Control Application** • Automatyka 2005, t. 9, z. 3

Thermowet is a control application for the process of metal melting conducted for the purpose of wetting angle measurement. The design carried out at Computer Engineering Department aims at construction of an efficient, flexible in respect of functional alterations and robust frame for the application. The core constituent element of the project is the object-oriented synchronization and

task management module. Another constituent elements are object-oriented image acquisition and processing and serial communication modules. The means by which the desired quality and scalability of the project is assured is design patterns. The usage of this means together with general object-oriented programming techniques allows for creating a design abstraction layer grouping the functionality of the application.

Michał Turek: **Object Analogies Detection Used for Object's Properties Steering** • Automatyka 2005, t. 9, z. 3

This paper will discuss usage possibilities of a new (and still being designed) analogies detection technique in object steering processes. Proposed solution could be named extraordinary, because it will automatically analyse incoming information stored in simple facts, consisting of object name, timestamp, factor name and factor amount only, and will build a knowledge base just on that information. A special knowledge format, similar to rule-based knowledge structure will be defined. This format apart from modified Input Facts will include statistically collected Fact Trends definitions, special Fact-connecting Rules and Output Rule Descriptions. As a destination – data mining process will produce rules consisting of object attribute changes and object factor affection changes. These rules will be updated every time, when a new fact arrives. Any analogies between different rules, especially coming from different objects will be used for construction or modification of another kind output rules. Rules will hold information about object-behaviour analogies, stored in a cause-result order. An output rules format will also be suitable for human interpretation and modification, what should allow to manipulate and mix manually stored expert knowledge with automatically gained one. During the analysis process, current object's state (being controlled) will be compared with object schemes defined in knowledge base rules. Compatible rules will finally deliver parameter change solution, which has usually been performed in similar object situation during a learning process.

Andrzej Tutaj: **Using of Modified Version of Smith Predictor in Distributed Control Systems** • Automatyka 2005, t. 9, z. 3

This paper deals with modifications of the Smith predictor used in the distributed control systems. Presented modifications make predictor handle the variable time delays or the packet dropout. The paper describes several types of modifications together

with the specifications of network properties for which the modifications are suitable. For some of presented systems the results of simulations are included. Based on this results the quality of control for classical and modifying predictors is compared. The issue of stability is also addressed.

Marek Zachara: **Real Time Estimation of Camera Motion Based on Movement Vectors** • Automatyka 2005, t. 9, z. 3

In the presented article a method for estimation of camera movement against the scene is proposed. The analysis is performed based on calculated motion vectors for selected regions of each frame. A method for selecting feature-rich regions has been also described – using such regions results in much less error during matching process. The main feature of the proposed algorithm is utilisation of large number of small regions distributed evenly over the whole frame. Advantages of such approach for motion estimation have also been listed. Finally, an additional method for minimizing error has been proposed based on comparision of motion vectors against vectors of the neighbouring regions.

Jerzy Zalewicz: **The Use of Laplace's Discrete Transformation to the Modeling Processes with Time Delay in Industry** • Automatyka 2005, t. 9, z. 3

Real dependence of technological parameters connected with transport of loose materials or liquids may be described by the use of Laplace's discreet transformation. A special attention will be paid not only to the easiness of physical time delay description with the use of the above mentioned transformation, but also the possibility to use for this purpose the specialist software MATLAB. Both continuous and discrete models describing signals of physical parameters with time delays mathematically described, and their comparison was done.

IMAGE ANALYSIS AND RECOGNITION

Robert Ambroziak, Joanna Sekulska-Nalewajko, Marek Matulski: **The Analysis of Diatom Fractal Measures** • Automatyka 2005, t. 9, z. 3

The paper presents application of fractal analysis to fractal measures determination of unicellular algae – diatoms. Five mor-

phological types of diatoms as well as one type of algae from *Pediastrum genus* belonging to green algae were tested. Fractal measures comparison as a method to morphology analysis could be adequate to organisms' identification and classification. In case of algae the differences of fractal measures between diatoms and green algae as well as between diatoms with varied morphology and diatoms with simply morphology were noticed.

