I T H E A

International Journal

INFORMATION THEORIES & APPLICATIONS

Reference Issue

2004 Volume 11

International Journal
INFORMATION THEORIES & APPLICATIONS
ISSN 1310-0513
Volume 11 / 2004, Reference Issue

IJ ITA is official publisher of the scientific papers of the members of the Association of Developers and Users of Intellectualized Systems (ADUIS).

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International Journal "INFORMATION THEORIES & APPLICATIONS" Vol.11, 2004 - Reference Issue
Printed in Bulgaria
Edited by the **Institute of Information Theories and Applications FOI ITHEA**, Bulgaria,
in collaboration with the V.M.Glushkov Institute of Cybernetics of NAS, Ukraine, and
the Institute of Mathematics and Informatics, BAS, Bulgaria.
Publisher: FOI-COMMERCE - Sofia, 1000, P.O.B. 775, Bulgaria. www.foibg.com, e-mail: foi@nlcv.net

ISSN 1310-0513

Preface

Verba volant, scripta manent !

The "**International Journal on Information Theory and Applications**" (**IJ ITA**) has been established in 1993 as independent scientific printed and electronic media. IJ ITA is edited by the *Institute of Information Theories and Applications FOI ITHEA* in collaboration with the leading researchers from the Institute of Cybernetics "V.M.Glushkov", NASU (Ukraine) and Institute of Mathematics and Informatics, BAS (Bulgaria).

During the years, IJ ITA became as well-known international journal. Till now, including this volume, more than **350** papers from more than **600** authors have been published. IJ ITA authors are widespread in **38** countries all over the world: ***Armenia*, Belarus, Belgium, *Bulgaria*, *Canada*, *Czech Republic*, *Denmark*, Egypt, Estonia, Finland, France, *Germany*, *Greece*, *Hungary*, *Ireland*, *Israel*, *Italy*, *Japan*, *Kirghizia*, *Latvia*, Lithuania, *Malta*, Mexico, Moldavia, *Netherlands*, Poland, Portugal, *Romania*, *Russia*, Scotland, Senegal, *Serbia and Montenegro*, *Spain*, Sultanate of Oman, *Turkey*, UK, *Ukraine*, and *USA***.

Volume 11/2004 of the IJ ITA contains **59** papers written by **115** authors from **24** countries (*marked in italics above*), selected from several international conferences, seminars and workshops organized or supported by the Journal.
At the first place, the main source for selection were the **ITA 2004** Joint International Events on Information Theories and Applications, (June 14-24, 2004, Varna, Bulgaria):

- Second International Conference i.TECH 2004 "Information Research, Applications and Education",
- XXIX-th International Conference ICT&P 2004 "Information and Communication Technologies & Programming",
- III-th International Workshop on General Information Theory,
- International INTAS-FET Strategic Workshop "Data Flow Systems: Algorithms and Complexity",
- Second International Workshop on Multimedia Semantic.

A special issue (No.3) of this volume contains papers from the International Seminar "Digitization of Cultural and Scientific Heritage" (27.08 – 03.09.2004, Bansko, Bulgaria).
Several papers were selected from the pool of papers directly submitted to IJ ITA.

Congratulations to *Mr. Tibor Vámos* and *Mr. Boicho Kokinov* who were awarded by the International Prize "**ITHEA**" for the year 2004. The "ITHEA" Prize has been established in 1995. It is aimed to mark the achievements in the field of the information theories and applications.

More information about the IJ ITA rules for preparing and submitting the papers as well as how to take out a subscription to the Journal may be obtained from www.foibg.com/ijita.

Krassimir Markov
IJ ITA Founder and Editor in chief

International Prize "ITHEA"

Awarded Scientists till 2004:

1995	*Sandansky*	*K. Bankov, P. Barnev, G. Gargov, V. Gladun, R. Kirkova, S. Lazarov, S. Pironkov, V. Tomov*
1996	*Sofia*	*T. Hinova, K. Ivanova, I. Mitov, D. Shishkov, N. Vashchenko*
1997	*Yalta*	*Z. Rabinovich, V. Sgurev, A. Timofeev, A. Voloshin*
1998	*Sofia*	*V. Jotsov*
1999	*Sofia*	*L. Zainutdinova*
2000	*Varna*	*I. Arefiev, A. Palagin*
2001	*St.Peterburg*	*N. Ivanova, V. Koval*
2002	*Primorsko*	*A. Milani, M. Mintchev*
2003	*Varna*	*T. Gavrilova, A. Eskenazi, V. Lozovskiy, P. Stanchev*
2004	*Varna*	*B. Kokinov, T. Vamos*

IJ ITA major topics of interest include, but are not limited to:

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Artificial Intelligence
- *Computer Intellectualisation*
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- *Knowledge Acquisition and Formation*
- *Distributed Artificial Intelligence*
- *Models of Plausible Reasoning*
- *AI Planning and Scheduling*

Bioinformatics
Business Informatics
Cognitive Science
Decision Making
Education Informatics
General Information Theory
Hyper Technologies
Information Models
Intellectualisation of Data Processing
Knowledge-based Society
Logical Inference
Natural language Processing
Neuroinformatics
Philosophy and Methodology of Informatics
Quality of the Programs
Software Engineering
Theory of Computation

APPLICATIONS

Business Information Systems
Communication Systems
Computer Art and Computer Music
Hyper Technologies
Intelligent Information Systems
Multimedia Systems
Programming Technologies
Program Systems with Artificial Intelligence
Pyramidal Information Systems
Very Large Information Spaces

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ABSTRACTS OF IJ ITA VOLUME 11/2004, NUMBER 1

COMPUTER DEMOCRACY – OUR NEXT STEP IN EUROPE

Tibor Vámos

Abstract: After about a quarter of a century of enlightened development and ongoing preparatory technological, scientific and political activities we are arrived at the realization period of the idea. The two major technological vehicles of progress are the World Wide Web, the most democratic international forum of information exchange and the advent of public key cryptography as a combined philosophical and practical device of individual integrity and collective responsibility.

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TOWARDS ACTIVE VISION IN THE DUAL COGNITIVE ARCHITECTURE

Adrian Nestor and Boicho Kokinov

Abstract: The paper describes an extension of the cognitive architecture DUAL with a model of visual attention and perception. The goal of this attempt is to account for the construction and the categorization of object and scene representations derived from visual stimuli in the TextWorld microdomain. Low-level parallel computations are combined with an active serial deployment of visual attention enabling the construction of abstract symbolic representations. A limited-capacity short-term visual store holding information across attention shifts forms the core of the model interfacing between the low-level representation of the stimulus and DUAL's semantic memory. The model is validated by comparing the results of a simulation with real data from an eye movement experiment with human subjects.

Keywords: active vision, cognitive architecture, eye movements, structural descriptions, visual attention.

