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Poster Session

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TABLE OF CONTECTS

P1 – On Control of Human Arm Switched Dynamics

Artur Babiarz

Institute of Automatic Control, Silesian University of Technology, Gliwice, Poland
artur.babiarz@polsl.pl

Abstract

In this paper, the analysis of switched human dynamics is shown. The analysis concerns the use of fractional-order $PI^\mu D^\Lambda$ controller and integer-order PID controller. The above-mentioned controllers are applied to control the non-linear plant, which is the human arm. The control object is described as a non-linear continuous-time switched system. The switching rule is state-dependent. At the end of the article, illustrative examples are presented. The examples show the influence of fractional order controller parameters on the quality of the responses to a given input signal.

Keywords: fractional order PID controller, switched system, human arm, switching rule

P2 – Hybrid Column/Row-Oriented DBMS

Małgorzata Bach, Aleksandra Werner

Institute of Informatics, Silesian University of Technology, Gliwice, Poland
malgorzata.bach@polsl.pl, aleksandra.werner@polsl.pl

Abstract

The rapid growth of data volumes which store the increasing amount of information makes the necessity of searching for the effective methods of data storing and processing. Some researches on this field recommend changing the row data organization that is classical for DBMS to the columnar one and/or the in-memory approach usage. The article presents chosen hybrid solutions which simultaneously enables storing data both in a row-based way and column-based one, as well as processes these data in the in-memory technology.

Keywords: row store, column store, clustered columnstore index, OLAP, hybrid column/row oriented systems

P3 – Profitability Analysis of PV Installation in Combination with Different Time-of-Use Strategies in Poland

Agnieszka Brachman, Robert Wojcicki

Institute of Informatics, Silesian University of Technology, Gliwice, Poland
agnieszka.brachman@polsl.pl, robert.wojcicki@polsl.pl

Abstract

Increasing the participation of energy originated from renewable sources is one of the most important issues for polish and EU economy. It is also required by all targets of the 2020 climate and energy package for EU. The usage of micro photovoltaic (PV) instalments for residential and commercial buildings in Poland has been increasing for several years. Introduction of the Renewable Energy Sources Act, will raise profitability of this type of installations even more. The paper presents an energetic and economical analysis of exemplary PV system for domestic production, under polish climatic and economic conditions. Moreover an overview of DSR strategies is presented, some of them are already available for customers, others require additional regulations or technology development.

Keywords: photovoltaic, smart grid, solar electricity, demand response, electricity market

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P4 – Practical Verification of Radio Communication Parameters for Object Localization Module

Karol Budniak[1], Krzysztof Tokarz[2], Damian Grzechca[1]

[1]Institute of Electronics, Silesian University of Technology, Gliwice, Poland
[2]Institute of Informatics, Silesian University of Technology, Gliwice, Poland
budniak.karol@gmail.com, krzysztof.tokarz@polsl.pl,
damian.grzechca@polsl.pl

Abstract

The paper presents parameters verification of a mobile device (battery supplied) for object localization built with GPS module and radio front-end. At first, construction of PC device (stationary unit) and mobile device (unit) are described. Mobile unit may be attached to a movable object. More, objects in-motion requires short round-triptime (mobile response on stationary request) and communication distance must be long enough for communication. In the paper the most important datasheet parameters have been compared with devices constructed and the number of test scenarios have been performed in order to verify parameters in real environment i.e. mobile unit lifetime on battery, communication range, output power, positioning accuracy, etc.

Keywords: radio communication, objects localization, RTLS

P5 – Estimation of the Joint Spectral Radius

Adam Czornik, Piotr Jurgaś, Michał Niezabitowski

Institute of Automatic Control, Silesian University of Technology, Gliwice, Poland
adam.czornik@polsl.pl, michal.niezabitowski@polsl.pl

Abstract

The joint spectral radius of a set of matrices is a generalization of the concept of spectral radius of a matrix. Such notation has many applications in the computer science, and more generally in applied mathematics. It has been used, for example in graph theory, control theory, capacity of codes, continuity of wavelets, overlap-free words, trackable graphs. It is impossible to provide analytic formulae for this quantity and therefore any estimation are highly desired. The main result of this paper is to provide an estimation of the joint spectral radius in the terms of matrices norms and spectral radii.

Keywords: joint spectral radius, graph theory, capacity of codes, continuity of wavelets, estimation, overlap-free words, trackable graphs

P6 – A Model of Genome Length Estimation Based on K-Mers Detection

Mateusz Garbulowski, Andrzej Polanski

Institute of Informatics, Silesian University of Technology, Gliwice, Poland
mateusz.garbulowski@polsl.pl, andrzej.polanski@polsl.pl

Abstract

The genome length estimation at raw sequencing data level gives a practical knowledge about size of the DNA sequence at early stage of analysis. In our research, we created a model based on random sampling of k-mer (very short DNA fragments), that we used to predict genome size. Furthermore, we made the comparison of model results with empirical whole-genome sequencing data.