Wojciech Bieniecki: **The Analysis of Image Preprocessing Requirements for Optical Character Recognition** • Automatyka 2005, t. 9, z. 3

The paper presents a survey over image processing algorithms for automatic optical text recognition. We point on image preprocessing techniques which are responsible for image defects as well as acquisition errors suppression. Image distortion depends not only on the device type and its operating conditions but also on image file format. The aim of the experimental part was to test the recognition ability of FineReader software on a test text page.

Stanisław Fuksa, Witold Byrski: **Four-Point Identification Method of Stereovision Transformation** • Automatyka 2005, t. 9, z. 3

Simple geometric relation corresponding to stereovision transformation is presented. The parameters identification and calibration method is given. Identification is based on knowledge of some number of points positions on monitor as well as their real positions in global coordinate system. The relation we are talking about is called "the plane transform" and can be used for recognition of space position of a given point visible on two cameras monitors. One of important properties of the calibration method is linearity and low dimension of equations for transform coefficients.

Ernest Jamro, Kazimierz Wiatr: **FPGA Implementation of Highly-Parallel Look-Up Table Operation** • Automatyka 2005, t. 9, z. 3

This paper describes FPGA (Field Programmable Gate Arrays) implementation of Loop-Up Table (LUT) operation. The LUT operation is employed as a initial operation for image processing, e.g. histogram equalization for further processing in neural networks. To satisfy the real time requirements the LUT operation must be highly parallel. Unfortunately, LUT operation requires sequential LUT memory writes (to change LUT parameters) which

makes parallel operation impossible in the straightforward way. Consequently the parallel algorithm is implemented in two ways: firstly by parallel operation within each LUT module, and secondly by parallel operation of different LUT modules while performing LUT operation on neighbor fragments of source image. In order to speed-up the hardware design, the modular design with Xilinx Embedded Development Kit (EDK) has been employed and several On chip Peripherals Bus (OPB) compatible modules have been designed.

Włodzimierz Mosorow, Tomasz Marek Kowalski: **Reduced Component Tree Application in Image Information Classification** • Automatyka 2005, t. 9, z. 3

The paper presents preliminary results of component tree analysis used in image processing. The reduction of the component tree has been proposed. This reduced tree either consists of the components corresponding to image regions defined as "the most meaningful" image information or is stripped of components corresponding to "the less meaningful" image information.

Zofia Stawska, Adam Jóźwik: **The Classifiers with Error Gradation Based on the Sums of Nearest Neighbors Ranks** • Automatyka 2005, t. 9, z. 3

A modification of the k nearest neighbor rule, which enables the classification confidence, is proposed. The quality of the standard classifiers is measured by the probability of misclassification estimated experimentally by a use of objects with known class membership. The error rate is computed as the percentage of misclassified objects. An error rate gradation enables the evaluation of the misclassification probability as a function of the object feature values.

Sebastian Stoliński, Szymon Grabowski: **Experimental Comparison of Median Filters for Impulse Noise Attenuation in Color Images** • Automatyka 2005, t. 9, z. 3

The median filter is a classic tool for impulse noise attenuation. Unfortunately, there is no natural ordering in vector spaces and thus the median definition for, e.g., pixels in RGR color space requires a change. The first generalization of the median filter into vector spaces was VMF filter (1990). In the following years, many alternatives have been proposed, offering often better image resto-

ration quality. In this work we extensively compare known filtering algorithms, taking into account both their image restoration accuracy and filtering speed. Additionally, we analyze the effectiveness of several filters on so-called microimages, i.e., small excerpts from real images. Also, we introduce the concept of using the directional metric as a decision criterion in several existing filters.

Mirosław Jabłoński, Jaromir Przybyło, Paweł Wołoszyn: **Automatic Face Segmentation for Human-Computer Interface** • Automatyka 2005, t. 9, z. 3

Efficient face detection and localization is a basic functionality needed for face gesture recognition in visual human-computer interfaces. Existing approaches to face localization are based on skin segmentation. However additional analysis is required when using popular, low quality cameras. This paper describes color-based face segmentation algorithm with automatic calibration of skin-color model parameters, using flash illumination. Proposed algorithm allows to increase efficiency of face segmentation.