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FORMAL DEFINITION OF THE CONCEPT "INFOS"

Krassimir Markov, Krassimira Ivanova, Ilia Mitov, Evgeniya Velikova-Bandova

Abstract: The concept INFOS is very important for understanding the information phenomena. Because of this, it is basic for the General Information Theory. The more precise formal definition of this concept is given in the paper.

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ONLINE GENETIC ALGORITHMS

Alfredo Milani

Abstract: This paper present a technique based on genetic algorithms for generating online adaptive services. Online adaptive systems provide flexible services to a mass of clients/users for maximising some system goals, they dynamically adapt the form and the content of the issued services while the population of clients evolve over time.

The idea of online genetic algorithms (online GAs) is to use the online clients response behaviour as a fitness function in order to produce the next generation of services. The principle implemented in online GAs, "the application environment is the fitness", allow modelling highly evolutionary domains where both services providers and clients change and evolve over time.

The flexibility and the adaptive behaviour of this approach seems to be very relevant and promising for applications characterised by highly dynamical features such as in the web domain (online newspapers, e-markets, websites and advertising engines). Nevertheless the proposed technique has a more general aim for application environments characterised by a massive number of anonymous clients/users which require personalised services, such as in the case of many new IT applications.

Keywords: genetic algorithms, adaptive web, evolutionary computation

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SIMULATING MEMBRANE SYSTEMS IN DIGITAL COMPUTERS

Fernando Arroyo, Carmen Luengo, Luis Fernandez,
Luis F. de Mingo, and Juan Castellanos

Abstract: Membrane Computing started with the analogy between some processes produced inside the complex structure of living cells and computational processes. In the same way that in other branches of Natural Computing, the model is extracted from nature but it is not clear whether or not the model must come back to nature to be implemented. As in other cases in Natural Computing: Artificial Neural Networks, Genetic Algorithms, etc; the models have been implemented in digital computers. Hence, some papers have been published considering implementation of Membrane Computing in digital computers. This paper introduces an overview in the field of simulation in Membrane Computing.

Keywords: Simulation, Membrane Computing, Multiset, Evolution Rules, Membrane Structure.

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TEACHING STRATEGIES AND ONTOLOGIES FOR E-LEARNING

Tatiana Gavrilova, Michael Kurochkin, and Victor Veremiev

Abstract. The paper presents one approach aimed at developing teaching strategies based on the principles of ontological engineering. The research framework is targeted on development of methodology and technology that will scaffold the process of knowledge structuring for e-learning. The structuring procedure is the kernel of ontology development. Ontologies that describe the main concepts of the domains are used both for teaching and

assessment techniques. Special stress is put on visual design as a powerful learning mindtool. The examples are taken from the courses on the foundations of artificial intelligence and intelligent systems development. These courses are delivered by the authors in St.Petersburg State Polytechnical University at School of Computer Science and in Poland in the First Independent University.
Keywords: E-learning, Ontologies, Visual Knowledge Engineering, Expert Systems Building Tools, Knowledge Acquisition, Knowledge Sharing and Reuse.

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HANDWRITING IN FORENSIC INVESTIGATIONS

Georgi Gluhchev

Abstract: The process of automatic handwriting investigation in forensic science is described. The general scheme of a computer-based handwriting analysis system is used to point out at the basic problems of image enhancement and segmentation, feature extraction and decision-making. Factors that may compromise the accuracy of expert's conclusion are underlined and directions for future investigations are marked.
Keywords: Handwriting, Identification, Verification, Screening, Forensic Investigation, Image Enhancement, Feature Extraction, Decision-making.

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NEURAL NETWORKS: A DIAGNOSTIC TOOL FOR GASTRIC ELECTRICAL UNCOUPLING?

Catherine Gooi and Martin Mintchev

Abstract: Neural Networks have been successfully employed in different biomedical settings. They have been useful for feature extractions from images and biomedical data in a variety of diagnostic applications. In this paper, they are applied as a diagnostic tool for classifying different levels of gastric electrical uncoupling in controlled acute experiments on dogs. Data was collected from 16 dogs using six bipolar electrodes inserted into the serosa of the antral wall. Each dog underwent three recordings under different conditions: (1) basal state, (2) mild surgically-induced uncoupling, and (3) severe surgically-induced uncoupling. For each condition half-hour recordings were made. The neural network was implemented according to the Learning Vector Quantization model. This is a supervised learning model of the Kohonen Self-Organizing Maps. Majority of the recordings collected from the dogs were used for network training. Remaining recordings served as a testing tool to examine the validity of the training procedure. Approximately 90% of the dogs from the neural network training set were classified properly. However, only 31% of the dogs not included in the training process were accurately diagnosed. The poor neural-network based diagnosis of recordings that did not participate in the training process might have been caused by inappropriate representation of input data. Previous research has suggested characterizing signals according to certain features of the recorded data. This method, if employed, would reduce the noise and possibly improve the diagnostic abilities of the neural network..
Keywords: Neural Networks, Gastric Electrical Activity, Gastric Electrical Uncoupling

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FOURIER NEURAL NETWORKS: AN APPROACH WITH SINUSOIDAL ACTIVATION FUNCTIONS

Luis Mingo, Levon Aslanyan, Juan Castellanos, Miguel Díaz, and Vladimir Riazanov

Abstract: This paper presents some ideas about a new neural network architecture that can be compared to a Fourier analysis when dealing periodic signals. Such architecture is based on sinusoidal activation functions with an axo-axonic architecture [1]. A biological axo-axonic connection between two neurons is defined as the weight in a connection in given by the output of another third neuron. This idea can be implemented in the so called Enhanced Neural Networks [2] in which two Multilayer Perceptrons are used; the first one will output the weights that the second MLP uses to computed the desired output. This kind of neural network has universal approximation properties [3] even with lineal activation functions.

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MUSIC AS THE SOURCE OF INFORMATION INFLUENCE AND SOUL EDUCATION

Larissa Kuzemina

Abstract: At present the research on the theoretical and practical aspects of the musical masterly performance is paid a great attention. But far from being all is developed in the field of the mastery art theory. In particularly, the masterly performance concept developed by B.L.Yavorsky, one of the greatest native musicians-researchers, known, first of all, for his own theory of fret rhythm afterwards called a theory of musical thinking, was kept in the background. The views of the scientist were repeatedly the subject of speculations, debates, discussions. He repeatedly wrote himself for the press outlining the fundamental tenets of his theoretical system. Despite controversial points the system developed by Yavorsky appealed to researches for its singularity, novelty, breadth of phenomenon scope in art, stimulated the creative search.
The basis for this system is the association of the theory with the history of the musical practice development and, first of all, an objective scientific investigation into particularities of musical thinking as a reflection of the social reality.