Keywords: genome length estimation, genome size, sequencing model

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P7 – Quantum Inferring Acausal Structure

Adam Glos

Institute of Theoretical and Applied Informatics, Gliwice, Poland
aglos@iitis.pl

Abstract

This poster presents a generalization of probability theory and inferring structures in a field of quantum information theory. First, the formalism of quantum information theory is introduced. Next, quantum theory is used to define a quantum conditional operators which are fundamental in describing quantum inferring structures. The result of reasoning performance over the structures was presented in a Monty Hall game. The experiment shows that entanglement of quantum states has influence on optimal behaviour of player in the game.

Keywords: qauantum Bayesian networks, acausal inferring, quantum reasoning, Monty Hall game

P8 – A Note on Capacity Provisioning in SDN Service Provider Networks

Mariusz Gola, Adam Czubak

Institute of Automatic Control and Informatics, Opole University of Technology
mariusz.gola@po.opole.pl, adam.czubak@math.uni.opole.pl

Abstract

In this paper we take a closer look at ISP networks that have a centralized SDN control plane. A heuristic algorithm for the CFA problem for such networks is proposed, that takes under account two factors: the speed of individual links and ISP network's given properties.

Keywords: WAN, routing, CFA, SDN

P9 – Application of Dimensionality Reduction Methods for Eye Movement Data Classification

Aleksandra Gruca, Katarzyna Harezlak, Paweł Kasprowski

Institute of Informatics, Silesian University of Technology, Gliwice, Poland
aleksandra.gruca@polsl.pl, katarzyna.harezlak@polsl.pl,
pawel.kasprowski@polsl.pl

Abstract

In this paper we apply two data dimensionality reduction methods to eye movement dataset and analyse how the feature reduction method improves classification accuracy. Due to the specificity of the recording process, eye movement datasets are characterized by both big size and high-dimensionality that make them difficult to analyse and classify using standard classification approaches. Here, we analyse eye movement data from BioEye 2015 competition and to deal with the problem of high dimensionality we apply SVM combined with PCA feature extraction and random forests wrapper variable selection. Our results show that the reduction of the number of variables improves classification results. We also show that some of classes (participants) can be classified (recognised) with high accuracy while others are very difficult to be correctly identified.

Keywords: eye movement data analysis, DTW, dimensionality reduction, classification, PCA, SVM, random forest

P10 – Emotion Recognition From Facial Images Using Binary Face Relevance Maps

Tomasz Herud[1,2], **Michał Kawulok**[1,2], **Bogdan Smolka**[3]

[1]Institute of Informatics, Silesian University of Technology, Gliwice, Poland
[2]Future Processing, Gliwice, Poland
[3]Institute of Automatic Control, Silesian University of Technology, Gliwice, Poland
tomasz.herud@polsl.pl, michal.kawulok@polsl.pl, bogdan.smolka@polsl.pl

Abstract

This paper is focused on automatic emotion recognition from static grayscale images. Here, we propose a new approach to this problem, which combines a few other methods. The facial region is divided into small subregions, which are selected for processing based on a face relevance map. From these regions, local directional pattern histograms are extracted and concatenated into a single feature histogram, which is classified into one of seven defined emotional states using support vector machines. In our case, we distinguish: anger, disgust, fear, happiness, neutrality, sadness and surprise. In our experimental study we demonstrate that the expression recognition accuracy for Japanese Female Facial Expression database is one of the best compared with the results reported in the literature

Keywords: emotion recognition, local binary patterns, face recognition

P11 – Classification Based on Incremental Fuzzy (1+p)-Means Clustering

Michal Jezewski, Jacek M. Leski, Robert Czabanski

Institute of Electronics, Silesian University of Technology, Gliwice, Poland
michal.jezewski@polsl.pl, jacek.leski@polsl.pl, robert.czabanski@polsl.pl

Abstract

Fuzzy clustering is often applied to determine the rules of the fuzzy rule-based classifiers (usually of the antecedents only). In this work a new fuzzy clustering approach is proposed for such a purpose. The idea consists in alternating clustering of the objects from two classes with the prototypes obtained after the previous clustering not allowed to move during the current clustering. As a result each clustering provides new location of a single prototype. The classification quality obtained by the fuzzy rule-based classifier using the proposed clustering was compared with the Lagrangian SVM method on several benchmark databases.

Keywords: clustering, fuzzy rule-based classification

P12 – Neural Network and Kalman Filter Use for Improvement of Inertial Distance Determination

Piotr Kopniak, Marek Kaminski

Institute of Computer Science, Lublin University of Technology, Lublin, Poland
p.kopniak@pollub.pl, m.kaminski@pollub.pl

Abstract

Appropriate distance estimation is very important in different applications, e.g. in navigation or developing natural interfaces for man-machine interaction. Article refers to this problem and presents two approaches in improving estimation of the distance. The distance is computed on the base of linear acceleration. The acceleration data is captured by an inertial sensor mounted on moving object. The first approach uses Kalman filter and appropriate preprocessing steps to denoise measured acceleration. This method improves the distance estimation in noticeable manner but is not optimal because of time growing errors. These errors results come from the imperfection of the accelerometer and double integration of acceleration data during computational step. The second approach improves the estimation accuracy by using a neural network. The neural network estimates position of moving object on the base of statistical properties of the acceleration signal. Both of mentioned approaches were compared and the results are described in this article. Theoretical contemplation was confirmed by practical verification which results are also presented. Conducted research show that these two approaches can be combined for an optimal problem solution.