Roman Vorobel, Magdalena Stobińska: **Adaptive Method for Image Contrast Enhancement** • Automatyka 2005, t. 9, z. 3

The method for adaptive contrast enhancement in the process of image reconstruction was presented. To reduce the enhancement of noise, which we can see as artifacts in processed images, a new approach to the local contrast evaluation with using an adaptive power variation method was proposed. It contributes to reducing noise amplification.

PROCESS TOMOGRAPHY

Krzysztof Grudzień, Andrzej Romanowski: **Solids Gravitational Flow Dynamics Determination Using One Plane Tomography Sensor** • Automatyka 2005, t. 9, z. 3

This paper covers the preliminary results of work concerning the investigation of gravitational solids flow dynamics. This widely present industrial process is examined with the aid of process tomography here. Experiments were conducted using two types of materials with different physio-chemical properties, e.g. rice and polyamide pellets. Proposed statistical analysis was applied to images derived form tomographic signals. Values associated with pixels in

each image has a random nature. Therefore, the applied methods for time series are based on the stochastic processes theory. The basic parameter estimators such as autocorrelation and variance are used in order to examine the gravitational flow with the aid of one tomographic sensor plane. The proper interpretation of solid materials concentration changes during the hopper discharging allows investigating the phenomenon dynamics. These result are promising to give in the future better monitoring and control possibilities of such systems. Proposed statistical analysis and designed experimental setup let us estimate the funnel propagation velocity during hopper discharging for various outlet diameters and various heights.

Andrzej Romanowski Krzysztof Grudzień: **The Juxtaposition of Image Reconstruction Methods and 2D Spatial Modelling for Process Tomography** • Automatyka 2005, t. 9, z. 3

This paper presents results of the work on image reconstruction methods and the application of advanced statistical methods to examine tomographic data. The algorithms shown here are such as: Linear Back Projection (LBP), Simultaneous Iterative Reconstruction Technique (SIRT) and finally Markov random field (Mrf) method for spatial modelling. The later method enables the stable solution of inverse problem associated with the so-called soft-field effect present in electrical tomography. This paper covers the discussion on advantages and disadvantages of the proposed solution in comparison to classical image reconstruction methods for capacitance tomography. The comparison is based on the static measurements for materials widely used in industry.

Radosław Wajman, Robert Banasiak, Łukasz Mazurkiewicz: **Image Reconstruction Process for Capacitance Horikography** • Automatyka 2005, t. 9, z. 3

The future of the process tomography is strongly associated with 3D process imaging. The traditional cross-sectional images will in many cases be replaced with images of the whole volume of the process. The aim of this paper is to demonstrate the possibilities of 3D process imaging and the results of numerical calculation for solving the forward problem for 3D Electrical Capacitance Tomography – ECT (Horikography). The authors also present a universal tool for 3D mesh generation for Finite Elements Method for many of different 3D ECT sensors. The results obtained from the 3D simulator are compared with the data from a real ECT tomography. The reconstruction process for this data is performed.

Jaroslaw Włodarczyk, Włodzimierz Mosorow, Sławomir Lewandowski: **Reconstruction Algorithms in Dual Modality Tomography** • Automatyka 2005, t. 9, z. 3

In many cases tomographic systems containing the single set of measuring sensors are not sufficient to the calculation of all important characteristic of investigated flows. Nowadays more and more a dual modality systems containing two independent sets of measuring sensors are used. The best example is the connection of the gamma tomography with an electrical capacitance tomography. These two modalities are complimentary both for spatial and temporal resolutions. The article presents the review of algorithms enabling the processing of data from both electrical capacitance and gamma ray tomography systems.