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DIGITAL CREATIVITY: ADVANTAGES, PROBLEMS, RESPONSIBILITIES

Velimir Velev

Abstract: The paper focuses on the rapid development of the digital culture and the challenges it imposes to human creativity. It analyses e-learning, digital entertainment, digital art and the issues of creativity and improvisation. It also presents a classification of the levels in the creative structure including hardware and software tools; product developers; creators and end users. Special attention is paid to the advantages of the new digital culture and the responsibilities of all people who create it or use it. We conclude that more attention should be paid to the threats and to ways of boosting positive creativity in the various fields of application of information and communication technologies.
Keywords: digital art, creativity, improvisation

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PRACTICAL, COMPUTATION EFFICIENT HIGH-ORDER NEURAL NETWORK FOR ROTATION AND SHIFT INVARIANT PATTERN RECOGNITION

Evgeny Artyomov and Orly Yadid-Pecht

Abstract: In this paper, a modification for the high-order neural network (HONN) is presented. Third order networks are considered for achieving translation, rotation and scale invariant pattern recognition. They require however much storage and computation power for the task. The proposed modified HONN takes into account a priori knowledge of the binary patterns that have to be learned, achieving significant gain in computation time and memory requirements. This modification enables the efficient computation of HONNs for image fields of greater that 100 × 100 pixels without any loss of pattern information.
Keywords: HONN, higher-order networks, invariant pattern recognition.

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AN INTERACTIVE METHOD OF LINEAR MIXED INTEGER MULTICRITERIA OPTIMIZATION

Vassil Vassilev, Krasimira Genova, Mariyana Vassileva, and Subhash Narula

Abstract: The paper describes a learning-oriented interactive method for solving linear mixed integer problems of multicriteria optimization. The method increases the possibilities of the decision maker (DM) to describe his/her local preferences and at the same time it overcomes some computational difficulties, especially in problems of large dimension. The method is realized in an experimental decision support system for finding the solution of linear mixed integer multicriteria optimization problems.
Keywords: linear mixed integer multicriteria optimization, interactive methods, decision support systems.

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SITUATION CENTERS IN MODERN STATE

Alexander Kuzemin

Abstract: Development of information technologies and hardware-software means make it possible to integrate various engineering solutions of technical, technological and information nature within the framework of the single system of implementation.
The situation center (SC) represents the complex of hardware-software means for the personal and team work of the managers group. Its main task consists in supporting decision-making on technical and strategic management solutions based on visualization and analytical procession of information.
The SC ensures the support of preparation and decision making in particular:
- elaboration of the versions and recommendations taking into account various conditions and limitations;
- choice or creation of the situation analysis model;
- structurization of the problems and definition of the most informative parameters;
- monitoring of socio-economical and socio-political information.

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THE USE OF SITUATION REPRESENTATION WHEN SEARCHING FOR SOLUTIONS IN COMPUTER AIDED DESIGN SYSTEMS

Alexander Kuzemin, Mikhail Sorochan, Igor Yanchevskiy, and Asanbek Torojev

Abstract: Projects solutions reuse methodology is offered for software development. The main idea consists in connection of the system objective with the situation using the entities which describe the condition of the system in the process of the objective statement. Every situation is associated with one or several design solutions, which can be used at the development. Based on this connection the situation representing language has been created, it lets to express a problem situation using a natural language describe. The similarity measure has been built to compare situations, it is based on the similarity coefficients with adding the absent part weight.

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MULTI-AGENT SYSTEMS IN THE HARVEST PROGNOSIS

Laura Ciocoiu, Cristian Paraschiv, and Dragoş Barbu

Abstract: The paper presents a case study of geo-monitoring a region consisting in the capturing and encoding of human expertise into a knowledge-based system. As soon as the maps have been processed, the data patterns are detected using knowledge-based agents for the harvest prognosis.
Keywords: data mining**,** topological maps, GIS, knowledge based agents, Model Based Reasoning

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LOCAL GOALS DRIVEN HIERARCHICAL REINFORCEMENT LEARNING

Arthur Pchelkin

Abstract: Efficient exploration is of fundamental importance for autonomous agents that learn to act. Previous approaches to exploration in reinforcement learning usually address exploration in the case when the environment is fully observable. In contrast, the current paper, like the previous paper [Pch2003], studies the case when the environment is only partially observable. One additional difficulty is considered – complex temporal dependencies. In order to overcome this additional difficulty a new hierarchical reinforcement learning algorithm is proposed. The learning algorithm exploits a very simple learning principle, similar to Q-learning, except the lookup table has one more variable – the currently selected goal. Additionally, the algorithm uses the idea of internal reward for achieving hard-to-reach states [Pch2003]. The proposed learning algorithm is experimentally investigated in partially observable maze problems where it shows a robust ability to learn a good policy.
Keywords: reinforcement learning, hierarchical behaviour, efficient exploration, POMDPs, non-Markov, local goals, internal reward, subgoal learning.

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ABSTRACTS OF IJ ITA VOLUME 11/2004, NUMBER 2

ASPICO: ADVANCED SCIENTIFIC PORTAL FOR INTERNATIONAL COOPERATION ON DIGITAL CULTURAL CONTENT

Jérôme Godard, Frédéric Andrès, and Kinji Ono

Abstract: In this paper, we present the development of an advanced open source multi-lingual cooperative portal system (ASPICO) dedicated to semantic management, and to cooperative exchange for research and education purpose on digital cultural projects. Advantages of using ASPICO include greater flexibility for digital resource management, generic and systematic ontology-based metadata management, and better semantic access and delivery based on an innovative Information Modeling for Adaptive Management (IMAM).
Keywords: Digital Silk Roads, Semantic Management, Metadata Annotation, Image-Learning Ontology.

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MPEG-7 BASED IMAGE RETRIEVAL ON THE WORLD WIDE WEB

Rajeev Agrawal, Farshad Fotouhi, Peter Stanchev, and Ming Dong

Abstract: Due to the rapid growth of the number of digital media elements like image, video, audio, graphics on Internet, there is an increasing demand for effective search and retrieval techniques. Recently, many search engines have made image search as an option like Google, AlltheWeb, AltaVista, Freenet. In addition to this, Ditto, Picsearch, can search only the images on Internet. There are also other domain specific search engines available for graphics and clip art, audio, video, educational images, artwork, stock photos, science and nature [www.faganfinder.com/img]. These entire search engines are directory based. They crawls the entire Internet and index all the images in certain categories. They do not display the images in any particular order with respect to the time and context. With the availability of MPEG-7, a standard for describing multimedia content, it is now possible to store the images with its metadata in a structured format. This helps in searching and retrieving the images. The MPEG-7 standard uses XML to describe the content of multimedia information objects. These objects will have metadata information in the form of MPEG-7 or any other similar format associated with them. It can be used in different ways to search the objects. In this paper we propose a system, which can do content based image retrieval on the World Wide Web. It displays the result in user-defined order.
Keywords: XML, MPEG-7, Metadata, Multimedia, Content Based Image Retrieval (CBIR)