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P13 – Behaviometrics of Digital Games for Children with Autism Spectrum Disorder

Agnieszka Landowska, Agata Kołakowska, Michał Wróbel

Faculty of Electronics, Telecommunications and Informatics, Gdańsk
University of Technology
nailie@eti.pg.gda.pl

Abstract

Poster depicts the possibility to improve therapy, education and everyday experience of autistic people, who use mobile technology. The concept is to obtain behavioral data from the tablet usage (gestures like taps, swipes, etc., accelerometer and gyroscope metrics). The behaviometrics might be taken unobtrusively and reveal the user experience as well as progress. The research is funded by the AUTMON project, that aims at development of automatic therapy monitoring tools and methods to support autistics as well as their parents and therapists, in educational processes and everyday life.

Keywords: assistive technology, behavioral therapy, behavioral metrics, therapy support system, autism spectrum disorder

P14 – Diagnostic Model for Longwall Conveyor Engines

Marcin Michalak[1], Beata Sikora[2], Jurand Sobczyk[3]

[1]Institute of Informatics, Silesian University of Technology, Gliwice, Poland
[2]Institute of Mathematics, Silesian University of Technology, Gliwice, Poland
[3]SOMAR S.A., ul. Karoliny 4, 40-186 Katowice, Poland
marcin.michalak@polsl.pl, beata.sikora@polsl.pl, j.sobczyk@somar.com.pl

Abstract

The paper presents a new approach of wall conveyor engines diagnosis. A wall conveyor is an essential device in coal mines. Its work is usually represented by three time series of current values of three conveyor engines. The startup of the conveyor is the phase with the maximal observed load during its work cycle. In the research, each startup is described with almost twenty variables. On the basis of 1000 real monitored startups, a set of association rules was inducted. On the basis of the further rules analysis and interpretation, a set of almost 50 rules was selected to the diagnosis system. The proposed diagnosis system compares the quality (precision) of each association rule from a selected subset--the precision evaluated on the representative data-with the precision of the same rule, evaluated on newly detected startups.

Keywords: machine diagnosis, association analysis, association rules

P15 – Memetic Neuro-Fuzzy System with Big-Bang-Big-Crunch Optimisation

Krzysztof Siminski

Institute of Informatics, Silesian University of Technology, Gliwice, Poland
krzysztof.siminski@polsl.pl

Abstract

The paper presents a memetic fuzzy inference system based on Big Bang Big Crunch (evolutionary optimisation) and gradient descent (local search) techniques. Tuning parameters of the fuzzy system with evolutionary optimisation failed to be successful, but application of both evolutionary and local optimisation achieved lower error rates than reference system (that uses only gradient descent optimisation). The results of experiments have been statistically verified.

Keywords: approximate inversion, imputation, incomplete data, neuro-fuzzy system

P16 – Evaluation of Improvement in Orientation Estimation Through the Use of the Linear Acceleration Estimation in the Body Model

Agnieszka Szczęsna[1], Przemysław Pruszowski[1], Janusz Słupik[2], Damian Pęszor[1], Andrzej Polanski[3]

[1]Institute of Informatics, Silesian University of Technology, Gliwice, Poland
[2]Institute of Mathematics, Silesian University of Technology, Gliwice, Poland
[3]Research Center of Polish-Japanese Academy of Information Technology, Bytom, Poland
agnieszka.szczesna@polsl.pl, przemyslaw.pruszowski@polsl.pl,
janusz.slupik@polsl.pl, damian.peszor@polsl.pl, apolanski@pjwstk.edu.pl

Abstract

The need for broadly defined measures of human motion and estimation of motion parameters occurs in many research disciplines. The article concerns the evaluation of improvement in basic orientation estimation methods for IMU sensors, throughout the use of rigid body (segment in skeleton model) constraints. The verified method utilizes the correlation between rational motions and linear accelerations in the body model and reduces the impact of the external acceleration on the estimation of orientation. The experimental study concerns comparison of this method to other methods of leveling the influence of linear external acceleration.

Keywords: inertial motion capture, IMU sensor, orientation filters, linear acceleration estimation

P17 – Independent Data Partitioning in Oracle Databases for LOB Structures

Lukasz Wycislik

Institute of Informatics, Silesian University of Technology, Gliwice, Poland
lukasz.wycislik@polsl.pl

Abstract

The paper presents an implementation of data partitioning in Oracle databases dedicated for LOB (i.e. Large OBjects). These LOB structures could encapsulate any of binary data including multimedia or electronic documents in various formats. The solution, unlike most of the other authors' proposals, is narrow enough that it allows for defining an API, a data schema and an implementation that need not change regardless of usage scenarios. However, it is flexible enough that one instance of proposed subsystem allows for the provision of partitioning services for many other systems what may be useful, for example, in systems deployed in accordance with the multi-tenant architecture.

Keywords: Oracle, databases, partitioning, LOB, secure files, ASM