Sławomir Lewandowski, Włodzimierz Mosorow, Jarosław Włodarczyk: **Analysis of Images Distortion in Gamma-Ray Tomography** • Automatyka 2005, t. 9, z. 3

Gamma-ray tomography is one of the most often use techniques for industrial process control. Computerised tomography is a system of indirect imaging, it means that the image is not obtained directly, but it is obtained on the way of numeric calculations (so-called image reconstruction). This paper presents analysis of images distortion and the reletionship between distortion and sources' and detectors' layout.

NEURAL NETWORKS

Joanna Grabska-Chrząstowska, Wiesław Libuszowski, Waldemar Tomalak: **Verification of Utility Neural Classifiers of Respiratory System Diagnosy** • Automatyka 2005, t. 9, z. 3

Spirometric examination is one of the most common tests performed in diagnosing respiratory system disorders. In case of asthma and chronic obstructive pulmonary disease (COPD) it is crucial element of the diagnosing. The analysis of the relationship between forced flows and volumes make possible the identification of the disorders. This work is aimed at the verification of the classifiers based on neural networks, which were evaluated earlier. The evaluation concentrates on specificity and sensitivity of the classification applied to the new set of data. In addition, the *k*-NN (nearest

neighbours) classifier was incorporated in the analysis. The results show worsening of specificity (resulting in poorer quality of classification), but better sensitivity of the methods used.

Marcin Kolibabka, Andrzej Cader: **Intuitive Methods of Initial Mould Weights for Multi Layered Perceptron** • Automatyka 2005, t. 9, z. 3

Many factors have influence on speed and effectiveness learning neural networks. The optimization any of that parameters permits on acceleration and the enlargement the effectiveness of learnedly. The initial values of weights in backpropagation method are one of those parameters. In article we propose graphic interface permitting set initial values based on operator intuition and experience. We also propose some rules setting weights which they are useful placing initial values.

Aleksander Kubiak, Zbigniew Mikrut: **Assessment of Rapeseed Quality with an Artificial Nose and Neural Network** • Automatyka 2005, t. 9, z. 3

This paper presents a system permitting the assessment of rapeseed quality with an electronic nose equipped with a 32 conductive polymer sensor matrix. Signals generated by the sensors were the input data into the backpropagation neural network. The changes in the seed odour, produced by a change in the moisture content over the permitted limit of 6%, were detected within 24 hours.

Jakub Poskrobko, Andrzej Cader: **An Ability to Irregular Behaviour Reduction of Multiagent Systems** • Automatyka 2005, t. 9, z. 3

Multiagent systems can be described as complex iteration dynamic system. Such system usually tends to undesirable chaotic behaviour. This paper describes an algorithm that can be used to decrease irregularities and improve efficiency of multiagent system.

Danuta Rutkowska: **Neuro-Fuzzy Networks for Classification: Architectures of RBF-Type and MLP – NEFCLASS System** • Automatyka 2005, t. 9, z. 3

Neuro-fuzzy systems in application to classification are considered in this paper, in particularly, connectionist architectures of the systems, such as RBF-type and the NEFCLASS system which has

been created based on the fuzzy multi-layer perceptron (MLP). The paper presents comparison of both neuro-fuzzy networks, pointing out their common features and differences. A general connectionist architecture that represents a fuzzy system and can be interpreted as the fuzzy perceptron or the RBF-type network is proposed.

BUSINESS INFORMATION SYSTEMS

Ewa Dudek-Dyduch, Tadeusz Dyduch: **Synchronization of Interrelated Cyclic Production Processes** • Automatyka 2005, t. 9, z. 3

The paper deals with a control of cyclic discrete production processes. The main aim of the paper is to present a new method to scheduling such processes. The method is based on so called pattern scheduling devised by the authors. The method is applied for control of a coke battery in steelworks. The generated presently schedule is not good enough because the normative coke burn time cannot be kept for particular chambers of the coke battery. A description of the coke battery and an analysis of the process are given in the paper. Then a mathematical model of the process that is worked out by the authors is presented. The main part of the paper deals with control of the process in presence of disturbances. Some classes of disturbances are differentiated and their influence on the process is analyzed. The control algorithm based on the devised method for control coke battery is proposed and analyzed.