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MPEG-7: THE MULTIMEDIA CONTENT DESCRIPTION INTERFACE

Peter Stanchev, David Green Jr., and Boyan Dimitrov

Abstract: In this paper a review of the most used MPEG-7 descriptors are presented. Some considerations for choosing the most proper descriptor for a particular image or video data set are outlined.
Keywords: MPEG-7, Multimedia, Content based retrieval

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IMAGESPACE: AN ENVIRONMENT FOR IMAGE ONTOLOGY MANAGEMENT

Shiyong Lu, Rong Huang, Artem Chebotko, Yu Deng, and Farshad Fotouhi

Abstract: More and more researchers have realized that ontologies will play a critical role in the development of the Semantic Web, the next generation Web in which content is not only consumable by humans, but also by software agents. The development of tools to support ontology management including creation, visualization, annotation, database storage, and retrieval is thus extremely important. We have developed ImageSpace, an image ontology creation and annotation tool that features (1) full support for the standard web ontology language DAML+OIL; (2) image ontology creation, visualization, image annotation and display in one integrated framework; (3) ontology consistency assurance; and (4) storing ontologies and annotations in relational databases. It is expected that the availability of such a tool will greatly facilitate the creation of image repositories as islands of the Semantic Web.
Keywords: Ontology, visualization, annotation, Semantic Web, DAML+OIL, ontology storage, ontology-based retrieval.

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WEB PAGE RETRIEVAL BY STRUCTURE

William Grosky and Gargee Deshpande

Abstract: Our research explores the possibility of categorizing webpages and webpage genre by structure or layout. Based on our results, we believe that webpage structure could play an important role, along with textual and visual keywords, in webpage categorization and searching.
Keywords: content-based retrieval, genre detection, layout ontologies.

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AN OPTIMAL DISTRIBUTED ALGORITHM FOR ALL-PAIRS SHORTEST-PATH

Saroja Kanchi and David Vineyard

Abstract: In this paper the network problem of determining all-pairs shortest-path is examined. A distributed algorithm which runs in O(n) time on a network of n nodes is presented. The number of messages of the algorithm is O(e+n log n) where e is the number of communication links of the network. We prove that this algorithm is time optimal.
Keywords: distributed algorithm, all-pairs shortest-path, computer network.

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A TWO LAYERED MODEL FOR EVOLVING WEB RESOURCES

Alfredo Milani and Silvia Suriani

Abstract: In this paper the key features of a two-layered model for describing the semantic of dynamical web resources are introduced.
In the current Semantic Web proposal [Berners-Lee et al., 2001] web resources are classified into static ontologies which describes the semantic network of their inter-relationships [Kalianpur, 2001][Handschuh & Staab, 2002] and complex constraints described by logical quantified formula [Boley et al., 2001][McGuinnes & van Harmelen, 2004][McGuinnes et al., 2004], the basic idea is that software agents can use techniques of automatic reasoning in order to relate resources and to support sophisticated web application.
On the other hand, web resources are also characterized by their dynamical aspects, which are not adequately addressed by current web models.
Resources on the web are dynamical since, in the minimal case, they can appear or disappear from the web and their content is upgraded. In addition, resources can traverse different states, which characterized the resource life-cycle, each resource state corresponding to different possible uses of the resource. Finally most resources are timed, i.e. they information they provide make sense only if contextualised with respect to time, and their validity and accuracy is greatly bounded by time.
Temporal projection and deduction based on dynamical and time constraints of the resources can be made and exploited by software agents [Hendler, 2001] in order to make previsions about the availability and the state of a resource, for deciding when consulting the resource itself or in order to deliberately induce a resource state change for reaching some agent goal, such as in the automated planning framework [Fikes & Nilsson, 1971][Bacchus & Kabanza,1998].
Keywords: Temporal Resources, Dynamic Web, evolutionary resources

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EFFECTIVENESS OF TITLE-SEARCH VS. FULL-TEXT SEARCH IN THE WEB

Peretz Shoval and Tsvi Kuflik

Abstract: Search engines sometimes apply the search on the full text of documents or web-pages; but sometimes they can apply the search on selected parts of the documents only, e.g. their titles. Full-text search may consume a lot of computing resources and time. It may be possible to save resources by applying the search on the titles of documents only, assuming that a title of a document provides a concise representation of its content. We tested this assumption using Google search engine. We ran search queries that have been defined by users, distinguishing between two types of queries/users: queries of users who are familiar with the area of the search, and queries of users who are not familiar with the area of the search. We found that searches which use titles provide similar and sometimes even (slightly) better results compared to searches which use the full-text. These results hold for both types of queries/users. Moreover, we found an advantage in title-search when searching in unfamiliar areas because the general terms used in queries in unfamiliar areas match better with general terms which tend to be used in document titles.
Keywords: Indexing, Information retrieval, Precision of search results, Search engines, Title search, Web search.

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EMPIRICAL METHODS FOR DEVELOPMENT AND EXPANDING OF THE BULGARIAN WORDNET

Pavlina Ivanova, George Totkov, and Tatiana Kalcheva

Abstract: Some basic points from the automated creation of a Bulgarian WordNet – an analogue of the Princeton WordNet, are treated. The used computer tools, the received results and their estimation are discussed. A side effect from the proposed approach is the receiving of patterns for the Bulgarian syntactic analyzer.
Keywords: Empirical Methods in NLP, WordNet

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MULTIPLIERLESS DCT ALGORITHM FOR IMAGE COMPRESSION APPLICATIONS

Vassil Dimitrov and Khan Wahid

Abstract: This paper presents a novel error-free (infinite-precision) architecture for the fast implementation of 8x8 2-D Discrete Cosine Transform. The architecture uses a new algebraic integer encoding of a 1-D radix-8 DCT that allows the separable computation of a 2-D 8x8 DCT without any intermediate number representation conversions. This is a considerable improvement on previously introduced algebraic integer encoding techniques to compute both DCT and IDCT which eliminates the requirements to approximate the transformation matrix elements by obtaining their exact representations and hence mapping the transcendental functions without any errors. Apart from the multiplication-free nature, this new mapping scheme fits to this algorithm, eliminating any computational or quantization errors and resulting short-word-length and high-speed-design.
Keywords: DCT, Image Compression, Algebraic Integers, Multiplier-less Architecture

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APPLICATIONS OF NONCLASSICAL LOGIC METHODS FOR PURPOSES OF KNOWLEDGE DISCOVERY AND DATA MINING

Vladimir Jotsov, Vassil Sgurev, and Adil Timofeev

Abstract: Methods for solution of a large class of problems on the base of nonclassical, multiple-valued, and probabilistic logics have been discussed. A theory of knowledge about changing knowledge, of defeasible inference, and network approach to an analogous derivation have been suggested. A method for regularity search, logic-axiomatic and logic-probabilistic methods for learning of terms and pattern recognition in the case of multiple-valued logic have been described and generalized. Defeasible analogical inference and new forms of inference using exclusions are considered. The methods are applicable in a broad range of intelligent systems.

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XML PRESENTATION OF DOCUMENTS USED FOR DATA EXCHANGE IN MANAGEMENT OF GENETIC RESOURCES

Lina Yordanova and Vladimir Dimitrov

Abstract: In the global strategy for preservation genetic resources of farm animals the implementation of information technology is of great importance. In this regards platform independent information tools and approaches for data exchange are needed in order to obtain aggregate values for regions and countries of spreading a separate breed. The current paper presents a XML based solution for data exchange in management genetic resources of farm animals' small populations. There are specific requirements to the exchanged documents that come from the goal of data analysis. Three main types of documents are distinguished and their XML formats are discussed. DTD and XML Schema for each type are suggested. Some examples of XML documents are given also.

Keywords: XML, document's format, data exchange

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XML EDITORS OVERVIEW AND THE CHALLENGE TO BUILD XML-ORIENTED EDITOR FOR MEDIAEVAL MANUSCRIPT DESCRIPTIONS

Pavel Pavlov

Abstract: The paper presents an overview of XML and software tools for its use, with an emphasis on XML editors. Based on the experience of two Bulgarian projects on preparing electronic descriptions of mediaeval manuscripts from the 1990es, we define the following requirements to the editor used for manuscript cataloguing: minimum elements on the screen; arrangement of elements according to the practice in the subject domain; supplying default values whenever this is possible; supplying possible values in combo boxes whenever this is possible; and ease of data entry (in Bulgarian with possibility to enter mediaeval text fragments in Old Cyrillic). These requirements were taken into account for the development of a specialized editor, XEditMan, which is presented in the article. Currently, 200 descriptions of manuscripts are available which were entered and edited using XEditMan. The average time for data entry with the editor is about three times less than the time spent in previously used software tools in Bulgaria.

Keywords: XML, XML editors, mediaeval manuscript cataloguing, XEditMan.

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USING WEB SITES EXTERNAL VIEWS FOR FUZZY CLASSIFICATION

Georgi Furnadzhiev

Abstract: In the paper a fuzzy sets implementation into web sites classification is considered. Web sites external features are addressed and the possibility to use them for the classification is proved. An example with five different categories classification is given.

Keywords: web mining, fuzzy sets, classification

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DIGITAL PRESERVATION AND ACCESS TO CULTURAL AND SCIENTIFIC HERITAGE: PRESENTATION OF THE KT-DIGICULT-BG PROJECT

Milena Dobreva and Nikola Ikonomov

Abstract: The fast development and wide application of digital methods, combined with broadened access to the Internet and falling computing costs, have created intense interest in electronic presentation and access to cultural and scientific heritage resources. Information technologies have offered cultural institutions new opportunities for the presentation of their holdings, which are now made accessible not only to the specialists, but also to the citizens and interested parties worldwide.
The paper presents an overview of the Bulgarian experience in the field of digital preservation and access and on-going work on the project "Knowledge Transfer for the Digitisation of Scientific and Cultural Heritage to Bulgaria" (MTKD-CT-2004-509754) supported by the Marie Curie programme of the FP6 of the EC.
Keywords: digitisation, cultural and scientific heritage.

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THE EXPERIENCE AT TRINITY COLLEGE DUBLIN

Mícheál Mac an Airchinnigh

Abstract: This is a script of a play(ing). A performance once enacted and then reflected upon is herein described.
Keywords: bridging, culture, image, playing, togethering, physicality, picture, re-creation, re-discovery, soul

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THE EXPERIENCE OF THE ARNAMAGNÆAN INSTITUTE, COPENHAGEN

Matthew Driscoll

Abstract: The Arnamagnæan Institute, principally in the form of the present writer, has been involved in a number of projects to do with the digitisation, electronic description and text-encoding of medieval manuscripts. Several of these projects were dealt with in a previous article 'The view from the North: Some Scandinavian digitisation projects', NCD review, 4 (2004), pp. 22-30. This paper looks in some depth at two others, MASTER and CHLT.
The Arnamagnæan Institute is a teaching and research institute within the Faculty of Humanities at the University of Copenhagen. It is named after the Icelandic scholar and antiquarian Árni Magnússon (1663-1730), secretary of the Royal Danish Archives and Professor of Danish Antiquities at the University of Copenhagen, who in the course of his lifetime built up what is arguably the single most important collection of early Scandinavian manuscripts in the world, some 2,500 manuscript items, the earliest dating from the 12th century. The majority of these are from Iceland, but the collection also contains important Norwegian, Danish and Swedish manuscripts, along with approximately 100 manuscripts of continental provenance. In addition to the manuscripts proper, there are collections of original charters and apographa: 776 Norwegian (including Faroese, Shetlandic and Orcadian) charters and 2895 copies, 1571 Danish charters and 1372 copies, and 1345 Icelandic charters and 5942 copies. When he died in 1730, Árni Magnússon bequeathed his collection to the University of Copenhagen. The original collection has subsequently been augmented through individual purchases and gifts and the acquisition of a

number of smaller collections, bringing the total to nearly 3000 manuscript items, which, with the charters and apographa, comprise over half a million pages.

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THE LATEST PRAGUE CONTRIBUTIONS TO WRITTEN CULTURAL HERITAGE PROCESSING

Kiril Ribarov

Abstract: This work presents a software package ACT (Annotated Corpora of Text) for lexical and corpus processing of European written cultural sources (currently used for processing of mediaeval Slavonic manuscripts). I use ACT as a contribution towards a contextual and intelligent heritage Information Technology framework. The software is suitable for capturing characteristics of old written sources including rich language variability on word and sentential level. It is not the word-form, but its understandings/interpretations that become central processing units, which can be assigned morphology distinctions, head-words (including recensional), translation equivalents; these interpretations can be joined in multi-word units or assigned correlation to other sources. The whole annotation process is automated and individual sorting orders and morphology tags structures can easily be defined. ACT incorporates modules for: complex searches on one or more sources, creation of various ready-to-use documents, web text and image access, incorporation of lexical card-files into a corpus, and text-from-card-files reconstruction.
Keywords: annotation, Old-Church Slavonic, lexical processing, cultural heritage

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DIGITISATION PROCESSING AND RECOGNITION OF OLD GREEK MANUSCIPTS (THE *D-SCRIBE* PROJECT)

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Abstract: After many years of scholar study, manuscript collections continue to be an important source of novel information for scholars, concerning both the history of earlier times as well as the development of cultural documentation over the centuries. D-SCRIBE project aims to support and facilitate current and future efforts in manuscript digitization and processing. It strives toward the creation of a comprehensive software product, which can assist the content holders in turning an archive of manuscripts into a digital collection using automated methods. In this paper, we focus on the problem of recognizing early Christian Greek manuscripts. We propose a novel digital image binarization scheme for low quality historical documents allowing further content exploitation in an efficient way. Based on the existence of closed cavity regions in the majority of characters and character ligatures in these scripts, we propose a novel, segmentation-free, fast and efficient technique that assists the recognition procedure by tracing and recognizing the most frequently appearing characters or character ligatures.
Keywords: Handwriting Recognition, Character Recognition, Binarization, Segmentation-free, Feature Extraction, Historical Document Recognition, Old Manuscript Recognition.