Lidia Dutkiewicz, Edyta Kucharska: **Algorithms of Transport Paths for Scheduling Problem with State Dependent Resources** • Automatyka 2005, t. 9, z. 3

The aim of the paper is to present algorithms of transport paths for machines in specific task scheduling problem. This problem belongs to NP-hard class and its characteristic feature is that resources, which are required to accomplishing the tasks, are changeable and depend on the current state of the system. Proposed model allows machines wait for resources to be accessible. The shortest and the fastest transport path for machine are described and defined in the paper.

Bogusław Filipowicz, Joanna Kwiecień: **Management of the Network of Self-Service Hypermarkets** • Automatyka 2005, t. 9, z. 3

The paper describes the problem of management of hypermarkets' network. Program, which allows to minimize operating costs of hypermarkets' network using simulation, is presented. Simula-

tion includes arriving of customers, sale of commodities, delivery of commodities to hypermarkets and transport of commodities between individual hypermarkets. Minimize costs is done by optimization of deliveries process or optimization of commodities dislocation between hypermarkets. The results obtained from the applied algorithms are also presented.

Kamil Kuliberda, Jacek Wiślicki: **Architecture of Object-Oriented Database Grid Solution – Data Grid** • Automatyka 2005, t. 9, z. 3

In this papers the authors present a new approach to designing, building and implementation of distributed data processing schema based on Grid Computing technology. The concepts are based on object-oriented database theory Stack-Based Approach to object-oriented databases and Updateable Views. The paper discussed basic mechanisms which allow for transparent accessing to the data as business information, precised their designs and realization issues.

Jakub Janiak, Zbigniew A. Nowacki: **An Integrated Enviroment for Low-Level Programming ASMEdit** • Automatyka 2005, t. 9, z. 3

The article touches on a problem of design and programming applications using assembly languages. Authors show classical approach based on conventional tools (system and freeware) and confront it with possibilities and improvements given by their Microsoft .NET application – ASMEdit, which is an integrated eviroment for low-level programming.

Zdzisława Rowińska, Roman Krzeszewski: **The Problem of the Repair Economy in the Computer System** • Automatyka 2005, t. 9, z. 3

The paper presents the possibilities of rationalization of the repair economy using computer systems. The computers are used for the planning of exploitation services, financial control, the control of spare parts, the collection and analysis data of the damages. The new computer systems help to organize the long time planned exploitation works in the whole system of the client service.

Tomasz Serafiński, Edgar Głowacki: **Traceability, Seeking for Changes Made by Use Case** • Automatyka 2005, t. 9, z. 3

Computer software should meet certain user requirements. Alas, the requirements are floating in time. Estimating the scope of changes in software, triggered by a new requirement will lead to

optimization of software development process. This will give us the ability to apply fast modifications into software as requirements are changing. This ability is a measure of efficiency of software development process. In business measures, the IT project can be competitive in the market.

Paweł Skrzyński: **Interest Rates Prediction on Interbank Money Market and Credit Market Based on Neural Networks** • Automatyka 2005, t. 9, z. 3

Interbank interest rates are strongly connected with Polish National Bank (NBP) percentage rates and credit rates of commercial banks. These rates are determined both by monetary policy of NBP and money market. This knowledge can be useful to banks, companies and households in decision making process about allocation. In this article we describe neural networks approach to WIBOR rate (Warsaw Interbank Offered Rate) prediction and credit rate prediction. Different learning methods are used: combined back propagation with gradient descent method and evolutionary strategy. In both cases we use four data point from time series (WIBOR or credit rate): t–6, t–3, t–1, t and predict value of a point that occurs later in the series: t+1. Later prediction process will be stimulated by expand a neural-net input band. This extension will concentrate other economical factors, which are strongly correlated to these rates hence exerting an economical influence on predicting values. Such approach is expected to significantly improve results, which will be proved and discussed in the article. Results improvement in this method mostly depends of input economical factor selection, taken from an external economical factor-dependence analysis. Results achieved will be compared and discussed.