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MINERVA – THE MINISTERIAL NETWORK FOR VALORISING ACTIVITIES IN DIGITISATION TOWARDS AN AGREED EUROPEAN PLATFORM FOR DIGITISATION OF CULTURAL AND SCIENTIFIC HERITAGE

Giuliana De Francesco

Abstract. MINERVA is a project funded by the European Commission IST Programme within the 5th Framework Programme. It created a network of EU Ministries and other agencies in charge of cultural policies and programmes, which is open to enlargement to new countries and new sectors of the civil society. The network discusses, correlates and harmonises the activities carried out in the field of digitisation of cultural and scientific heritage, aiming at creating a common European platform made up of agreed recommendations, guidelines, standards. The network acts also to foster collaboration between European Commission and Member States, to ensure awareness of European policies at national level, to exchange good practice, to coordinate national programmes in order to embed in national digitisation activities the technical results achieved by the network. Some main outcomes of the activities are presented.

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DML AND RUSDML – VIRTUAL LIBRARY INITIATIVES FOR COVERING ALL MATHEMATICS ELECTRONICALLY

Bernd Wegner

Abstract: With the rapidly growing activities in electronic publishing ideas came up to install global repositories which deal with three mainstreams in this enterprise: storing the electronic material currently available, pursuing projects to solve the archiving problem for this material with the ambition to preserve the content in readable form for future generations, and to capture the printed literature in digital versions providing good access and search facilities for the readers. Long-term availability of published research articles in mathematics and easy access to them is a strong need for researchers working with mathematics. Hence in this domain some pioneering projects have been established addressing the above mentioned problems.
Keywords: DLM, EMANI, ERAM, RusDML

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MANUSCRIPT DIGITIZATION AND ELECTRONIC PROCESSING OF MANUSCRIPTS IN THE CZECH NATIONAL LIBRARY

Zdeněk Uhlíř

Abstract: The paper informs about the history of manuscript digitisation in the National Library of the Czech Republic as well as about other issues concerning processing of manuscripts. The main consequence of the massive digitisation and record and/or fulltext processing is a paradigm shift leading to the digital history.
Keywords: manuscript digitisation, processing of manuscripts, digital history, paradigm shift.

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INTEGRATED AND PERSONALIZED DIGITAL INFORMATION SERVICES

Yaşar Tonta

Abstract: Digital information services are gradually becoming integrated with other systems and services such as library automation systems, student information services, and electronic learning systems. Users demand seamless access to a multitude of digital information services without leaving their desktop computers. They prefer using systems that recognize them when they log on, acknowledge their rights and privileges, and thus provide personalized information services. This paper summarizes the recent developments concerning integrated and personalized digital information services. It first emphasizes the role of the Internet in providing information services and then goes on to discuss the integration and personalization issues by emphasizing their importance for digital information services.

Keywords: Digital information services, Personalization, Integrated information services, Personalized information services.

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DESIGNING A CULTURAL HERITAGE SECTOR BROKER USING SDBC

Boris Shishkov

Abstract: Among the actual cultural-heritage-related problems is the one of effectively managing and globally distributing digitized cultural (and scientific) information. The only feasible way to realize this goal is via the Internet. Hence, a significant issue to be considered is the adequate design of software applications which to realize brokerage tasks within the global space. However, due to the great complexity of this cultural-heritage-related task (compared to other brokerage tasks successfully realized by software systems), the usage of the existing popular modeling instrumentarium seems inadequate. Hence, in this paper, an approach is presented and it is briefly discussed how the approach could be useful for building cultural heritage sector brokers.

Keywords: SDBC; Software broker; Cultural heritage

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DIGITIZATION PROJECTS CARRIED OUT BY THE MATHEMATICAL INSTITUTE BELGRADE

Zoran Ognjanovič and Žarco Mijajlovič

Abstract: In this paper some current digitization projects carried out by the Mathematical Institute of Serbian Academy of Science and Arts Belgrade and the Faculty of Mathematics Belgrade are described. The projects concern developing of a virtual library of retro-digitized books and an Internet data base and presentation of electronic editions of some leading Serbian journals in science and arts, and the work on the South-Eastern European Digitization Initiative (SEEDI).

Keywords: digitization, cultural heritage, scientific heritage, virtual library, SEEDI

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MALTESE EXPERIENCE WITH DIGITIZING CULTURAL HERITAGE

Charles Farrugia

Abstract. The article gives an account of the various microfilming initiatives taken in Malta during the last thirty years. Various archives have managed to microfilm their holdings under co-operation agreements with international societies, or manuscript libraries. The advent of digital technology is now posing new challenges and opportunities for the archives sector. The idea of a National Memory Project that will try to bridge the different approaches in the preservation of records in the various public, private, and ecclesiastical archives in Malta is discussed. Technical challenges are highlighted, as are the opportunities that arise from collaboration and active participation in international projects such as the European Visual Archives (EVA), and the SEEDI initiative.
Keywords. Archives, Audio-Visual Archives, Cultural Heritage, Digitization, Malta, National Archives of Malta National Memory Project

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PRESENTATIONS OF BULGARIAN INSTITUTIONS

NATIONAL ARCHIVES

Nikolay Markov

Abstract: Digitisation as an opportunity for Bulgarian National Archives to fulfill its functions as a heritage Institution and a government agency according to the new standards.

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THE ROLE OF THE NATIONAL LIBRARY IN PRESERVING NATIONAL WRITTEN HERITAGE

Elissaveta Moussakova and Alexandra Dipchikova

Abstract: The first part presented at the meeting by A. Dipchikova is a brief report of the role of the National library as an institution in collecting, preserving and making accessible the national written heritage. Problems of digitization are examined from the point of view of the existing experience in cataloguing. Special attention is paid to the history and the significance of international standards, the experience in the field of development and maintenance of authority files on national and international level as well as in markup languages. Possibilities of using MARC and XML in the library are discussed. The second part presented here by E. Moussakova is giving an overview of the latest activities of the Library in the sphere of digitisation of the old Slavic manuscripts which are component of the national cultural heritage. It is pointed out that the current work is rather limited within the scope of preparation of metadata than being focused on digital products.
Keywords: National Library, Slavic manuscripts, digitization, preservation

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INSTITUTE FOR BULGARIAN LANGUAGE, BAS

Vassil Rajnov

Abstract. The paper presents the history, structure and ongoing activities of the Institute for Bulgarian Language of Bulgarian Academy of Sciences.
Keywords: Bulgarian language, grammar, vocabulary, lexicology, lexicography, dialectology, etymology, onomastics, general and applied linguistics, corpora, phonetics, speech communication, computer modelling.

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COMPUTER PROCESSING OF MEDIEVAL SLAVIC SOURCES IN THE INSTITUTE OF LITERATURE AT BAS REPERTORIUM PROJECT (1994–2004)

Anissava Miltenova

Abstract: The work on the "Repertorium project" is presented in the paper. At the beginning of Repertorium project we had concentrated on the production of manuscript descriptions based on the promise that one would be able to employ them directly in computer-assisted analysis at some point in the future. Last years had shown that the descriptions were suitable for use in a range of analytical applications, but primarily within a fairly low-level query framework that did not take full advantage of the hierarchical XML structure. The production of electronic manuscript descriptions enabled new and innovative philological perspectives on the data. Not only did it make traditional activities easier and more reliable, but it also created opportunities for radically new philological research.

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THE INVOLVEMENT OF INSTITUTE FOR INFORMATION TECHNOLOGIES IN TEXT PROCESSING

Georgi Glushkov

Abstract: The activities of the Institute of Information Technologies in the area of automatic text processing are outlined. Major problems related to different steps of processing are pointed out together with the shortcomings of the existing solutions.
Keywords: Image Processing, Image Enhancement, Text Segmentation

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FACULTY OF MATHEMATICS AND INFORMATICS, SOFIA UNIVERSITY

Maria Nisheva

Abstract: The Faculty of Mathematics and Informatics (FMI) of Sofia University “St. Kliment Ohridski” is briefly presented as an educational and research institution. The possible contribution of FMI to KT-DigiCULT-BG project is analyzed.
Keywords: computer science, information technologies..

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MULTI-DOMAIN INFORMATION MODEL

Krassimir Markov

Abstract: The Multi-Domain Information Model for organisation of the information bases is presented.
Keywords: Multi Domain Information Model, Information Bases, Knowledge Representation.

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ALGORITHM BIDIMS FOR AUTOMATED SYSTEMATIZATION OF DATA ARRAY. CASE STUDY: REDISCOVERING MENDELEEV'S PERIODIC TABLE OF CHEMICAL ELEMENTS.

Andrey Zagoruiko and Nikolay Zagoruiko

Abstract: The method (algorithm BIDIMS) of multivariate objects display to bidimensional structure in which the sum of differences of objects properties and their nearest neighbors is minimal is being described. The basic regularities on the set of objects at this ordering become evident. Besides, such structures (tables) have high inductive opportunities: many latent properties of objects may be predicted on their coordinates in this table. Opportunities of a method are illustrated on an example of bidimentional ordering of chemical elements. The table received in result practically coincides with the periodic Mendeleev table.
Keywords: bidimensional structure, data mining, ordering, prediction, approximation.

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ADAPTIVE CONTROL AND MULTI-AGENT INTERFACE FOR INFOTELECOMMUNICATION SYSTEMS OF NEW GENERATION

Adil Timofeev

Abstract: Problems for intellectualisation for man-machine interface and methods of self-organization for network control in multi-agent infotelecommunication systems have been discussed. Architecture and principles for construction of network and neural agents for telecommunication systems of new generation have been suggested. Methods for adaptive and multi-agent routing for information flows by requests of external agents-users of global telecommunication systems and computer networks have been described.

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REPRESENTING "RECURSIVE" DEFAULT LOGIC IN MODAL LOGIC

Frank Brown

Abstract: The "recursive" definition of Default Logic is shown to be representable in a monotonic Modal Quantificational Logic whose modal laws are stronger than S5. Specifically, it is proven that a set of sentences of First Order Logic is a fixed-point of the "recursive" fixed-point equation of Default Logic with an initial set of axioms and defaults if and only if the meaning of the fixed-point is logically equivalent to a particular modal functor of the meanings of that initial set of sentences and of the sentences in those defaults. This is important because the modal representation allows the use of powerful automatic deduction systems for Modal Logic and

because unlike the original "recursive" definition of Default Logic, it is easily generalized to the case where quantified variables may be shared across the scope of the components of the defaults.
Keywords: Recursive Definition of Default Logic, Modal Logic, Nonmonotonic Logic.

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ON THE RELATIONSHIPS AMONG QUANTIFIED AUTOEPISTEMIC LOGIC, ITS KERNEL, AND QUANTIFIED REFLECTIVE LOGIC

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Abstract: A Quantified Autoepistemic Logic is axiomatized in a monotonic Modal Quantificational Logic whose modal laws are slightly stronger than S5. This Quantified Autoepistemic Logic obeys all the laws of First Order Logic and its L predicate obeys the laws of S5 Modal Logic in every fixed-point. It is proven that this Logic has a kernel not containing L such that L holds for a sentence if and only if that sentence is in the kernel. This result is important because it shows that L is superfluous thereby allowing the ori ginal equivalence to be simplified by eliminating L from it. It is also shown that the Kernel of Quantified Autoepistemic Logic is a generalization of Quantified Reflective Logic, which coincides with it in the propositional case.
Keywords: Quantified Autoepistemic Logic, Quantified Reflective Logic, Modal Logic, Nonmonotonic Logic.

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METHODS FOR SOLVING NECESSARY EQUIVALENCES

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Abstract: Nonmonotonic Logics such as Autoepistemic Logic, Reflective Logic, and Default Logic, are usually defined in terms of set-theoretic fixed-point equations defined over deductively closed sets of sentences of First Order Logic. Such systems may also be represented as necessary equivalences in a Modal Logic stronger than S5 with the added advantage that such representations may be generalized to allow quantified variables crossing modal scopes resulting in a Quantified Autoepistemic Logic, a Quantified Autoepistemic Kernel, a Quantified Reflective Logic, and a Quantified Default Logic. Quantifiers in all these generalizations obey all the normal laws of logic including both the Barcan formula and its converse. Herein, we address the problem of solving some necessary equivalences containing universal quantifiers over modal scopes. Solutions obtained by these methods are then compared to related results obtained in the literature by Circumscription in Second Order Logic since the disjunction of all the solutions of a necessary equivalence containing just normal defaults in these Quantified Logics, is equivalent to that system.
Keywords: Solving Necessary Equivalences, Modal Logic, Nonmonotonic Logic.