Paweł Skrzyński, Michał Turek: **Code and Executable Application Generation from UML 2.0 Model** • Automatyka 2005, t. 9, z. 3

UML – Unified Modelling Language was first standardized in 1997. Since that it has been becoming more popular and was rapidly accepted as the standard modelling language for specifying software and system architectures. At the beginning usage of UML was limited to earlier phases of system development. This was caused by insufficient language mechanism in first version of UML. On the other hand CASE tools did not took full advantage of UML potential – code generation was limited only to static structure of classes. Hence there have always been irrelevance between system design and its implementation. New version of UML and modern

CASE tool such as Telelogic Tau G2 enable to address the problem. Not only is rich code generation (which can be completed by programmers) possible but even developing executable applications with UML. Furthermore there is possibility of verifying model in design not implementation phase which let us reduce overall project costs. In this article we present the transformation from UML model, through code in objected oriented language to executable application. CASE Tool used is Telelogic Tau G2 so does UML dialect.

Wojciech Janicki: **Data Quality** • Automatyka 2005, t. 9, z. 3

The subject of article is Data Quality understood as quality of data accumulated in database. Text contains definition of basic features and parameters which help to qualify the quality of database. The article is trying to answer on questions whether the quality of database can be bad with discussion of causes and factors estimating database as database about low quality. There are described the directions of workings having on aim improving the quality of database. At the end of the article is placed discussion about influence of quality of database on the organization as well as results the bad quality of database.

Jacek Wiślicki, Kamil Kuliberda: **Metabase for the Cost-Based Query Optimization in the SBA Object-Oriented Databases** • Automatyka 2005, t. 9, z. 3

The article is focused on the structure of the metabase (metamodel) employed by the dynamic query optimizer based on a cost model used in object databases basing on the SBA (Stack-Based Approach) concept. The introduction covers the fundamentals of SBA and SBQL (Stack-Based Query Language) and the basic of the optimizer. The main part of the paper covers the implementation aspects of the metabase being the source of information utilized by the cost model during the optimization process.

COMPUTER SCIENCE IN EDUCATION

Krzysztof Przybyszewski: **Tutorials and Training Modules for the E-learning** • Automatyka 2005, t. 9, z. 3

The electronic course books (ECB) are the basic and the most important elements for the content of each e-learning system. They may be the independent units (we call them tutorials) or they may be the elements of the bigger structures (for example: each of them

is a course for one school or study subject). There are two main elements that decide kind of level of the didactic feedback (or the level of the intelligence of the ECB): the base of skills that contains the problems and exercises; and the evaluation base that contains the algorithms for the skills level estimation. These two elements decide a level of the automatization of the learning process, as well. In the case that the training element (the base of skills) is the biggest part of the ECB, we call it the skill training unit (STU). The structures of some STU that have been built by the researchers from the Information Proceedings Methods Unit in The Academy of Humanities and Economics in Łódź and some future projects of researches, are described in this work.

Robert Wielgat, Marek Gorgoń: **Teaching Multimedia with MATLAB 6.5-Based TMT Application** • Automatyka 2005, t. 9, z. 3

An original idea of multimedia teaching in Matlab 6.5 environment is presented. In order to accomplish the idea TMT program was created. Contents and structure of the program has been presented. Future works has been briefly discussed. Program is actually used by students in Higher State Vocational School in Tarnów.

Konrad Grzanek, Rafał Grzybowski: **Data Storing Methods in Design Patterns Recognition System** • Automatyka 2005, t. 9, z. 3

Quality evaluation is one of the key elements of software project accomplishment. Among many evaluation methods there is the static analysis of the source code during its generation and development. As a result of this analysis key factors appear, playing roles of indicators useful during the evaluation phase. These factors describe software complexity which has its source in software modules structure and implementation details. Design patterns instance recognition is one of the major methods of evaluating software structure and it’s complexity. Building an effective design patterns instance recognition automata requires an efficient data management and access layer Present paper describes requirements for such kind of solution and shows some analytical results related to large datasets processing results with few Open Source database management systems.