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GENERAL ASPECTS OF CONSTRUCTING AN AUTONOMOUS ADAPTIVE AGENT

Arthur Pchelkin

Abstract: There are a great deal of approaches in artificial intelligence, some of them also coming from biology and neirophysiology. In this paper we are making a review, discussing many of them, and arranging our discussion around the autonomous agent research. We highlight three aspect in our classification: type of abstraction applied for representing agent knowledge, the implementation of hypothesis processing mechanism, allowed degree of freedom in behaviour and self-organizing. Using this classification many approaches in artificial intelligence are evaluated. Then we summarize all discussed ideas and propose a series of general principles for building an autonomous adaptive agent.
Keywords: reinforcement learning, neural networks, functional systems theory, inductive automaton.

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SENSITIVITY AND BIAS WITHIN THE BINARY SIGNAL DETECTION THEORY, BSDT

Petro Gopych

Abstract: Similar to classic Signal Detection Theory (SDT), recent optimal Binary Signal Detection Theory (BSDT) and based on it Neural Network Assembly Memory Model (NNAMM) can successfully reproduce Receiver Operating Characteristic (ROC) curves although BSDT/NNAMM parameters (intensity of cue and neuron threshold) and classic SDT parameters (perception distance and response bias) are essentially different. In present work BSDT/NNAMM optimal likelihood and posterior probabilities are analytically analyzed and used to generate ROCs and modified (posterior) mROCs, optimal overall likelihood and posterior. It is shown that for the description of basic discrimination experiments in psychophysics within the BSDT a 'neural space' can be introduced where sensory stimuli as neural codes are represented and decision processes are defined, the BSDT's isobias curves can simultaneously be interpreted as universal psychometric functions satisfying the Neyman-Pearson objective, the just noticeable difference (jnd) can be defined and interpreted as an atom of experience, and near-neutral values of biases are observers' natural choice. The uniformity or no-priming hypotheses, concerning the 'in-mind' distribution of false-alarm probabilities during ROC or overall probability estimations, is introduced. The BSDT's and classic SDT's sensitivity, bias, their ROC and decision spaces are compared.

Keywords: binary signal detection theory, sensitivity, bias, ROC, mROC, overall likelihood and posterior, neural space, psychometric function, just noticeable difference (jnd), uniformity or no-priming hypotheses.

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ABOUT NEW PATTERN RECOGNITION METHOD FOR THE UNIVERSAL PROGRAM SYSTEM "RECOGNITION"

Alexander Dokukin and Oleg Senko

Abstract: In this work the new pattern recognition method based on the unification of algebraic and statistical approaches is described. The main point of the method is the voting procedure upon the statistically weighted regularities, which are linear separators in two-dimensional projections of feature space. The report contains brief description of the theoretical foundations of the method, description of its software realization and the results of series of experiments proving its usefulness in practical tasks.

Keywords: pattern recognition, statistically weighted regularities, voting procedure.

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ANALYSIS OF SECURITY IN ARCHIVING

Dimitrina Polimirova–Nickolova

Abstract: Some basic types of archiving programs are described in the paper in addition to their advantages and disadvantages with respect to the analysis of security in archiving. Analysis and appraisal are performed on the results obtained during the described experiments.

Keywords: Web Security, Mail Security, Information Security, Archive Programs, Compressed Objects, Methods Of Encryption.

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REALIZATION OF OPEN ADDRESSING HASH TABLE IN THE CHAINED ALLOCATED MEMORY

Valentina Dyankova and Rositza Hristova

Abstract: In this article, we examine a realization of an open addressing hash table in the chained allocated memory, giving us the opportunity to decrease the number of linear probing when a given element has not been inserted in the table
Keywords: open addressing hash table, collision, search for an element, deleting of an element

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EXTENDED EXECUTIVE INFORMATION SYSTEM (EEIS)

Todorka Kovacheva

Abstract: In the following paper a new class of executive information system is suggested. It is based on a selforganization in management and on a module modeling. The system is multifunctional and multidisciplinary. The structure elements of the system and the common features of the modules are discussed.
Keywords: Extended executive information system, evolution management, module modeling, conflict resolution, data warehouse, selforganization, NLP, reality games, agent tree, multiagent system.

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INFORMATION MODELLING OF TWO-DIMENSIONAL OPTICAL PARAMETERS MEASUREMENT

Georgi Stoilov, Nikola Mechkarov, and Peter Sharlandjiev

Abstract: A method for measurement and visualization of the complex transmission coefficient of 2-D micro-objects is proposed. The method is based on calculation of the transmission coefficient from the diffraction pattern and the illumination aperture function for monochromatic light. A phase-stepping method was used for diffracted light phase determination.
Keywords: microscopy, phase-stepping method, interferometry, inverse problem in optics

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SPREAD SPECTRUM WATERMARKING TECHNIQUE FOR INFORMATION SYSTEM SECURING

Todor Todorov

Abstract: In this paper we consider a computer information system and a way to realize the security of the data in it with digital watermarking. A technique for spread spectrum watermarking is presented and its realization with MathLAB 6.5 is shown.
Keywords: Web-based information systems, Spread spectrum watermarking, Images.

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MATHEMATICAL PACKAGES FOR TEACHING AND RESEARCH IN INTERNET – APPLICATION AND INFORMATION SUPPORT

Tsvetanka Kovacheva

Abstract. The paper considers the use and the information support of the most important mathematical Application Packages (AP), such as Maple, Matlab, Mathcad, Mathematica, Statistica and SPSS – mostly used during Calculus tuition in Universities. The main features of the packages and the information support in the sites of the producers are outlined, as well as their capacity for work in Internet, together with educational sites and literature related to them. The most important resources of the TeX system for preparation of mathematical articles and documents are presented.
Keywords: Internet, mathematical Application Packages, mathematical programs, Maple, Matlab, Mathcad, Mathematica, Statistica, SPSS.

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THE B-TERMINAL BUSY PROBABILITY PREDICTION

Stoyan Poryazov

Abstract: In the teletraffic engineering of all the telecommunication networks, parameters characterizing the terminal traffic are used. One of the most important of them is the probability of finding the called (B-terminal) busy. This parameter is studied in some of the first and last papers in Teletraffic Theory. We propose a solution in this topic in the case of (virtual) channel systems, such as PSTN and GSM. We propose a detailed conceptual traffic model and, based on it, an analytical macro-state model of the system in stationary state, with: Bernoulli–Poisson–Pascal input flow; repeated calls; limited number of homogeneous terminals; losses due to abandoned and interrupted dialling, blocked and interrupted switching, not available intent terminal, blocked and abandoned ringing and abandoned conversation. Proposed in this paper approach may help in determination of many network traffic characteristics at session level, in performance evaluation of the next generation mobile networks.
Keywords: terminal teletraffic, call blocking, human behavior, nonlinear system of equations.
AMS Subject Classification: 68N01, 65H10, 94C99, 60K30

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